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Leveraging intersections in management theory and practice

10-11 June 2021

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Full Papers

edited by

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To the reader,

this volume contains the *full papers* of the Sinergie-SIMA 2021 Management Conference, hosted online by the University of Palermo on 10-11 June 2021.

The legitimacy of management scholars in society increasingly rests on their ability to create social and economic value by finding solutions and offering effective and timely guidance to decision makers in firms and institutions. This is especially true in face of the extraordinary economic, societal, health and environmental challenges that firms and governments are currently facing worldwide, also as a consequence of the COVID-19 pandemic.

The purpose of the Conference was to discuss about the enhancement of the intersections between theory and managerial practice, calling attention to the many challenges to which impactful studies about the most challenging aspects firms and managers are tackling today need to provide an answer.

These challenges encompass the bridging of different disciplines, theories, methods, levels of analysis and, in particular, the intersections between theory and practice.

The Conference call for papers gave the opportunity to submit either an *extended abstract* or a *full paper*. Overall, the editorial staff received 114 *extended abstracts* and 52 *full papers*.

For the *extended abstracts*, the evaluation of the submissions was carried out by the Conference Chairs and the Scientific Committee, on the basis of their consistency with the Conference topic and/or with management studies, according to SIMA Thematic Groups. The clarity and (even potential) relevance of the contributions were evaluated, as well.

For the *full papers*, the evaluation followed the peer review process, with a double-blind review performed by two referees - university lecturers, expert about the topic - selected among SIMA and the community of Sinergie members.

In detail, the referees applied the following criteria to evaluate the submissions:

- clarity of the research aims,
- accuracy of the methodological approach,
- consistency of the contents with the Conference topic/tracks and/or with management studies,
- contribution in terms of originality/innovativeness,
- relevance in relation to the Conference topic/tracks and/or with management studies,
- clarity of communication,
- significance of the bibliographical basis.

The *peer review* process resulted in full acceptance, acceptance with revisions or rejection of the submissions. In the case of disagreement among reviewers' evaluations, the decision was taken by the Conference Chairs. Each work was then sent back to the Authors together with the referees' reports to make the revisions suggested by the referees.

The evaluation process ended with the acceptance of 42 *full papers* and 107 *extended abstracts*, which were published in two distinct volumes.

All the *full papers* published in this volume were presented and discussed during the Conference and published online on the web portal of Sinergie journal (www.sijm.it).

While thanking all the Authors, Chairs and participants, we hope that this volume will contribute to advance knowledge about the enhancement of the intersections between theory and managerial practice.

The Conference Chair and Scientific Coordination

Sandro Castaldo, Arabella Mocciano Li Destri, Marta Ugolini, Lara Penco

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The intersection between SMEs' business strategies and crisis phases: a systematic literature review

GIANLUCA PUSCEDDU* LUDOVICA MOI* FRANCESCA CABIDDU[▲]

Abstract

Objectives. *This conceptual paper aims to develop a framework examining the kind of strategies implemented by small and medium-sized enterprises (SMEs) throughout the different stages of unexpected events.*

Methodology: *This paper reports a systematic literature review (SLR) to synthesize how SMEs react in crisis times and illustrate core themes of previous research across the phases of crisis prevention, response, and recovery.*

Findings: *The study develops a circular event framework and illustrates the leading business strategies implemented by SMEs in the different moments of unpredicted circumstances: (1) flexible planning, financial resources equipment, proactiveness, and collaboration, during the crisis prevention phase; (2) cost minimization and cash flow protection, revenue generation - operations and business model pivoting, stakeholders relationships, and dynamic approaches during the crisis response phase; (3) business model re-configuring, and stakeholder and employee relationships re-establishment, in the crisis recovery phase.*

Research limits: *The conceptual nature of this work stimulates further theoretical and empirical studies. Future research should empirically test and validate the proposed framework in specific research settings.*

Practical implications: *This research represents a useful benchmark for managers and practitioners to understand better what strategies could be more suitable according to specific moments during crises.*

Originality of the paper: *This study analyzes the evolution of SMEs' business strategies in time of crisis from a novel perspective, pointing out the prevention, response, and recovery phases' circularity.*

Key words: *Crisis management; disaster; recovery; resilience; Covid-19; SMEs; business strategies*

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1. Introduction

Crisis management defines a systemic procedure, supported by internal and external stakeholders, to identify crisis signs, avoid and plan for possible distress, and recover and learn from the crisis (Mitroff, 1988; Pearson and Mitroff, 1993; Pearson and Clair, 1998).

Scholars have developed two main conceptualizations of crisis: crisis-as-an-event and crisis-as-process. The crisis-as-an-event perspective focuses mainly on investigating the aftermath of a crisis. Conversely, the crisis-as-process perspective focuses on the need to examine crisis-fostering conditions, together with the mechanisms of organizational weakening (Roux-Dufort, 2007). Such a perspective also analyzes the crisis evolution and how organizations react to crisis stages (Williams *et al.*, 2017). Notably, the prominence given to extreme, unexpected or unpredictable events concerning the crisis concept (Fink, 1986; Hermann, 1963; Pearson & Clair, 1998; Quarantelli, 1988) moves over time, highlighting that events defined as unexpected could have been expected (Ford, 2020). For this purpose, recent studies have focused their attention on understanding better how crises arise and the possibilities and threats they offer (Doern *et al.*, 2019).

Over the past decades, academic attention to crisis management has gradually increased (Fallini, 2017) due to recent disasters' volume, nature, and impact (Doern *et al.*, 2019). Today, the Coronavirus pandemic (COVID-19) unexpected outbreak has considerably furthered the salience of this topic. The many lockdowns in economies worldwide have significantly contributed to unprecedented distress "with no documented equivalent in the entrepreneurship literature" (Kuckertz *et al.*, 2020: 2). Notably, the stepback imposed by the lockdown of all non-essential businesses both limited and wholly torn down opportunities for many firms to generate revenue, fundamentally changing the way they do business (Moi and Cabiddu, 2020). These problems are more complicated for small and medium-sized enterprises (SMEs). Indeed, with their limited ability to overcome the involved risks and sustain the costs due to the slowed down business activities, SMEs, are facing the complex problems of the lack of funds and liquidity to implement social-distancing measures and regulations for operating and reopening during this health emergency (Fairlie, 2020).

Despite the relevance of crisis management for SMEs, existing literature primarily targets large firms with less attention on smaller businesses (e.g., Herbane, 2010; Kraus *et al.*, 2013). As a result, how SMEs transform their business strategies during unexpected events remains an exciting and unexplored research topic in business, economics, and management studies, needing a solid theoretical basis (Herbane, 2010; Kraus *et al.*, 2012; Naidoo, 2010).

This paper attempts to fill this gap, answering the following research question: "What are the business strategies adopted by SMEs during the different stages of unexpected events?" We performed a systematic literature review about crises in SMEs' context (Denyer *et al.*, 2008; Tranfield *et al.*, 2003). Following the crisis-as-process perspective, we organize our findings in three main phases: crisis prevention, response, and recovery (Elliott *et al.*, 2005; Hills, 1998; Runyan, 2006; Smith, 1990).

This study contributes to extending prior literature on crisis management by investigating how SMEs may modify business strategies to address crises. It also proposes a framework pointing out the circularity of the crisis prevention, response, and recovery phases, and propositions that categorized the main strategies intersecting with the different moments of unpredicted circumstances. Notably, since all strategic responses are based on previous experience, the same experience can lead to several strategic responses during the crises' various phases. Moreover, each of the strategic responses can affect the others. From a managerial perspective, this work supports managers and practitioners in implementing or redefining their business strategies by suggesting the most suitable strategy according to the different sequences belonging to uncertainty.

2. Methodology

To identify how small businesses react in crisis times, we conducted a systematic literature review (SLR) (Denyer *et al.*, 2008; Tranfield *et al.*, 2003). This is a replicable, scientific and transparent process (Thorpe *et al.*, 2005) that follows specific procedures designed to reduce review biases and errors (Tranfield *et al.*, 2003), thereby improving the quality of the review process and results (Mihalache and Mihalache, 2015). Moreover, it synthesizes and organizes the literature accumulated in a specific field (Wang and Chugh, 2014), giving evidence of the study's validity by replicating exact steps during the review process (Wang and Chugh, 2014).

We performed the SLR by leveraging two databases, i.e., Web of Science (WoS) and Scopus. We searched for the keywords (Crises OR crisis OR disaster* OR recover* OR resilience OR COVID* OR Coronavirus) AND ("small business*" OR "small firm*" OR "small enterprise*" OR "small organization*" OR SME OR SMEs), restricting the research to the business, management, accounting and economics subject areas. We focused the research on papers published between January 2010 - July 2020 to capture the latest developments and trends of the topic (Danese *et al.*, 2018).

The research yielded a total of 1657 articles. After eliminating duplicates, we reduced the articles' list to 1379 titles. We proceeded with the article selection by closely reading the abstracts. We excluded papers that did not investigate business strategy changes in SMEs due to unexpected challenges and those papers that did not have crisis management at their core. Furthermore, we considered non-relevant papers that primarily focused on crises or/and SMEs through an exclusively advanced financial and banking perspective. The "grey literature" (i.e., books, book chapters, conference proceedings, dissertation abstracts, and working papers) was excluded. A total of 89 articles was identified. Few papers were not available in full-text, reducing the sample to 75 articles. Thirty-nine articles were, hence, considered to be suitable for the analysis. Based on hand searching and citation tracking, 14 additional articles were selected. A final sample of 53 papers was obtained (see Appendix 1, 2, 3, 4).

3. Intersecting SMEs' business strategies with crisis phases

To provide a clear picture of how crisis events affect SMEs, we organized the business strategies into intersecting categories. These categories allow synthesizing the literature that addresses this research topic. Ten SMEs strategies were identified across three phases: crisis prevention, response, and recovery (Elliott *et al.*, 2005; Hills, 1998; Smith, 1990) (see Table 1). Crisis prevention investigates the concepts of mitigation and planning (Fink, 1986). Crisis response focuses on how organizations shift their resources to minimize business damages (Hale *et al.*, 2005). Finally, crisis recovery is when organizations "learn" from the crisis (Elliott *et al.*, 2005; Hale *et al.*, 2005; Smith and Sipika, 1993).

Tab. 1: Crisis phases and SMEs' strategies during unexpected events

Phases	SMEs strategies	Issues explored	Sources
Crisis prevention	Flexible planning to be resilient against potential destructive crisis effects	SMEs focus on building a robust business to deal with crises.	Ates and Bititci (2011); Demmer <i>et al.</i> (2011); Gunasekaran <i>et al.</i> (2011); Ha <i>et al.</i> (2020); Herbane (2019); Hong <i>et al.</i> (2012); Moneva-Abadía <i>et al.</i> (2019); Thun <i>et al.</i> (2011); Vargo and Seville (2011)
	Financial resources equipment to mitigate the unexpected risks	SMEs ensure they have adequate resources in their business to safeguard business management and supply chain.	Kraus <i>et al.</i> (2012); Tognazzo <i>et al.</i> (2016)
	Proactiveness to promote and anticipate changes in the demand	SMEs look for opportunities to gain competitiveness from. They pull energy to become more customer-centered and forge a strong client base.	Cassia <i>et al.</i> (2012); Demmer <i>et al.</i> (2011); Gunasekaran <i>et al.</i> (2011); Herbane (2010); Hong <i>et al.</i> (2012); Ismail <i>et al.</i> (2011); Kraus <i>et al.</i> (2012); Le Nguyen and Kock (2011); Naidoo (2010)
	Collaboration to create a sharing and open environment	SMEs find outside help through deep complementary alliances building, thus creating an open business environment.	Ates and Bititci (2011); Branicki <i>et al.</i> (2018); Demmer <i>et al.</i> (2011); Doern (2016); Gunasekaran <i>et al.</i> (2011); Ha <i>et al.</i> (2020)
Crisis Response	Cost minimization strategies and cash flow protection	SMEs focus on their financials. They reflect on which unnecessary spending to pause or cut back to protect cash flow, cover potential absences, and generate liquidity.	Battisti <i>et al.</i> (2013); Bourletidis and Triantafyllopoulos (2014); Doern (2016); Edvardsson and Teitsdóttir (2015); Eggers and Kraus (2011); Giannacourou <i>et al.</i> (2015); Hong <i>et al.</i> (2012); Kottika <i>et al.</i> (2020); Mayr and Lixl (2019); Mendoza <i>et al.</i> (2018); Morrish and Jones (2020); Pal <i>et al.</i> (2012); Parker and Ameen (2018); Shafi <i>et al.</i> (2020); Smallbone <i>et al.</i> (2012); Thorgren and Williams (2020)
	Revenue generation strategies: operations and business model pivoting	SMEs innovate to stay top-of-mind for their existing customers' minds, stimulating demand and renewing supply.	Alberti <i>et al.</i> (2018); Antonoli and Montresor (2021); Barniatzi and Kirchmaier (2014); Battisti <i>et al.</i> (2013); Bourletidis and Triantafyllopoulos (2014); Cioppi <i>et al.</i> (2014); Dias <i>et al.</i> (2020); Doern (2016); Edvardsson and Teitsdóttir (2015); Eggers and Kraus (2011); Giannacourou <i>et al.</i> (2015); Hong <i>et al.</i> (2012); Johansen (2020); Kottika <i>et al.</i> (2020); Lado <i>et al.</i> (2013); Le Nguyen and Kock (2011); Macpherson <i>et al.</i> (2015); Madrid-Guijarro <i>et al.</i> (2013); Mayr and Lixl (2019); Mayr, Mitter, and Aichmayr (2017); Morrish and Jones (2020); Pal <i>et al.</i> (2012); Pal <i>et al.</i> (2014); Pal <i>et al.</i> (2013); Shafi <i>et al.</i> (2020); Smallbone <i>et al.</i> (2012); Thorgren and Williams (2020); Tsilika <i>et al.</i> (2020)
	Stakeholders relationship: what SMEs need others for	SMEs mobilize practical resources, strengthen or build the stakeholders' relationship, and ask for support.	Adekola and Clelland (2020); Cioppi <i>et al.</i> (2014); Dias <i>et al.</i> (2020); Doern (2016); Eggers and Kraus (2011); Giannacourou <i>et al.</i> (2015); Ha <i>et al.</i> (2020); Macpherson <i>et al.</i> (2015); Mayr and Lixl (2019); Mayr <i>et al.</i> (2017); Mendoza <i>et al.</i> (2018); Morrish and Jones (2020); Ogawa and Tanaka (2013); Shafi <i>et al.</i> (2020); Thorgren and Williams (2020); Vargo and Seville (2011)
	Dynamic approaches in small business management	SMEs use learning orientation, ambidexterity, causal, and effectual decision-making logic to ensure minimal disruption overall.	Battisti, Beynon, Pickernell, and Deakins (2019); Dolz, Iborra, and Safón (2019); Iborra, Safón, and Dolz (2019); Laskovaia <i>et al.</i> (2019); Osiyevskyy <i>et al.</i> (2020)
Crisis Recovery	Business model re-configuring: developing an innovation mindset within SMEs	SMEs accept risks and design new business models.	Doern (2016); Ha <i>et al.</i> (2020); Hong, Huang, and Li (2012); Le Nguyen and Kock (2011); Mendoza <i>et al.</i> (2018); Morrish and Jones (2020); Shafi <i>et al.</i> (2020); Thorgren and Williams (2020)
	Re-establishing stakeholder and employee relationships	SMEs re-establish stakeholders' relationships, relying on their support.	Asgary <i>et al.</i> (2012); Doern (2016); Ha <i>et al.</i> (2020); Hong <i>et al.</i> (2012); Mendoza <i>et al.</i> (2018); Morrish and Jones (2020); Shafi <i>et al.</i> (2020); Thorgren and Williams (2020)

Source: our elaboration

3.1 The crisis prevention phase

This first phase investigates crisis prevention strategies adopted by SMEs to prevent unwanted crisis outcomes.

Crisis prevention is about mitigation and planning (Fink, 1986). During this phase, small business leaders - entrepreneurs/business owners, CEOs, and managers - and employees seek to understand how to be best prepared, whether they experienced adversity from an unforeseen situation.

According to previous literature, SMEs should stay focused on: flexible planning to be resilient against potential destructive crisis effects (Herbane, 2019; Moneva-Abadía *et al.*, 2019); financial resources equipment to mitigate the unexpected risks (Kraus *et al.*, 2012; Tognazzo *et al.*, 2016); proactiveness, to promote and anticipate changes in the demand (Cassia *et al.*, 2012; Herbane, 2010); and collaboration, to create a sharing and open environment (Branicki *et al.*, 2018).

Flexible planning to be resilient against potential destructive crisis effects

Small businesses' preparation for the road ahead is as fundamental as their present performance when going through difficult times.

Researchers have shown that SMEs hyper-focus on contingency planning to build a robust business to deal with crises during the prevention phase (Hong *et al.*, 2012). In this regard, various studies show SMEs' necessity to be agile and have plans to promptly prevent unwanted crisis outcomes and respond to changing landscapes immediately (Ates and Bititci, 2011; Gunasekaran *et al.*, 2011; Herbane, 2019).

Creating a flexible organizational structure and developing a "crisis-ready" culture to facilitate resilience are essential in SMEs. In doing this, SMEs develop proactive, long-term strategic, and resilience-planning activities - such as long-track strategic planning records, setting up crisis

management plans, and investing in equipment infrastructures (Vargo and Seville, 2011). Scanning the external environment is necessary to detect warning signs that could prompt an impending crisis (Hong *et al.*, 2012). Furthermore, insurance purchasing becomes a foremost priority for small businesses to protect the company from financial losses, whereas an external event manifests as a crisis within the organization (Ha *et al.*, 2020; Hong *et al.*, 2012).

A fascinating insight into crisis prevention comes from solutions to strengthen the firm's capacity to focus straight on customer needs. Thus, paying attention to socially responsible strategies (e.g., recycling and reducing emissions and waste, saving energy to achieve greater efficiency, introducing alternative energy sources, using, purchasing, or producing organic items) can restore the firm reputation and maintain competitiveness (Moneva-Abadía *et al.*, 2019).

Financial resources equipment to mitigate the unexpected risks

One of the biggest concerns during crises is cash flow. When it comes to SMEs, to walk through uncertain and unpredictable times (Fink, 1986; Hermann, 1963; Quarantelli, 1988), it is necessary to improve business liquidity, ensuring SMEs the adequate resources before and after unexpected situations. This action safeguards business management and the supply chain. Minimizing risky projects is necessary due to their negative interaction effect on SMEs' performance when combined with market turbulence (Kraus *et al.*, 2012). The accumulation of slack - that is, surplus resources - serves to buffer against adversity and favors, then, the pursuit of a sustainable competitive advantage. Therefore, it is essential to help out SMEs through unforeseen events (Tognazzo *et al.*, 2016).

Proactiveness to promote and anticipate changes in the demand

Scholars argue that to contain "economic turmoil" times, SMEs look for incentives to gain competitiveness from; they pull energy to become more customer-centered and forge a strong client base (Cassia *et al.*, 2012; Herbane, 2010; Kraus *et al.*, 2012; Naidoo, 2010).

Implementing an agile approach with operational - improving the current products for existing customers - and strategic capabilities - creating new markets introducing a unique value proposition to reach new customers - significantly enhances the organization's resilience (Ismail *et al.*, 2011).

It is essential for SMEs to critically reflect on the changes in demand and the trends they can anticipate. This behavior can subsequently highlight the need to find radical new pivots as a result - to reposition SMEs' product and service offering. Promoting innovative products or services to existing consumers by looking for new international markets for SMEs' trading activities makes it far easier to evolve positively and grow in the wake of a crisis (Herbane, 2010; Le Nguyen and Kock, 2011).

Collaboration to create a sharing and open environment

Research has established that finding outside help through meaningful complementary alliances building - with loyal customers, suppliers, employees, and competitors - helps create an open business environment (Ates and Bititci, 2011; Branicki *et al.*, 2018; Ha *et al.*, 2020).

Collaboration is an excellent practice for the following unexpected challenges, a resource of resilience, and a critical small business value to limit unforeseen situations' adverse consequences. Turning SMEs networks and creating linkages between teams is crucial. This approach, involving everyone around the organization, sustains both-side knowledge sharing and provides immediate effect expertise in the areas where SMEs lack the required coping skill to resolve the crisis. Creative partnership implementation increases innovation, efficiency, and flexibility in SMEs. Creating an open and transparent culture within the small business of encouraging organizational members to report potential problems and challenges will help develop an organization's anticipation mindset.

Therefore, we propose that:

Proposition 1a (P1a): The adoption of strategies as flexible planning during the crisis prevention stage increases SMEs' ability to mitigate the unwanted crisis outcomes.

Proposition 1b (P1b): The adoption of strategies as financial resources equipment during the crisis prevention stage increases SMEs' ability to mitigate the unwanted crisis outcomes.

Proposition 1c (P1c): The adoption of strategies as proactiveness during the crisis prevention stage increases SMEs' ability to mitigate the unwanted crisis outcomes.

Proposition 1d (P1d): The adoption of strategies as collaboration during the crisis prevention stage increases SMEs' ability to mitigate the unwanted crisis outcomes.

3.2 The response phase

Researchers consider the response phase significant as the decisions taken in this time frame can mitigate the crisis' destructive effects (Elliott *et al.*, 2005).

To navigate small business challenges and fight adversity, SMEs try to be open to change - to upskill themselves and re-invent their business approach. Although it is not always easy for SMEs to go through a crisis, they can rapidly pivot it to a massive opportunity to handle these events in stride by "embracing change" in their ways of performing.

In this phase, a strong focus is given to cost minimization strategies and cash flow protection (Eggers and Kraus, 2011; Smallbone *et al.*, 2012), revenue generation strategies - operations and business model pivoting (Macpherson *et al.*, 2015; Morrish and Jones, 2020), stakeholder relationships (Doern, 2016; Mayr *et al.*, 2017), and dynamic small business management (Battisti *et al.*, 2019; Osiyevskyy *et al.*, 2020).

Cost minimization strategies and cash flow protection

In a crisis response stage, earnings are considerably put at risk (Runyan, 2006), and SMEs are required to have a deep understanding of their financials.

On the one hand, during unpredicted events, financial risks increase (i.e., risk of default, business failure, bankruptcy), and, on the other hand, profit margins tend to decrease. Having adequate resources to navigate small businesses through a crisis, thus, minimizing costs and generating revenues, is indispensable. Numerous studies highlight the importance of clarifying business priorities to identify which spending to pause or cut back to protect cash flow, cover potential absences, and generate liquidity (Battisti *et al.*, 2013; Eggers and Kraus, 2011; Smallbone *et al.*, 2012). A great place to look is given to people - employees' wages and emoluments. These expenses significantly weigh on SMEs' balance sheets. Therefore, in times of uncertainty, they are often reduced or cut down (Battisti *et al.*, 2013; Mayr and Lixl, 2019; Smallbone *et al.*, 2012).

To ensure they can weather the tough times ahead, small business leaders share tough instant decisions that impact people's lives. In doing so, they contribute to maintaining cash in the company, providing a timely defense against challenging events and limiting the crisis' adverse consequences. When revenues decrease, SMEs optimize their workforce by maintaining the most operationally talented employees and laying off a non-productive workforce to ensure business operation efficiency (Hong *et al.*, 2012; Thorgren and Williams, 2020). SMEs transparently communicate with organizational members to make them understand the rationale of the business decision. They update employees on what is happening inside the organization, even though it can be challenging for small business leaders to guarantee future scenarios.

When SMEs expect revenue to rebound soon, flexible furlough schemes (i.e., temporary leave without pay and working hours reduction according to the established law) might be the best option to enable SMEs to control cost reduction (Battisti *et al.*, 2013; Smallbone *et al.*, 2012). Interrupting personnel recruitment in the company and gradually reducing salary are other approaches to managing better small business revenues (Kottika *et al.*, 2020; Thorgren and Williams, 2020).

Small business leaders focus on their core values during unexpected circumstances, allocating financial resources to their most profitable assets. In this direction, seeking to reduce loss-making and risky investments to focus on more profitable ones results in a wise attitude (Mayr and Lixl, 2019), together with proactive risk management strategies, referred to the mediation of both

investments in risk-averting infrastructure and disruption orientation (Parker and Ameen, 2018).

To buffer against adversity and mitigate some of the risks involved, reasonable cash reserves in the company and the availability of government grants are the best funding for SMEs to take advantage of and inject internally financial resources (Doern, 2016; Morrish and Jones, 2020). Indeed, external debt (i.e., bank loans) due to current economic volatility and business financial constraints is highly discouraged since SMEs could hardly pay it back (Smallbone *et al.*, 2012).

Revenue generation strategies: operations and business model pivoting

Revenue generation strategies concern the multiple efforts implemented by SMEs, e.g., to be innovative, stimulate demand, and renew supply to stay on their existing customers' minds and be at the forefront of responding to a crisis, thereby seeking new opportunities in the marketplace.

When SMEs' leaders cough up in managing financial resources more wisely, re-evaluating, or shifting the current business model and the value proposition, thinking outside the box and adapting while remaining anchored to their core values are meaningful methods to achieve business success.

Scholars strongly emphasize repositioning and value proposition flexibility to decrease costs and boost sales (Lado *et al.*, 2013; Macpherson *et al.*, 2015; Mayr and Lixl, 2019; Tsilika *et al.*, 2020).

Flexibility is the hallmark of successful small businesses, leading to a new focus in SME's corrective actions and pivoting (Hampel *et al.*, 2019) - moving away from the organization's current strategy and pursuing a new course direction. This approach aims to create a unique offer for SMEs to drive change proactively - shifting business thinking from surviving to a crisis to thriving. Thus, it is necessary to generate an offer that stands out from others on the market, implying an absolute added value and revenue generation. The market is moving towards SMEs' operations; hence, stay aligned and exploring new revenue streams is critical.

Investing in customers facilitates the building of long-life loyalty and trust. Knowing the clients enhances revenue generation. This implies being passionate about listening to them to understand the specific troubles they face, empathize, and feel the urgency to accommodate their in-depth needs. Being fast and centered around meeting customers' needs (e.g., physiological, safety, love/belonging) is a key ingredient. Quickly pivoting SMEs offering, repositioning, and providing a greater breadth of products or services that are likely to break into the market and stay relevant in the new normal is an excellent method to filling the needs gap (Macpherson *et al.*, 2015; Madrid-Guijarro *et al.*, 2013).

Appropriately strategizing and analyzing what markets SMEs will go into is part of an innovation mindset. New perspectives, habits, and priorities change consumers' buying behavior. When SMEs know their market's nuances, successfully pivoting can lead SMEs into changing periods and attract different customer segments than before. Blue-sky thinking (Wrigley *et al.*, 2016) enables SMEs to design new effective solutions for the market they believe they are coming. Especially when crises unfold, consumers do not need perfect products. Sometimes the right solution is to provide the customer with a small modification to the product they are accustomed to (Bamiatzi and Kirchmaier, 2014). SMEs need to be passionate because the client's outcome is huge. Introducing customized products or services is a way to face the rapid evolution of consumers' behavior (Bamiatzi and Kirchmaier, 2014). To be persuaded to buy, customers need disposable income. Cheaper and inferior products and services can suit those cash-strapped audiences' requirements clamping down on their spending (Bamiatzi and Kirchmaier, 2014).

The literature analysis shows how the investments in innovation related to the value proposition and the production process are closely linked and very often complementary (Bamiatzi and Kirchmaier, 2014). Process innovation is one of SMEs' most defining characteristics, improving the production chain's operational efficiency and quality (Antonioli and Montresor, 2021; Macpherson *et al.*, 2015; Madrid-Guijarro *et al.*, 2013; Morrish and Jones, 2020; Plechero, 2018; Tsilika *et al.*, 2020). It helps SMEs bring money into the business, remain competitive, and meet customer demands.

For some SMEs' operations, outsourcing is an alternative to manage adversity and sustain growth (Edvardsson and Teitsdóttir, 2015; Pal *et al.*, 2012). SMEs hyper-focus on those business activities they are good at, and delegate the most time and high resource allocation tasks.

Outsourcing helps to keep costs under control and increases efficiency.

Once the newly adapted products and services are created, internationalization strategies facilitated by globalization's powerful impact will make the brand known outside national borders, reducing risks when the domestic and international economy changes (Bamiatzi and Kirchmaier, 2014; Battisti *et al.*, 2013; Eggers and Kraus, 2011; Mullaumeri *et al.*, 2015).

Finally, researchers stress how budgeting funds for external marketing communication channels - such as social media, web site, catalogs, and public relations - should be at the forefront of reaching out to SMEs' audience, ensuring on-brand messaging and brand identity (Bamiatzi and Kirchmaier, 2014; Eggers and Kraus, 2011; Lado *et al.*, 2013). In light of the crisis, communicating means making consumers know about organizational values - what the business stands for and what SMEs' employees take pride in, gauging how the business is performing, presenting changed products and services, and provoking customers' response by purchasing.

Stakeholders relationship: what SMEs need others for

During the heightened state of a crisis, SMEs need to mobilize practical resources. Regardless of the slashes in the payment chain, when critical situations wreak havoc on small businesses, it is strictly necessary to strengthen or build the relationship with the stakeholders - for example, suppliers, clients, community, organizational members, other businesses - and ask for support (Doern, 2016; Eggers and Kraus, 2011; Macpherson *et al.*, 2015; Mayr *et al.*, 2017; Morrish and Jones, 2020; Ogawa and Tanaka, 2013). Communication in crises covers a central role: when difficult news needs to be shared, leadership is necessary - ensuring honesty and clarity towards employees and general stakeholders. Thus, extra support, reassuring, and encouraging SMEs' staff (Ha *et al.*, 2020).

SMEs genuinely consult with everyone they think can help and engage in team building. Bilateral expertise, skills, and resource sharing are great fashions to find new strategies and seize business opportunities. SMEs need to be unashamed in seeking help and accept the need for collaboration. Keeping on stakeholder relation is the roadmap that favors establishing an innovative business culture that is amenable to communicating and listening to others, being knowledgeable about what other people know, and implementing what they learned. Furthermore, facing mutual difficulties, cooperation can provide more favorable terms for vendors' and suppliers' agreements renegotiations, thus, ensuring loss minimization (Mayr and Lixl, 2019; Thorgren and Williams, 2020).

Dynamic approaches in small business management

During periods of uncertainty and turbulence in the small business context, another aspect concerns the development of a dynamic and reactive behavior.

Learning orientation (Battisti *et al.*, 2019), defined as "the ability of an organization to create, transfer, and integrate knowledge and modify its behavior to improve performance" (Altinay *et al.*, 2016: 872), helps SMEs sustain their performance. In particular, it encourages businesses to constantly challenge the status quo and strive for constant enhancement, leading to a more versatile and adaptable way of doing things (Altinay *et al.*, 2016).

In improving SMEs behaviors, scholars also identify ambidextrous strategies - leveraging the existing assets, knowledge, and competencies (exploitation) or try to develop the new ones (exploration) (Osievskyy *et al.*, 2020) - as successful elements to best react to tough times and ensure minimal disruption overall.

From a strategic management perspective, to support the competition, scholars highlight continually focusing on causal and effectual decision-making logic approaches (Laskovaia *et al.*, 2019). In particular, while the emergent nature of effectual logic allows businesses to make incremental investments that help them step forward and adapt to changing circumstances, causal decision-making is considered a collection of highly reflective and rational practices that reinforce prediction and strategic planning (Laskovaia *et al.*, 2019).

Accordingly, we propose that:

Proposition 2a (P2a): The adoption of strategies as cost minimization and cash flow protection in the crisis response stage increases SMEs' ability to navigate unforeseen challenges and fight adversity.

Proposition 2b (P2b): The adoption of strategies as revenue generation - operations and business model pivoting increases SMEs' ability to navigate unforeseen challenges and fight adversity.

Proposition 2c (P2c): The adoption of strategies as stakeholders relationship in small business management in the crisis response stage increases SMEs' ability to navigate unforeseen challenges and fight adversity.

Proposition 2d (P2d): The adoption of strategies as dynamic approaches in small business management in the crisis response stage increases SMEs' ability to navigate unforeseen challenges and fight adversity.

3.3 The recovery phase

The third phase focuses on understanding recovery strategies adopted by SMEs in the aftermath of unexpected challenges.

During the post-crisis stage (Smith, 1990), SMEs step back on all the measures they wish they had taken before the unpredicted event, modifying the organization structure and implementing preventive action items for the future (Doern, 2016; Le Nguyen and Kock, 2011).

Turning "learning" (Elliott *et al.*, 2005; Hale *et al.*, 2005; Smith and Sipika, 1993), intended as changing business behaviors (Pauchant and Mitroff, 1992), into innovative actions is essential to go back to the basics. Nevertheless, within SMEs, the learning approach is often limited in a more practical sense (Doern, 2016). One reason is the perceived lack of control and limited ability to change within small businesses (Herbane, 2010).

Elaborating upon previous studies, the areas on which SMEs should stay focused during this crisis containment process can be broken down into business model re-configuring (Morrish and Jones, 2020) and stakeholder and employee relationships re-establishment (Doern, 2016; Hong *et al.*, 2012).

Business model re-configuring: developing an innovation mindset within SMEs

Unlike the theoretical contribution of the crisis prevention and the response phases indicated the importance of minimizing risky projects (Kraus *et al.*, 2012), studies in the recovery phase change course. In this stage, the literature highlights a common trend by SMEs in spotting opportunities to do things differently and being more open about encouraging a taking risk culture (Morrish and Jones, 2020).

The most prominent feature of a crisis is sparking uncertainty, triggering volatility in the marketplace (Fink, 1986; Hermann, 1963; Quarantelli 1988). Investing in resources takes time and energy. Not all SMEs' recovery investments will pay out necessarily. Sitting back and doing nothing when having constraints does not lead to game-changing solutions. Positive adaptation - being active, leveraging everything is at business disposal, generating new resources and strategies, and do it quickly - is more likely to carry small businesses through difficult times and drive the business into the future.

Scholars have shown how SMEs revisit their insurance policies (Doern, 2016; Ha *et al.*, 2020), diversify their product-service offering, develop new business models, and pivot to guide the organization to the other side of their current trouble (Morrish and Jones, 2020).

SMEs' primary objective is to achieve organizational goals - delivering, creating, and capturing value. Although it may seem like a massive undertaking, innovating and experimenting are essential to adapt to new situations and potentially develop unexpected and more effective ways of doing business. In this regard, some SMEs have made fast, agile moves, from repurposing their target market to a complete shift in production lines (Shafi *et al.*, 2020). Moreover, they have tried to invest in side businesses (Morrish and Jones, 2020), although the possibility that the new business

will not go the right way. SMEs' behavior is beyond a classic situation where they would have acted more deliberately. SMEs act in this bold way with the only attempt to recover and get out of the crisis. Thus, to stay in balance: having a payoff that exceeds the expenses.

Several scholars have shown how SMEs review their business model distribution channels to reach out to their target customer segments and deliver their value proposition (Morrish and Jones, 2020). Being strategically agile (Doz and Kosonen, 2008; Weber and Tarba, 2014) is considered by the researchers one of the primary features to develop innovative ideas (Weber and Tarba, 2014) in changing scenarios. When the COVID-19 pandemic unfolded globally, SMEs have been forced to adapt, thus, changing the ways they perform. SMEs cannot afford to wait to innovate. In the new normal, it is vital to keep on learning methods of working that are better suited to changing environments and continuously adapt. When the unexpected event makes the physical location shut down, striving for positive adaptation, taking an active response, and accelerating their problem solving is fundamental for SMEs to ensure business continuity. Enhancing their decision-making boundaries, opportunity seeker SMEs shift relatively quickly from a distribution channel that is no longer direct and physical but virtual and online (Shafi *et al.*, 2020; Thorgren and Williams, 2020). Leveraging technology in the best way possible enables SMEs to rethink how they deliver services. Specifically, this behavior responds to a particular need of the moment - a temporary practice born out of necessity - in a recovery phase that SMEs could maintain in the long term. This action requires adopting a new and robust vision for small businesses. One example is the delivery service offering to customers' homes to rebuild business operations and reopen, considering a new normal situation going on (Shafi *et al.*, 2020; Thorgren and Williams, 2020) where conditions are not yet those of the past. Thus, a crisis can become a catalyst to bolster creativity and resilience, pursuing new business growth successfully.

Difficult situations require new ways of doing things. Nevertheless, there is no need to wait for a thought time to start innovating. Companies understand how essential it is to approach customers humanely and empathically following unplanned and unexpected events. SMEs' aim is to show the product's visibility and communicate closeness to the consumer concerning the situation that is being experienced. Thus, pushing critical messaging takes on an important role.

Re-establishing stakeholder and employee relationships

Designing new business models and adapting them to changing situations involves re-establishing stakeholder (i.e., community, suppliers, customers, and employees) relationships and relying on their support (Doern, 2016; Hong *et al.*, 2012; Morrish and Jones, 2020).

Collaboration is considered an inner strength to supplement deficiencies (i.e., lack of funding) and provides SMEs the extra energy they need to navigate critical occurrences. Drawing upon leadership teams ensures a sense of community where everyone can benefit from the new knowledge. All small businesses' tools and expertise combined with those of the people they do have access to enable fostering new ideas and implementing creative solutions.

After difficult times, the perceived loss of control over future scenarios can lead employees to explore other work opportunities, or business leaders may consider downsizing as a first option to wrest control from the current ambiguous situation. Hiring a capable staff and retaining old employees becomes extremely hard. Nevertheless, SMEs cannot stop investing in the human aspect. In this regard, smart and exciting insights come from recovery plans for rehiring, establishing personnel funds (Ha *et al.*, 2020; Hong *et al.*, 2012), and training personnel in disaster response (Ha *et al.*, 2020).

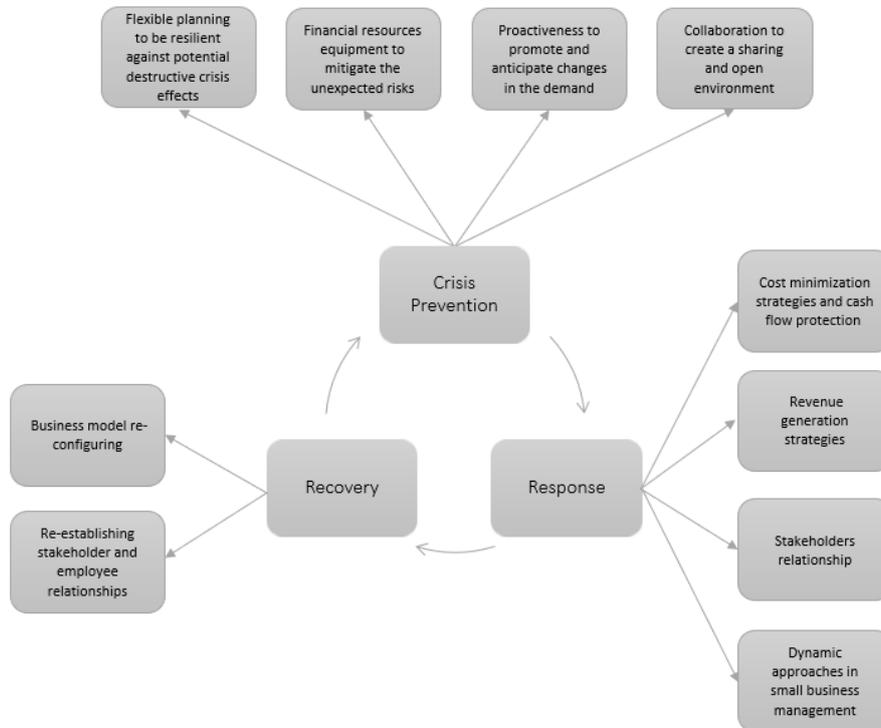
Figure 1 provides a visual summary of our framework, pointing out the circularity and the intersection of the prevention, response, and recovery crisis phases with small business strategies.

Hence, we state that:

Proposition 3a (P3a): The adoption of strategies as business model re-configuring in the crisis recovery phase deepens learning relevance in bouncing back from unexpected challenges and increase the likelihood of breakthrough results.

Proposition 3b (P3b): The adoption of strategies as stakeholder and employee relationships re-establishment in the crisis recovery phase deepens learning relevance in bouncing back from unexpected challenges and increase the likelihood of breakthrough results.

Fig. 1: The circular event framework of SMEs business strategies in a time of crisis



Source: our elaboration

4. Discussion and theoretical contribution

Despite the vast body of knowledge on crisis management, research on this topic is still in its infancy regarding SMEs' context. By elaborating upon prior crisis management literature, this study contributes to extend current research in meaningful ways. First of all, research on small business strategies to face unexpected situations was fragmented across different fields. Previous studies have mainly analyzed specific aspects or outcomes related to facing such a condition of uncertainty (Doern, 2016; Morrish and Jones, 2020). This work contributes to providing a more solid theoretical basis, identifying the features that, collectively and in an integrative manner, define SMEs' strategies across the different stages of a crisis event. Furthermore, we define a framework of strategic responses to a crisis in SMEs' context that better aligns with the proper definition of crisis as an unexpected, ever-changing event (Bazerman and Watkins, 2004; Fink, 1986; Hermann, 1963; Quarantelli, 1988; Weick *et al.*, 1999).

Secondly, we contribute to extending prior literature by developing a three-stage circular event theoretical framework on SMEs' strategies when coping with crises, differentiating such strategies across the phases of crisis prevention, response, and recovery.

Crisis prevention. Previous research on the crisis prevention process has shown that preparing for unforeseen situations is a key to positive results (Elliott *et al.*, 2005; Fink, 1986; Hale *et al.*, 2005; Quarantelli, 1988; Smith, 1990). In particular, the effectiveness of an organization's crisis response depends to a certain degree on the form of preparation it conducted before a crisis (Pearson and Clair, 1998). By extending prior literature, we generate new insights into the link between the prevention phase and strategic behaviors. We specify that, in the crisis prevention

phase, four are the firms' main strategies that could increase SMEs capacity to mitigate and prevent unwanted crisis outcomes: foster ongoing and intensive planning activities to enhance SMEs' flexibility and adaptability to shape destructive crisis effects (Herbane, 2019; Moneva-Abadía *et al.*, 2019), the equipment of financial resources to mitigate the risks involved in a crisis (Kraus *et al.*, 2012; Tognazzo *et al.*, 2016), proactive actions to promoting and anticipating changes in demand (Cassia *et al.*, 2012; Herbane, 2010), and collaboration (Branicki *et al.*, 2018).

Crisis response. Earlier studies defined the crisis response phase as significant since the choices taken in this time frame can minimize the crisis's disruptive effects (Elliott *et al.*, 2005). By improving prior literature, we suggest that, in the crisis response phase, other four different strategies increase the SMEs' ability to navigate unpredicted challenges and fight adversity: cost minimization and cash flow protection (Eggers and Kraus, 2011; Smallbone *et al.*, 2012), revenue generation - operations and business model pivoting (Macpherson *et al.*, 2015; Morrish and Jones, 2020), stakeholders relationships (Doern, 2016; Mayr *et al.*, 2017), and dynamic approaches in small business management (Battisti *et al.*, 2019; Osiyevskyy *et al.*, 2020).

Crisis recovery. Analyzing the post-crisis stage (Smith, 1990), prior scholars argue about "learning" (Elliott *et al.*, 2005; Hale *et al.*, 2005; Smith and Sipika, 1993) in terms of changing business behaviors (Pauchant and Mitroff, 1992) into innovative actions to go back to business as usual. Nevertheless, the learning approach is often limited within SMEs (Doern, 2016) due to their perceived lack of control and limited capacity to change in small businesses (Herbane, 2010). By extending previous studies, we advance that, during the recovery phase, SMEs that concentrate on business model re-configuring - developing an innovation mindset within SMEs - (Morrish and Jones, 2020) and stakeholder and employee relationships re-establishment (Doern, 2016; Hong *et al.*, 2012) foster their recovery from unexpected challenges and the likelihood of breakthrough results.

Our final contribution is related to the circularity of our framework. While previous literature has considered crisis management strategies more sequential than circular (focusing on the event's occurrence rather than on the intersection and effect that each phase has on subsequent ones), this paper contributes to existing literature pointing out the circularity of the crisis prevention, response, and recovery phases. As shown in figure 1, the strategic responses during the different phases of the crisis - prevention, response, and recovery - have separable effects and interact with one another. All the strategic responses develop through prior experience; therefore, the same experience may contribute simultaneously to the different strategic responses during the crisis's different phases. Also, each of the strategic responses may affect one another. During the prevention phase, the strategic responses affect the management response's development by influencing the recovery phase and how managers interpret and utilize it when a new crisis happens.

5. Managerial implications

The present study provides significant managerial insights into efficient SMEs' crisis management strategies. This is a salient topic because of the current challenging times we are experiencing due to the COVID-19 pandemic.

Specifically, this work increases SMEs managers' and practitioners' awareness of efficient business strategies to cope in fast-changing business scenarios where unexpected and adverse events can threaten organizational goals. Practitioners should recognize the benefits **of correctly implementing a crisis-ready culture** to emerge when crises strike.

Notably, a crisis is an evolving circumstance, that is, an event that continuously evolves. Crisis management is an ongoing process to carry out throughout the company's life. Thus, it is fundamental to understand the importance of **continuously** implementing up-to-date strategies to improve SMEs' performance effectiveness and ensure business continuity. **Moreover, our framework could help managers develop a "crisis ready" mindset within SMEs** to emerge in

turbulent, unpredictable, and competitive business landscapes.

Thanks to the proposed framework, we tried to understand not only how SMEs may adjust their strategies in different moments of a crisis (pre, during, and post-crisis), but, more importantly, to understand what strategies could be more suitable according to the cyclic, different, specific moments related to situations of emergency. The findings of this study may provide remarkable and useful insights for managers and practitioners to foster resilience in competitive and turbulent marketplaces, thus, understanding what strategies could be more suitable according to the specific phases of distress (i.e., crisis prevention, response, and recovery) (Elliott *et al.*, 2005; Hills, 1998; Smith, 1990). **Another critical lesson that managers could learn from the insights of this study is that implementing an integrated, strategic crisis-action plan with speed and resourcefulness is fundamental to reducing chaos and accelerating decisions. They have to plan for days ahead of an unexpected event and an extended period of uncertainty.**

6. Limitation and future research

Given the growing necessity to understand SMEs' business strategies during the phases of unexpected events, this study adopted a clear and rigorous literature review approach based on a careful selection of journals to advance current knowledge of this topic. While these study findings rely on a rigorous and reliable systematic literature review to extend knowledge in an up-and-coming research area, we acknowledge that this research has some limitations that may be addressed by future research.

Notably, we focused only on articles that satisfied stringent quality and content criteria (e.g., the use of keyword "SMEs"). Thus we excluded some SMEs-related studies and books (Danese *et al.*, 2018), considering non-relevant papers that primarily focused on crises or/and SMEs through an exclusively advanced financial and banking perspective. We concentrated on peer-reviewed publications and excluded unpublished research, results presented in book chapters, and conference findings (Nolan and Garavan, 2016). Our analysis also suffers from certain common SLR flaws, such as omitted relevant studies that could have impacted the research's creativity and innovation (Easterby-Smith *et al.*, 2010; Wang and Chugh, 2013).

By extending the knowledge in this nascent line of inquiry, future studies could further deepen and explore additional strategies that could be employed for conceptualizing crisis response strategies across the different stages.

Furthermore, future works could extend this research field through empirical studies to examine what happens in a specific sector or setting when companies need to change their business strategies at a given time during a crisis **and test the framework we proposed to validate it effectively. With reference to a financial-level research perspective, future research avenues could focus could investigate the specific aspects related to the turnaround and the impact of financial resources on unexpected risk.**

Finally, starting from the theoretical propositions, future studies could also deepen the impact of the identified strategies across the different moments of a crisis on SMEs' competitive performance.

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Resilient food service entrepreneurs and the Covid-19 pandemic ♦

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Abstract

Objectives. *The paper aims at exploring the impact of entrepreneur's resilience and Covid-19 fear on the performance of food service businesses. As in micro- and small-businesses the individual and the business sides are strictly intertwined, resilience may be investigated using not only the entrepreneurial lens but also the psychological/clinical ones. Indeed, individual fear of the Covid-19 infection can alter the entrepreneur's approach in managing the business.*

Methodology. *The study consisted in administering a structured questionnaire to a sample of food service entrepreneurs (N. 139). Data was processed applying a linear regression analysis.*

Findings. *The work evidences that the fear of getting infected by the Covid-19 virus reduces business performance. However, the resilience capacity nurtured by food service businesses counteracts this negative impact.*

Research limits. *The work is explorative in nature and requires further investigation. The Covid-19 pandemic is still on-the-going while resilience should be studied after an adequate time span. However, it is important to immediately understand the phenomenon - due to its unprecedented effects and the lack of previous knowledge.*

Practical implications. *The food service sector is within the most affected by the Covid-19 pandemic. A deeper knowledge on the effects of the pandemic on business performance can enable small food service entrepreneurs to better rely and highly invest in their resilience capacity to face crises. It gives guidance to policy makers to support this goal.*

Originality of the study. *Business resilience continues to be scantily investigated in extant management literature on small firms. Moreover, studies on entrepreneurs' psychological resilience are concentrated on personality traits rather than concerns, such as individual fear. Thus, exploring the impact of Covid-19 fear to get infected on business performance is novel.*

Key words: *resilience; covid-19 pandemic; micro and small entrepreneur; fear of getting infected; food service.*

♦ Even if the paper is the result of a common effort of the authors, paragraphs 2, 3 and 6 can be attributed to Elisa Martinelli; parr. 4 and 5 to Francesca De Canio; paragraph 1 to Giuseppe Nardin.

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1. Introduction

On March 11, 2020, the World Health Organization (WHO) declared the Coronavirus (COVID-19) to be a pandemic (WHO, 2020).

Governments all over the world - even if with different time span and effectiveness - started to take extreme measures, such as social-distancing, use of Personal Protection Equipment (PPE), travel restrictions, lockdowns (local and national), etc., suddenly affecting economies worldwide. Many sectors and businesses suffered limitations in their operational activity and/or even stops, especially the ones considered not essential and riskier in terms of virus infection. This situation put performance under pressure. Within this context, the potential of entrepreneur's resilience may result in an important capacity to face the pandemic, able to preserve or better support performance. In fact, even the entrepreneur is a person who manages a business for profit and growth in risky conditions (Keith *et al.*, 2016), when a critical event happens his/her ability not only to survive but also to perform in an adequate way may be substantially threaten and put at risk.

Despite the increasing interest showed by extant literature to organisational resilience, "resilience at an individual level has received less attention, especially from the entrepreneur perspective" (Santoro *et al.*, 2020, p. 142). A few are the works specifically related to this topic (Bullough and Renko, 2013; Bullough *et al.*, 2014; Korber and McNaughton, 2018). Furthermore, extant literature acknowledges a role of the characteristics of entrepreneurs, narrowly defined in terms of their skills and education (Gunasekaran *et al.*, 2011), de-emphasising the role of the entrepreneur's individual resilience as well as the underlying positive connection between individual resilience and business success (Fisher *et al.*, 2016). This is especially evident when micro- and small-enterprises are concerned: the entrepreneur's individual capacities and characteristics can have a direct and significant role in the strategic and operational management of the enterprise, especially when critical events are disruptive to business operations. As such, "the capacities of the small firm to 'bounce back' or adapt to disruptions - an aspect of business success - is intimately entangled with the owner-manager's own personal resilience" (Wall and Bellamy, 2019, p. 270). Hence, studies investigating how entrepreneurs face crises are needed (Duchek, 2018), especially today: the pandemic has shown a magnitude, a geographical coverage and a time-length never experienced before, discarding traditional models and previous evidence.

Moreover, although several studies have explored the role of resilience in providing positive outcomes to entrepreneurs (among others: Ayala and Manzano, 2014; Baron and Markman, 2003; Envick, 2005), and some focus on entrepreneurs' psychological resilience, personality traits rather than concerns, such as individual fear, were considered. But the latter can alter the entrepreneur's approach in managing the business and studying resilience concentrating only on the organizational side may generate a partial view of the phenomenon. In particular, the role of fear for their own health, to the best of our knowledge, was not tested in an entrepreneurial context. Korber and McNaughton (2018) called for future contributions on entrepreneurship and resilience able at incorporating research from other fields. As in micro- and small-businesses the individual and the business sides are strictly intertwined, resilience may be investigated using not only the entrepreneurial lens but also the psychological/clinical ones. Indeed, individual fear to get infected by a virus in time of pandemic may alter the entrepreneur's approach in managing the business and, consequently, the relative performance. In this context, this paper aims at studying the impact of the natural biological disaster that is currently affecting our lives and economies - namely: the Covid-19 pandemic - in the food service sector, one of the most affected by the spread of the pandemic. Specifically, this work explores the role of entrepreneur's resilience and Covid-19 fear to get infected on the business performance of food service businesses.

The paper aspires at providing the following contributions. First, our work extends the knowledge on the impact of entrepreneur's resilience on business performance as scantily investigated focus, poorly empirically supported (Bhamra *et al.*, 2011; Linnenluecke, 2017; Martinelli *et al.*, 2018; (Martinelli and Tagliazucchi, 2018, 2019). Second, our study contributes to the literature on micro- and small-enterprises exploring the role of a novel factor such as individual

fear to get infected by a virus at work. Considering that the Italian economic system is mainly composed by small and micro-businesses - particularly in the food service sector - in which the psychological impacts of the potential infection on entrepreneurs might have shattering consequences on business continuity and performance, we selected the food service sector as empirical context of this research. In fact, this is a sector mainly constituted by micro- and small-enterprises and of critical importance for the Italian socio-economic system, both in terms of value added produced and employment, as well as in terms of social interactions and people living habits. Third, resilience to natural disasters has been mainly studied in the aftermath of sudden-onset events (Martinelli *et al.*, 2019), while a few are the works on slow on-set events like the outbreak and spread of the Covid-19 pandemic. The persistence of this crisis, currently still ongoing, and the long-term effects on small businesses are incredibly negative but still uncertain in their magnitude and possible end; as a consequence, empirical studies devoted to understand the impact of the Covid-19 outbreak are needed.

The present work is structured as follow: after having briefly presented the development of the literature on resilience in the business and management field, the hypotheses underpinning the study are depicted. Subsequently, the methodology adopted is described, detailing the impact of the Covid-19 pandemic on the Italian food service sector, the sample features and the measurements employed. The survey results are then presented. A brief discussion of the theoretical, managerial and policy implications of these preliminary findings is offered in the conclusions paragraph, which reports the study limitations and the possible further research avenues.

2. Resilience in the business and management literature

External shocks, crisis of different nature and calamities are more and more recurrent worldwide and their effects may be highly negatively impacting on organizations and businesses (Linnenluecke, 2017). Inappropriate or delayed responses may seriously put the latter in danger (Williams *et al.*, 2017) and preventative strategies and approaches rendering businesses less vulnerable to disruptive events are increasingly needed. Apart from the long tradition of the disaster management discipline - mainly focused on disruptions inside firms and how these organizations could rely on processes and practices to ensure business continuity and avoid interruptions - a surge interest by the academic community is now taken by the resilience concept, its determinants and possible outcomes.

Resilience relates to the ability of an organization to “effectively absorb, develop situation-specific responses, and ultimately engage in transformative activities to capitalize on disruptive surprises that potentially threaten organization survival” (Lengnick-Hall *et al.*, 2011, p. 244). Studies in the field were mainly addressed at understanding the features allowing an organization to effectively overcome adversities and disruptions (Bhamra *et al.*, 2011), identifying some antecedents of resilience: cognitive or contextual enabling capabilities (e.g. Lengnick-Hall and Beck, 2005), slack resources (e.g. Sutcliffe and Vogus, 2003; Gittell *et al.*, 2006) and innovation (e.g. Hamel and Valikangas, 2003).

When contextualized to the field of business and management, resilience appears in its infancy (Linnenluecke, 2017) but in strong development, giving birth to some main branches: resilience determinants (Martinelli *et al.*, 2018, 2019); the adaptability of business models (Sutcliffe and Vogus, 2003; Hamel and Välikangas, 2003) and the design of resilient supply chains (Christopher and Peck, 2004; Pettit *et al.*, 2010; Ponis and Koronis, 2012). Moreover, two different perspectives are featuring the resilience conceptualization: the traditional one - named as the bouncing-back perspective - theorizes resilience as the recovery capacity to return to a pre-existing state, while the more recent view - and the bouncing-forward one (Martinelli and Tagliazucchi, 2019; Martinelli *et al.*, 2019) - which considers resilience as a capability enabling businesses to catch new opportunities (Sutcliffe and Vogus, 2003; Lengnick-Hall *et al.*, 2011; Martinelli *et al.*, 2018) and perform even better than the pre-crisis situation.

Extant literature evidenced that businesses display different level of resilience capacity in relation to the following features:

- the different array of resources and capabilities they possess (Martinelli *et al.*, 2018)
- the sector in which they operate - e.g. industry vs services
- the different size they possess.

Regarding the latter feature, small businesses face many challenges when hit by a critical event as they usually possess scarcer resources compares to bigger companies (Webb *et al.*, 2000), along with poorer managerial capabilities, intuitive and subjective decision-making and less formalized organizational structures (Lieberman-Yaconi *et al.*, 2010; Lussier and Sonfield, 2015). These features can result in serious constrictions when small businesses are hit by unexpected threats (Halkos *et al.*, 2018). However, small businesses can also display some advantages when facing a critical occurrence as “they are more flexible and better able to respond quickly to changing environments. This adaptive capability is crucial to improve resilience to crises such as natural disaster” (Battisti and Deakins, 2012, p. 6).

The resilience construct is relevant in the field of entrepreneurship research for two main reasons. First, resilience can help in understanding why some entrepreneurs and their businesses perform better than their non-resilient peers do. Second, cognitive and behavioral entrepreneurial traits are considered able to boost the business’ ability to adapt to new circumstances. The attributes of the individual entrepreneurs, directly and indirectly, have been shown to impact resilience of small enterprises, in terms of emotional attachment (Branicki *et al.*, 2018), personal characteristics (Battisti and Deakins, 2017), previous experience (Branicki *et al.*, 2018; Muñoz *et al.*, 2018), but also psychological traits. The latter is consistent with the conceptualisation of individual resilience, a construct firstly developed into the psychological and clinical domain and defined as a personal ability to adapt in the face of setbacks and in order to overcome adversities (Connor and Davidson, 2003). Indeed, the effects of a crisis or a disruptive event in micro- and small-enterprises is highly concerned with the psychological impact of the disruptive event upon the entrepreneur (Caliendo *et al.*, 2020; Van Gelder *et al.*, 2007), and related to the personal drawbacks s/he may suffer (Gherhes *et al.*, 2006). Indeed “natural disasters can severely constrain an entrepreneur’s ability to act freely, while also limiting resources. Such constraints can influence certain psychological variables that explain variance in entrepreneurial intentions and behaviour” (Monllor and Murphy, 2017, 622). From this viewpoint, the fear to get infected by a virus can modify the entrepreneur’s approach in managing the business and, consequently, the relative performance. However, extant literature did not consider this effect.

3. Research context and Hypotheses

The objective of the study is to explore the impact of organizational resilience and Covid-19 fear on the performance of food service entrepreneurs. Since resilience is a latent characteristic, this potential capacity can only be grasped and analyzed when it occurs (Linnenluecke, 2017).

The research context is featured by a specific kind of natural disaster, namely a pandemic. Indeed, natural disasters are a large group of extreme events: earthquakes, tsunami, volcanic eruption, floods, and bushfires are categorized as sudden on-set disasters while pandemics, climate changes and pollution are considered as slow-onset disasters (Cutter *et al.*, 2008). While the former cause unexpected damages in a limited time-period, with a definite beginning and end, the latter occur slowly and progressively, impacting in a subtle way (Staupe-Delgado, 2019). The Covid-19 pandemic falls into this latter group as it is a biologic slow-onset disaster particularly threatening as global and uncertain in its time-length, generating unforeseen effects.

Specifically, how organizational resilience impacts on business performance is drawn by leveraging on the concept of "adaptive fit": an organization adapts to the changed conditions of the surrounding environment (Lengnick Hall and Beck, 2005), “re-establish[ing] a strong fit between the firm and a new reality” (Lengnick Hall *et al.*, 2011, p. 244), in order not only to return to a

previous state of equilibrium but even performing better (Martinelli *et al.*, 2018). Consequently, we can postulate the following hypothesis:

HP1: organizational resilience exerts a significant and positive effect on business performance

Businesses in the food service sector tend to be owner-manager entrepreneur centric, and owner-managed (Gherhes *et al.*, 2016). In this kind of businesses, the organizational level and the individual-owner level are closely intertwined and difficult to extricate, posing a number of questions when resilience investigation is concerned. The individual level can prevail, due to the unformalized organizational structure of these small businesses and the key influence of the business owner (Lussier and Sonfield, 2015); this realistic acknowledgement can bring to postulate that business performance might be affected by the negative consequences of the spread of the virus at the individual psychological level. In the context of sudden events or recession times, some authors (e.g. Karman, 2000; Lengnick-Hall *et al.*, 2011; Linnenluecke *et al.*, 2012) showed that individual characteristics, thoughts and perceptions are translated into tangible actions, deeply affecting the response towards the disruptive event or the crisis faced. Indeed, the effects of a crisis or a disruptive event in small businesses is highly related to the psychological impact of the disruptive event upon the business owner (Caliendo *et al.*, 2020; Van Gelder *et al.*, 2007). Indeed “natural disasters can severely constrain an entrepreneur’s ability to act freely, while also limiting resources. Such constraints can influence certain psychological variables that explain variance in entrepreneurial intentions and behavior” (Monllor and Murphy, 2017, p. 622). When considering the specific sector under investigation, previous works proved that restaurateurs tend to attribute their failures to external conditions (Camillo *et al.*, 2008), while a study conducted by Parsa *et al.* (2005) indicated that internal factors are more frequently causes of failure - even if both are clearly important. Psychological reactions, such as anxiety and fear, are fundamental factors impacting individual’s behaviours. One of the central factors which might produce high levels of stress and anxiety during the pandemic is the fear of Covid-19 (Bitan *et al.*, 2020; Taylor *et al.*, 2020). From this viewpoint, the fear to get infected by the virus can negatively impact on the capacity of food service entrepreneurs to develop a good business performance, even if the effect can not only be direct but may be considered as moderating the causal link between organizational resilience and business performance, as the subsequent hypotheses are postulating.

HP2: The Covid-19 fear exerts a significant and negative effect on business performance

HP3: The Covid-19 fear moderates the relationship between organizational resilience and business performance

4. Methodology

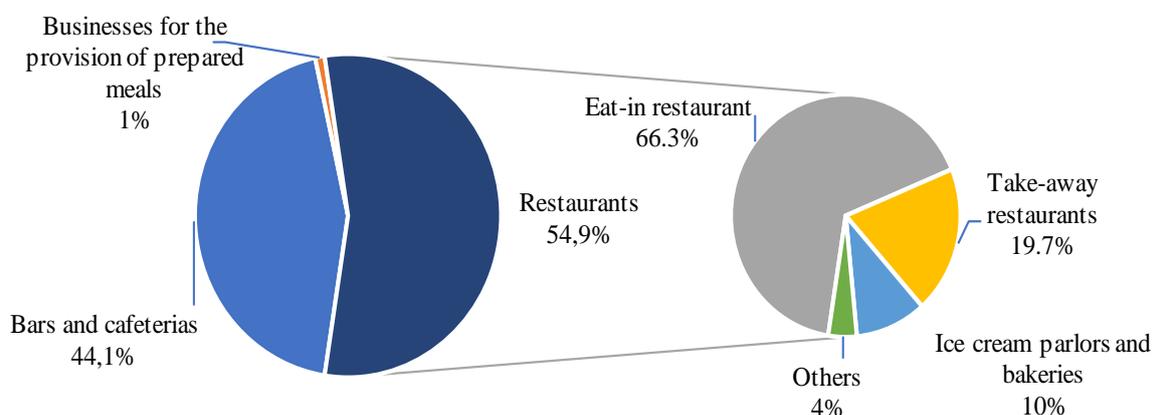
To reach the study aims a survey focused on a sample of small enterprises active during the Covid-19 emergency in the food and beverage service sector was performed.

4.1 The impact of the Covid-19 pandemic on the food service sector

The empirical context selected food service or catering sector, is the larger segment featuring the hospitality industry. Restaurants and cafés lead it, despite several other catering formats are included in the industry. In Italy, in particular, these businesses have an important commercial role aimed at satisfying food and beverage customers’ needs, but also a social and entertaining mission: restaurants and cafés tend to characterize the Italians’ lifestyle. Indeed, a long tradition is connected with bars and restaurants in the country. Bars and restaurants are widely distributed throughout the Italian peninsula: at the end of 2018 in Italy 336,137 enterprises belonging to the branch of food and beverages services were operating, producing a value added of more than €46 billion and

employing 918,105 people. Considering the overall number of businesses forming this sector, 184,587 (54.9%) were restaurants, 148,274 (44.1%) were bars or cafeterias, and the remaining 1% were businesses devoted to the provision of prepared meals, e.g., canteens or banqueting firms (FIPE, 2020a). As reported in Figure 1, the segment of restaurants also encompasses ice cream parlors and bakeries, which account for approximately the 10%, while take-away restaurants reach almost the 20% (FIPE, 2020).

Fig. 1: The food and beverages industry in Italy



Source: FIPE, Federazione Italiana Pubblici Esercizi (2020a)

The most common type of company in the sector is the sole proprietorship, which accounts for approximately 50% of total firms (FIPE, 2020a). Micro businesses dominate the Italian scenario of food and beverages services (Eurostat, 2021).

The sector was in good health and showed positive growth rates before the spread of the pandemic. Starting from the first national lockdown and the suspension of catering services - the 11th March 2020 - the situation changed completely. A survey conducted by Confimprese (2020), relatively to the activity of food service enterprises between March and April (Phase 1) and published in May, revealed that 24% of respondents declared of having lost more than 95% of the revenues in the period, compared to the previous year.

It has been estimated by INAIL that the lockdown measures taken relatively to the food service industry caused serious employment issues. Indeed, they represented the suspension of 1.1 million workers of the total of 1.2 million employed in the whole country. The re-opening of restaurants, bars and other food service enterprises was allowed from May 18th, after over 2 months of closures, in compliance with the provisions and protocols included in DPCM 05/17/20. Nevertheless, the rules concerning social distancing and the displacement of tables and chairs resulted in discouragement for many business owners of the sector. Worrying data were published in mid-May 2020, since Confimprese reported that the majority of the surveyed firms in the food and beverage services (51.43%) was against anticipated reopening, under the conditions and rules imposed; while the remaining portion of surveyed enterprises showed their approval (48.57%) (Confimprese, 2020). In this regard, also a large part of bars' business owners did not agree to re-opening under strict protocols, since the reduced capacity of the local, together with additional costs related with single-use materials and hygienic devices would exceed potential profits and cause further losses. In addition, a survey conducted from June 1st to 14th 2020 highlighted a persistent negative trend (-41% compared to June 2019), despite the resume of the activities in the sector (Pacifico, 2020), showing a constant growth of both home delivery (+15.5%) and takeaway services (+19%), in comparison to the previous year. A continuous assessment of the activity after the restart of operations on May 18th, 2020 has also been conducted by FIPE, by administering surveys to 340 micro-enterprises in the food service and leisure sectors. Indeed, an evaluation of performances of food and beverages service enterprises, during the four weeks after the reopening, showed a very

slow but positive trend of their activities starting from the very beginning of Phase 2. However, a relevant general pessimistic attitude among business owners was detected by FIPE (2020b), since, four weeks after the end of the lockdown, only 51.5% of them was satisfied with the reopening. In addition, after a month from the reopening, the majority of business owners (66.4%) were not optimistic about the possibility of completely come back to their performance's level before Covid-19 (FIPE, 2020b). Other alarming data collected by FIPE (2020b) concerned the number of workers employed after May 18th's reopening. Indeed, on average, the studied enterprises were only using 27.0% of their employees, compared to pre-Covid-19.

During summer, the negative trend in performance has started to slow down, because people have been eating out more frequently from the beginning of July 2020. As regards the food service sector, it registered losses around 50% during the last two weeks of June 2020; while the losses of the sector were around 37% in the first two weeks of July 2020 (Di Palma, 2020). Therefore, signs of a slight and slow recovery have emerged at that time. Despite this signal of recovery, data from FIPE still highlighted concerns for the entire sector, since the majority of enterprises was still suffering consistent losses and was under a great pressure at the beginning of July 2020. Indeed, around 61% of the surveyed business owners was satisfied of the reopening, while a larger portion (68%) still showed serious concerns, by not believing in a full recovery of their activity, up to pre-Covid-19 performance levels. Further data from Osservatorio Confimprese-EY (2020), confirmed a decline of 37.8% on average during the 2020 for the food & beverage industry due to the Covid-19 pandemic in the country.

Starting from October 2020, the situation began to getting worst again and the new restrictions introduced by the government put new limitations and stops to the food service businesses on a regional base. This is the context in which our study took place, as detailed in the subsequent paragraphs.

4.2 Research method

The survey involved a number of small business owners currently running different typologies of enterprises - including bars, restaurants, pizzerias, pubs, cafeterias and others and took place in some selected municipalities of the Modena province, in order to avoid peculiarities and specificities only related to one particular city. A structured questionnaire was administered face-to-face by two trained interviewers in the period between October 15th and November 13th 2020, since the entering of the Emilia-Romagna region in the orange, and then red area, lead to limit the restaurants and cafés activity only to take-away, rendering impossible the data collection.

Before starting to administer the questionnaire, lists of all the enterprises belonging to the food and beverage service sector that were active at the moment of the research in the selected municipalities were prepared through a desk analysis. Subsequently, the questionnaire was tested on a few business owners. The administration of the first questionnaires allowed for the identification of comprehension problems related with some questions and the need to reduce the time required to fill it. As a result, the interviewers came up with another version of the structured questionnaire, by following the suggestions of the first participants and by re-elaborating several questions to make them clearer, in addition to reduce the overall amount of questions. A further test was made by using the second version of the questionnaire. In this second step, other business owners were involved and further problems with the length of the survey were detected, since in the majority of the cases the business owners were working by themselves in their enterprises. Finally, a third and final version of the questionnaire was prepared.

In restaurants, pizzerias and trattorias, the questionnaires were mainly administered before or after their working timetable, respectively between 10:00-11:30 in the morning and 14:00-15:30 in the afternoon; while, in bars and cafeteria they were mainly administered in those moments in which, typically, very few customers hang out in the venue or shortly before their closing time.

4.3 The sample

The sample is composed by 139 food service businesses, including both bars and cafeterias (55.4%) and restaurants, pizzerias and trattorias (44.6%). The location of such enterprises was in the city centre for 24.5% of the units and outside it for the remaining 75.5% (Table 1).

Tab. 1: Typology and location

Variable	Frequency	%	% Cumulative
Typology of food service business	139	100.0	
- Bar/Cafeteria	77	55.4	55.4
- Restaurant/Pizzeria/Trattoria	62	44.6	100.0
Location in the city center	139	100.0	
- No	105	75.5	75.5
- Yes	34	24.5	100.0

Source: our elaboration

The interviewees were mainly business owners (69.1%) or partners (29.5%), males (64.0%), with an average age of 46 years (Table 2). The sample includes people from different generations, since the youngest interviewee is 21, while the oldest is 68. In addition, the majority of participants are high school graduates (50.7%) or junior high school graduates (40.6%), while only few interviewees have a very low educational level - elementary school (1.4%) - or very high ones - bachelor's degree (5.1%) and master's degree (2.2%).

Tab. 2: Interviewees' role and demographic features

Variable	Frequency	Min	Max	Mean	St. Dev.	%	% Cumulative
Role in the enterprise	139					100.0	
- Owner	96					69.1	69.1
- Partner	41					29.5	98.6
- Manager (business rental)	2					1.4	100.0
Sex	139					100.0	
- Male	89					64.0	64.0
- Female	50					36.0	100.0
Birth year	139	1952	1999			100.0	
- [1950-1960]	15					10.8	10.8
- [1961-1970]	41					29.5	40.3
- [1971-1980]	43					30.9	71.2
- [1981-1990]	28					20.1	91.4
- [1991-2000]	12					8.6	100.0
Age	139	21	68	46.33	11.62		
Educational level	138					100.0	
- Elementary school	2					1.4	1.4
- Junior high school	56					40.6	42.0
- High school diploma	70					50.7	92.8
- Bachelor's degree	7					5.1	97.8
- Master's degree	3					2.2	100.0

Source: our elaboration

16 out of 139 interviewees - 11.5% - have more than one enterprise in the sector of interest. Of the above-mentioned 16 entrepreneurs, 14 of them have another business activity (87.5%), while one entrepreneur has two additional businesses (6.3%) and another one has three (6.3%).

Regarding the enterprises' features (Table 3), 72.7% of them were born from the 1997 onwards. The remaining ones have longer histories and have experienced a development through the years (23.0%). A minority of them (4.3%), instead, has more than 44 years and in some cases are family business which lived one, or more, generational passages. As a result, there is a relevant standard deviation (14.19 years) referred to the age of the enterprises in the sample.

Further information collected are related with the dimensions of the venue and the kitchen. This data is helpful to understand the number of customers that can be directly served and seated in the available area.

A large majority of business owners rented the venue of the enterprise they are currently running (86.3%), while only 13.7% of them owns the place.

Tab. 3: Businesses' features

Variable	Frequency	Min	Max	Mean	St. Dev.	%	% Cumulative
Opening year of the enterprise	139	1956	2020			100.0	
- [1956-1976]	6					4.3	4.3
- [1977-1996]	32					23.0	27.3
- [1997-2006]	30					21.6	48.9
- [2007-2017]	40					28.8	77.7
- [2017-2020]	31					22.3	100.0
Age of the enterprise	139	0	64	16.23	14.19		
Area of the venue (sqm.)	135	22	1000	153.17	137.91		
Area of the kitchen (sqm.)	135	/	150	32.56	31.43		
The venue is	139					100.0	
- Owned	19					13.7	13.7
- Rented	120					86.3	100.0

Source: our elaboration

Regarding the observed businesses' dimensions (Table 4), there has been a slight negative variation in the total number of employees (-0.54), in the part-time (-0.08) and occasional ones (-0.27). The reason behind such minor variation may be found in the economic help provided by the government during spring and summer 2020. Indeed, one of the questions inserted in the following section asked whether the enterprise used layoff to guarantee a salary to their employees. From this question emerged that 82 enterprises (59.0%), on the total of 139 investigated, used layoff for their employees. Probably the use of such economic help limited the creation of a gap in employment in this sector between the end of 2019 and Autumn 2020.

As far as sales are concerned, interviewees were asked about 2019 sales and the expected variation registered in revenues, in comparison to 2019. Since only 36 participants over 139 were willing to share their revenues value of 2019, it was not possible to comment on this element. On the other hand, almost the entire sample was able to provide an estimated percentage of variation in revenues that they have suffered in 2020, on average -34.56%. The general tendency in the sector suggests that the large majority of enterprises have experienced a loss during spring and summer 2020 (84.8%); very few firms have registered an increase in their revenues (4.5%), up to October 2020. The reasons behind such increases in revenues, in some cases, have to be found in a business model change, like the introduction of a new type of service - takeaway, home delivery, drive-in - or in the adoption of a new strategy. On the other hand, there are also few firms that did not registered an increase, nor a decrease in revenues (6.3%). In some of the cases, the reason is associated with the degree of diversification of the enterprise, since several participants reported that they did not suffer a loss in their revenues thanks to the presence of tobaccos in their bar. Because of this diversification of the business, they had the obligation to remain opened during the entire Covid-19 emergency, which allowed them to sell tobaccos and scratch cards in large quantities and to compensate the loss suffered because of the suspension of the bar's activity. Finally, few enterprises (4.5%) could not precisely tell whether or not they were suffering a loss or an increase in revenues, compared to 2019, at the moment of the interview, by stating that it would depend on their amount of work or possible new governmental restrictions during Christmas holidays.

Tab. 4: Businesses' dimension and estimated Covid-19 effect on performance

Variable	Freq.	Min	Max	Mean	St. Dev.	$\Delta\%$ mean	%	% Cum.
Staff members at the end of 2019	137							
- Total		1	20	5.44	3.79			
- of which, part-time				1.32	2.30			
- of which, occasional				0.98	2.28			
Staff members at the present day	138							
- Total		1	22	4.90	3.47	-0.54		
- of which, part-time				1.24	2.01	-0.08		
- of which, occasional				0.71	1.79	-0.27		
Revenues in 2019	36	30.000€	900.000€					
Possible revenues' variation at the present day (%)	112	-83%	+20%	-34.56%	19.00		100.0	
- 0% variation	7						6.3	6.3
- Positive variation	5						4.5	10.8
- Negative variation	95						84.8	95.6
- Not sure because it depends on Christmas holidays	5						4.5	100.0

Source: our elaboration

4.4 Measurements

The measurements used to test the postulated hypotheses were evaluated on a 7-point Likert scale (1= strongly disagree; 7= strongly agree).

The organizational resilience construct was measured adopting the scale tested by Kantur and İşeri Say (2015), which first propose a measurement scale focused on resilience capacity, where elements linked to the robustness of the company facing the critical event, its ability to adapt easily and quickly to new environmental conditions and cohesion within the people working in the business are key. As a matter of fact, three are the dimensions constituting organizational resilience: robustness, rapidity and integrity. As can be observed in the table below, the highest mean value reported is for the first robustness' item. This item refers to the constant attempt of business owners to provide continuity to their enterprises and the average result confirms that the totality of respondents is currently pursuing this objective. Moreover, other higher mean values assessed the integrity dimension, evidencing that in this sample of enterprises there is a strong tendency in employees to be committed and pursue a common goal. On the other hand, some of the lower mean values define the rapidity dimension.

Covid-19 Fear was assessed employing a reduced scale validate by Bitan *et al.* (2020) in the psychologic field.

The dependent variable is Business Performance, considered as the ability to generate sales and profitability in comparison with the pre-Covid situation, measured by two items evaluated on a 7-point Likert scale coded from 1 "very decreased" to 7 "very increased".

Tab. 5: Investigated Constructs and related items

	Items	Mean	St. Dev.
Resilience	My organization stands straight and preserves its position.	6.65	0.954
	My organization is successful in generating diverse solutions.	5.59	1.402
	My organization shows resistance to the end in order not to lose.	5.12	1.685
	My organization does not give up and continue its path.	5.98	1.406
	My organization rapidly takes actions.	5.43	1.665
	My organization develops alternatives in order to benefit from negative circumstances.	4.72	1.858
	My organization is agile in taking required actions when needed.	5.71	1.415
	My organization is a place where all employees engaged to do what is required from them.	6.26	1.192
Covid Fear	My organization is successful in acting as a whole with all of its employees.	6.28	1.167
	Fear of being infected by the virus on my part or my collaborators	3.97	2.340
Business Performance	Fear for my customers	4.45	2.090
	Sales evolution in comparison with the pre-Covid-19 situation	2.41	1.310
	Profitability evolution in comparison with the pre-Covid-19 situation	2.43	1.323

Source: our elaboration

In the following table (Tab. 6) the reliability measures (i.e. α -Cronbach) are reported for each investigated construct.

Tab. 6: Reliability measure for each dimension

Constructs	N. item	Average	Dev. St.	α -Cronbach
Resilience	9	49.123	.93735	0.812
Covid Fear	2	44.842	156.808	0.792
Business Performance	2	24.203	124.999	0.898

Source: our elaboration

5. Results

A linear regression was performed employing Business performance as the dependent variable while organizational resilience and Covid-19 fear as independent variables. The model considered not only a direct effect of Covid-19 fear but also an interaction effect between organizational resilience and Covid-19 fear on Business performance.

Results evidence an acceptable model fit (Table 7), considering the target of interviewees composed by small entrepreneurs.

Tab. 7: Linear regression coefficients

Models	Non-standardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta
(Constant)	1.411	.555	
ORGR	.456	.104	.342***
COVIDF	-.275	.062	-.345***
MODERATOR	.005	.092	.004 ^{n.s.}

$R^2 = .202$ ($p < .001$).

*** $p < .001$.

n.s.: Not significant

Source: our elaboration

Findings show that organizational resilience exerts a significant and positive effect on food service entrepreneurs' performance, while the Covid-19 fear exerts a direct, but not moderating, and negative effect on the dependent variable. The work evidences that the fear of getting infected by the Covid-19 virus reduces business performance but the resilience capacity nurtured by food service entrepreneurs is able to counteract this negative effect.

6. Conclusions

The paper has explored the role of resilience and fear of get infected by the Covid-19 virus on micro- and small-enterprise performance. In so doing the paper contributes to extant literature on entrepreneur's resilience confirming its role in enhancing performance even during a slow on-set natural disaster such as the current pandemic. This was not foregone as the latter has shown a magnitude, a global exposure and a time-persistence never experienced before. This work has also highlighted a novel effect when dealing with psychological individual resilience: the entrepreneur's fear of getting infected by the virus directly impacts performance and have to be managed together with the entrepreneur's resilient capacity to face adversities. Consequently, the paper extends previous findings by Caliendo *et al.* (2020) and Monllor and Murphy (2017) focused only on the phycological attitude of the entrepreneur. In case of slow on-set disasters, the fear for their own, employees and customers health play an important negative role and should be included in the possible factors affecting business performance.

From a managerial viewpoint, the food service sector has been severely hit by the Covid-19 pandemic and its businesses evidenced relevant decreases in sales and had to stop or limited their operational activities, putting at serious risk their business continuity. In this context, the study aimed at exploring the role that organizational resilience can display on business performance during the spread of the pandemic, evidencing the important impact that resilient food service businesses might have on their success. In fact, having created a resilient organization, food service entrepreneurs can counteract the psychological side-effect created by the fear to get infected by the virus. As the organizational and individual level in such small businesses tend to overlap, our study contributes to the literature on resilience testing that the fear of the virus does not moderate but exert a direct negative effect on business performance.

A deeper knowledge on the effects of the pandemic on business performance, also considering that the pandemic last longer than other crises, can enable small food service entrepreneurs to better rely and higher invest in their resilience capacity to face crises. The long-stand of a pandemic may represent a moment in which the entrepreneur finds out resilient actions by properly leveraging his/her business resources and capabilities - although limited as in case of small and micro businesses, building on robustness, agility and integrity. This represent a key point for small food service businesses at the light of the increasing number of epidemics and pandemics hitting the food service setting since the beginning of the 21st century. Accordingly, the identification of resilient practices today, may represent a preventive strategy to cope with future and frequent expected crises. At the same time our findings can give guidance to policy makers to support entrepreneurs not only from an economic point of view, but also psychologically. So, together with subsidies, taxes exemptions/suspensions and other economic provisions, policy makers should also organize medical supporting services to strengthen the mental traits of food service entrepreneurs. Similarly to other individuals, entrepreneurs fear to be infected by the virus running their activity. However, to rescue their business they continue to operate. This study shows that a resilient organization is effectively compensating the Covid-19 fear. This aspect is key in service businesses, where there is a high contact between people (e.g. owner/employees and customers).

This is a preliminary study and it is affected by some limits. Firstly, its explorative nature reduces the possibility to generalize results and calls for further investigation. Secondly, the Covid-19 pandemic is still on-the-going while resilience should be studied after an adequate time span from the hit of the disaster. However, it is important to immediately start to understand the phenomenon - due to its unprecedented effects and the lack of previous knowledge - even in the short term, paving the way to next longitudinal studies. Third, no control variables were considered at this stage, while the business age and size can play a role (e.g. Battisti and Deakins, 2017). Fourth, the regression analysis carried out makes it possible to give a first reading of the relationships between the variables, but other methodologies - such as structural equation modeling (SEM), for instance - could provide a more solid and complete understanding of the model effects.

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Michelin-starred chefs' responses to COVID-19 through the lens of the effectuation paradigm

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Abstract

Objectives. *This research aims to investigate how the business models, resources and competences of Italian Haute Cuisine restaurants changed and adapted to face the strong challenges related to the global pandemic coronavirus disease 2019 (COVID-19) crisis.*

Methodology. *The study performs an explorative qualitative analysis focused on the Italian Michelin three-starred chefs. By adopting a mixed method approach, primary data was collected by several semi-structured interviews with industry experts, while secondary data was gathered by a netnography analysis of online industry-related media sources.*

Findings. *Italian Michelin three-starred chefs' responded to the challenges at different level of interventions: organizational, industry, and business ecosystem. At organizational level, three starred chefs focused mainly on their human resources, their business models, and their technological solutions. At industry level, the response strategies were concretely oriented to confirm their leadership position and their activity of coaching. Finally, at ecosystem level, the response strategies have been directed to their customers and their relationships with local suppliers.*

Research limits. *By adopting an explorative analysis and investigating only the Italian context, the findings cannot be generalized to the whole population of three starred restaurants.*

Practical implications. *These insights underline that restaurants have to implement different strategies to sustain their business during crisis period, by exploiting their resources, competences and capabilities, redefining their business models and developing flexible and speedy responses to unpredictable changes.*

Originality of the study. *The main contribution of this study is to explore the adaptation process implemented by Italian three starred chefs during the crisis, by adopting the entrepreneurial effectuation perspective.*

Key words: *three starred chefs, crisis management, COVID-19, haute cuisine, effectuation theory*

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1. Introduction

UNWTO (2020) has acknowledged tourism as one of the hardest hit industries by the COVID-19 pandemic. Among the tourism subsectors, restaurants have suffered the most significant sales and job losses (Gössling *et al.*, 2020). As a result, the entire industry has been called to deeply redesign its operations and strategies (Dube *et al.*, 2020).

By aiming to contribute to a better understanding of the effects of COVID-19 on the restaurant industry, this research gives its support focusing primarily on premium and upscale restaurants - also known as “Haute Cuisine” (HC).

Even if HC chefs are a small part of the overall gastronomy sector (roughly 0.5%), they are considered celebrities (Zopiatis and Melanthiou, 2019). Presenza and Messeni Petruzzelli (2019) highlighted how HC chefs can be seen as innovators and trendsetters, able to continually reinvent their offer to provide guests with unique food and service experiences (Batat and De Kerviler, 2020).

A peculiarity of HC is that there is a synergy between how artistic and managerial elements must coexist. Entrepreneurial vision and managerial capabilities are required from HC chefs to exploit the opportunities and threats that emerge both inside and outside the boundaries of the fine-dining restaurant (Slavich *et al.*, 2014). Their economic and cultural significance is manifested by their value-creation capability through aesthetic and symbolic work (Svejenova *et al.*, 2015). Their success is mainly defined by a restaurant rating system developed through strict guidelines and rules, which are established by critics, journalists, culinary schools’ experts, and above all, convention setters as the Michelin Red Guide, internationally acknowledged as the most thorough (Presenza and Messeni Petruzzelli, 2019).

Previous studies on HC restaurants and chefs investigated several topics such as the exploration of the entrepreneurial activities of chefs and their related business strategies (Abecassis-Moedas *et al.*, 2016), the strategies used to generate revenues (Surlmont *et al.*, 2005), the key dimensions characterizing creative processes (Bouty and Gomez, 2013; Stierand *et al.*, 2014; Abbate *et al.*, 2019), the leadership factors and the chefs’ competencies (Pratten, 2003; Zopiatis, 2010). Other themes refer to the role of culinary innovation (Albors-Garrigós *et al.*, 2018) and the HC’s capacity to develop new rules in the sector (Capdevila *et al.*, 2018).

Despite the increasing popularity of this phenomenon, Jones (2009) argues that the overemphasis on HC is problematic, especially during times of economic downturn. The focus has always been related to looking for drivers to promote ‘success’ (Santana, 2004), while themes related to recovering from a crisis and the development of successful strategies to address a crisis have been less investigated (i.e.: Tse *et al.*, 2006; Israeli, 2007; Alonso-Almeida *et al.*, 2015). More recently, Batat (2020) reviewed this topic looking at the COVID-19 pandemic crisis in the specific context of French Michelin-starred chefs, highlighting “a need for more research on how luxury restaurants adapt to crises and what are the response strategies they deploy to sustain their businesses” (p. 2).

The present paper addresses this call specifically focusing on the Italian Michelin three-starred chefs. The aim is to investigate how the business models, resources and competences of Italian HC restaurants changed and adapted to face the strong challenges related to the global pandemic crisis by implementing concrete response strategies to sustain their businesses. This study employed two main approaches. A Netnography analysis has been conducted to gather data originated in and manifested through the documents produced by the three-starred chefs on the online industry-related media. To ensure the accuracy (i.e., reliability and validity) of the data retrieved, semi-structured interviews with six Italian industry experts have been carried out.

The Italian context was selected because it is recognized worldwide as one of the most important countries of the tradition for HC. Combining all Michelin starred restaurants, in the last available Michelin ranking (Michelin, 2020), Italy is ranked third while Japan maintains the first position and France the second. For Italy, regionally embedded HC has gained significant international recognition in the last decade (Slavich *et al.*, 2014). The dynamic success is due to the chefs’ capability to emphasize local productions and traditions, and for its contemporary chef-oriented

ambition to enhance traditional Italian cuisine through innovation (Leone, 2020). The Italian emergence of HC is also forged on the concepts of 'farm to - table' and 'zero-kilometer restaurant' (Julian, 2015).

The main contribution of this paper is to analyse the response strategies carried out by Italian starred chefs to react to COVID-19 in the context of entrepreneurial effectuation theory (Sarasvathy, 2001). In fact, findings reveal first highlights that will make contributions to the entrepreneurship literature and help determine the value of effectuation to the field of crisis management. By grouping three levels of analysis - namely organizational, industry, and ecosystem- the findings illustrate an entrepreneurial behaviour that tends to be flexible, takes advantage of environmental contingencies as they arise, and looks for understanding the directions of future development.

After this introduction, the paper is organized as follows. Second section discusses the literature related to how restaurants cope with the adverse outcomes generated by a crisis and links it to the entrepreneurial effectuation theory, providing a theoretical framework for the study. The third section introduces and analytically explains the multiple case study approach. Then, section four presents the main findings while the following one proposes the model that explains the Italian three-starred chefs' response strategies system against COVID-19. Finally, the last section wraps up conclusions and outlines both theoretical and managerial implications fronting the unexpected and severe crisis generated by this pandemic.

2. Theoretical background

Pauchant and Mitroff (1992) defined a crisis as "a disruption that physically affects a system as a whole and threatens its basic assumptions, its subjective sense of self, its existential core". In other words, a crisis can be understood as a situation faced by an individual, group or organization which they are weak to cope with by the use of normal routine procedures (Booth, 1993).

Restaurants are called to react to the adverse outcomes generated by a crisis implementing different response strategies to sustain their businesses, possibly even going up to reconsidering their current business practices (Bronner and de Hoog, 2014). This may take place through a range of interventions that span from a slight reconfiguration of their business model to radical ones (Basu and Wadhwa, 2013). They can introduce internally focused actions aimed at adapting to the shifting environmental pressures, or externally focused actions aimed at modifying their environment (Chattopadhyay *et al.*, 2001).

Furthermore, they can pursue a defensive approach or an offensive one. With the former, chefs are focused on reducing operating costs and revenue enhancement plans to generate more cash inflow to the restaurant (Tse *et al.*, 2006). Human resource practices are a further example (Israeli, 2007). They mainly refer to practices aimed at reducing the employee headcount or employee working hours. With the second, they search for product or market opportunities available during the crisis (Tan and See, 2004). Tse *et al.* (2006) stated that in a time of crisis lobbying for government financial support (i.e.: interest-free loans or allow for a suspension of certain fees and charges) becomes a further intervention that restaurants need to achieve. Restaurants may also intervene changing the marketing mix, offering discounts or other forms of promotion to entice potential customers to dine, and improving their social image in order to attract customers by supporting social-related causes (Tse *et al.*, 2006). Marketing and promoting new services (such as catering, events, etc.) is a further action as suggested by Israeli (2007).

Looking at the response strategies that restaurants implement, Alonso-Almeida *et al.* (2015) distinguish between proactive and reactive strategies. Proactive strategies are linked to the implementation of dynamic capabilities that are critical for survival in fluctuating settings (Claver-Cortes *et al.*, 2007). Instead, reactive strategies are rapidly formulated and applied in conjunction with proactive strategies to mitigate problems and stay successful (Zatzick *et al.*, 2009). Alonso-Almeida *et al.* (2015) added further considerations: both proactive and reactive strategies can

produce cost-cutting measures. However, while proactive strategies may support restaurants to develop dynamic capabilities that improve the competitive advantage, reactive strategies can be ineffective and even more dangerous because able to injury or compromise the reputation of restaurants with high-end positioning (Batat, 2020).

Based on the previous description of the literature on crisis response strategies, in entrepreneurship research the theoretical perspective known as effectuation theory appears particularly suitable for examining the response strategies that HC restaurants implement against COVID-19. The reasons are different. Primarily, since effectuation approach particularly well in an unpredictable operating environment or in the face of constant change (Dutta *et al.*, 2015). In this vein, even before Harmeling *et al.* (2004) had already argued that a set of studies used qualitative analyses to examine whether entrepreneurs mobilize effectual principles when they face adverse conditions. Secondly, effectuation better describes the entrepreneurial processes in dynamic, non-linear and resource-scarce environments (Fisher, 2012). In fact, using effectuation logics facilitates the entrepreneur to understand several potential effects and change the goals as new opportunities/threats arise. It follows that effectuation entrepreneurs control the state space, rather than estimating it, by integrating unpredicted contingencies (e.g., environmental turbulence, unpredictability and resource scarcity) and imagined failures in the process of creation (Mäkimurto-Koivumaa and Puhakka, 2013). Thirdly, this approach is considered as a critical logic of action in the contexts with high environmental uncertainty. It follows that undesired circumstances are considered a source of information and feedback for the (re-)design of new business models (Hensel and Visser, 2019).

Effectuation theory assumes that entrepreneurs utilise the resources to meet the demands of the market in a flexible manner (Sarasvathy, 2001). A good example of effectuation is provided by Matalamäki *et al.* (2017, p. 125) telling the metaphor of a chef “using whatever ingredients are in the store cupboard to decide which meal to cook, that is, the outcome relies on the available materials. In an alternative version of this activity, the chef has a recipe (plan) which he/she follows by acquiring the ingredients (resources) and using them to achieve the end result, set as the goal of the activity”.

Effectuation refers to “a particular way of articulating one’s actions, which also considers such things as the context in which these actions take place, the resources one has, the constraints one may face, and the aims, goals, and ends one might pursue given all this” (Grégoire and Cherchem, 2020, p. 622). Looking at the entrepreneurial decision-making process, the aim of ‘effectuators’ becomes to achieve the best possible strategic results from leveraging the available resources and controlling the environmental uncertainty through creating new markets, products, and opportunities (Shirokova, 2020). It treats the control over the external contingencies by focusing on the means available rather than operating on the basis of future, hard-to-predict competitive scenarios (Sarasvathy and Dew, 2005). Effectuation takes a set of means as given and focuses on selecting between possible effects that can be created with that set of means (Harms and Schiele, 2012). Means consist of personal knowledge and skills on an individual level and physical and organisational, as well as human resources, at company level (Barney, 1991). Forming partnerships and nurture the business ecosystem is a further example to expand their resource base and control an uncertain future (Murdock and Varnes, 2018) because effectuation emphasizes the importance of establishing and using strategic alliances and pre-commitments from different stakeholders in order to reduce and/or eliminate uncertainty (Sarasvathy, 2001) and to enlarge the business’ access to resources and thus to provide new means (Welter *et al.*, 2016).

In the following, in order to shed more light on the nexus between crisis recovery strategies and effectuation’s conceptual articulation, the paper examines the change in the practices and in the response strategies assumed by the Italian Michelin three-starred chefs to fight against the crisis generated by the COVID-19 pandemic.

3. Methodology

3.1 Research setting

This study uses HC as a research setting to represent an extraordinary example of a crisis phenomenon (Abecassis-Moedas *et al.*, 2016) for various reasons. Firstly, it exemplifies a relevant sector in the worldwide economy (Albors-Garrigós *et al.*, 2018). Indeed, the increasing creation of dedicated TV channels, the considerable growth of culinary schools, the expansion of ratings, rankings and awards, and the phenomenon of celebrity chefs are creating a multi-billion global industry (Zopiatis and Melanthiou, 2019). Secondly, it can be considered as “a kind of lighthouse in the industry” (Surlemont and Johnson, 2005, p. 578) that creates trends in management, marketing, and supply (de la Lastra *et al.*, 2020), by becoming a point of reference in the innovation processes and quality standards for other restaurants (Cooper *et al.*, 2017). Thus, it has a significant influence on the image of the restaurant industry (Presenza *et al.*, 2019). Thirdly, the HC field has a strong experimental and creative nature by trying to explore and implement innovative solutions derived by traditional methods and novel cooking techniques (De Filippi *et al.*, 2007). Fourthly, HC is a highly competitive context in which the necessity to define and develop strategies to respond to pressuring external conditions is essential to ensure stability and profitability over time. Fifthly, it is a setting in which performance is fundamental, as seen in the external evaluations of restaurants and chefs or an extended number of awards (Abecassis-Moedas *et al.*, 2016).

To narrow the research and make the results more robust and significant, the paper focuses on the Red Michelin Guide because experts consider it the most relevant tastemaker in the HC sector of the restaurant industry (Lane, 2010). The Michelin rating system - that ranges from no star to three stars - is organized around two operating variables, which, in the end, enable the comparison between restaurants: inclusion/exclusion and ranking (Karpik, 2010).

The three-starred chefs are relevant for their extraordinariness. They are the ‘winners’ because they had been most successful in the star system over the last decade, or in some cases, even longer (Surlemont *et al.*, 2005). Following Adler’s theory (1985) and Rosen’s (1981), three-starred chefs can be considered superstars in the field of HC, an excellent example of the ‘winner-take-all’ markets, where “rewards tend to be concentrated in the hands of few top performers, with small differences in talent or effort giving rise to enormous differences in incomes” (Frank and Cook, 1996, p. 24).

3.2 Data collection

The research uses a multiple case study approach because it allows comparing the results of each case with the other cases to reveal similar patterns and, consequently, to confirm emerging concepts (Davis and Eisenhardt, 2011). Different reasons led to this research approach. First, the topic is complex and less investigated, hence calling for the theory-building (Eisenhardt, 1989) combined with the guidelines proposed by Yin (1984) and Klein and Myers (1999). Second, this approach allows for a close correspondence between theory and data (Glaser and Strauss, 1967). Consequently, this study adopts an exploratory, qualitative research design to investigate the phenomenon in detail since no prior empirical research is available.

Data have been collected using two main approaches: netnography and semi-structured interviews with Italian industry experts. The combination of methods, variously labelled as “convergent methodology” (Campbell and Fiske, 1959) or “convergent validation” (Slovic, 1962), gives great support to complement information acquired from the other methods. This methodological approach allows the researchers to gain a more systematic and comprehensive understanding of the findings achieved (Denzin and Lincoln, 2002), offering the opportunity to increase the findings’ trustworthiness.

Netnography analysis. Also referred to as cyberethnography, it is a qualitative method, to gather data using online search engines on webpages and social media channels looking for content related

to the topic being investigated (Tavakoli and Wijesinghe, 2019). It is an interpretive research method that applies non-intrusive observation, which focuses on the context of online textual communication and not on the physical forms of human communication (Kozinets, 2002). It allows gathering data from online searching. It enriches existing theory with new insights from real-world cases comparing different organizations in a search for similarities and differences to finally make a theoretical generalization to the existing body of research concerned with strategies adopted to crises reaction in its prodromal phase.

Table 1 shows the list of the Italian Michelin three-starred restaurants investigated. The second column reports the name of the restaurant while the third column the name of the chef. The other two columns provide the year in which the third star was awarded and the cities where the restaurant operates, respectively. In the first column, an identification code has been created to identify each case. The theoretical saturation was reached (Strauss and Corbin, 1998), having examined multiple sources through the netnography analysis approach.

Tab. 1: List of Italian Michelin three-star restaurants

id	Name of restaurant	Name of chef	Year of award	Location
C_1	Mudec by Enrico Bartolini	Enrico Bartolini	2020	Milano
C_2	Uliassi	Mauro Uliassi	2019	Ancona
C_3	St. Hubertus	Norbert Niederkofler	2018	Bolzano
C_4	Piazza Duomo	Enrico Crippa	2013	Alba, Cuneo
C_5	Reale	Niko Romito	2013	Castel di Sangro, L'Aquila
C_6	Osteria Francescana	Massimo Bottura	2012	Modena
C_7	Da Vittorio	Roberto and Enrico Cerea	2010	Brusaporto, Bergamo
C_8	La Pergola	Heinz Beck	2005	Rome
C_9	Le Calandre	Max Alajmo	2003	Rubano, Padua
C_10	Dal Pescatore	Santini Family	1996	Canneto sull'Oglio, Mantua
C_11	Enoteca Pinchiorri	Annie Féolde	1993	Florence

Source: our elaboration

Comparing Comparing the research aim with with the literature review, authors were able to authors were able to define the search topics used to carry out the Netnography analysis. Three main search topics were used and are:

- COVID-19 and starred chefs.
- Coronavirus and starred chefs.
- Pandemic and starred chefs.

Starting from these topics, each source has been examined looking for chefs' thoughts and their actions to react to the crisis generated by COVID-19.

Table 2 shows the data collected, summarized, and grouped by source, with a detailed explanation. Relevant data was extrapolated primarily from the following sources: Guide Michelin, Gambero Rosso, Identità Golose, TheWorlds50Best.com, StarChef.com. Additionally, data was collected from Italian daily newspapers. Besides, the authors continuously monitored leading Restaurants' Websites, Restaurants associations, specialized HC blogs, webinars as well as personal websites of the three-starred chefs. Furthermore, posts on social media platforms were also checked by subscribing to alerts, specifically from Facebook and YouTube, where chefs communicate by posting their news, views, and pictures.

As for differentiating the data collection strategy and sources, three researchers were independently involved in the retrieval of information regarding the case studies. After a first-round of search, all retrieved information was collected, duplicates were removed, and each researcher independently analysed the remaining documents. All information coming from these sources, collected from March 1 to June 3, 2020, have been labelled with the acronym OS in the findings while the relative sentences have been re-elaborated preserving the main idea.

Tab. 2: Data source identified and analysed from March 1 to June 3, 2020

Groups of secondary data	Sources of evidence		Quantity
Archival records	Specialized magazine articles		28
	Newspapers articles		19
Documentary information and videos	Restaurant's Websites		11
	Youtube videos about	the restaurant	11
		the chef	10
	Facebook	the restaurant	11
		the chef	11

Footnote: each record counts for one unit of analysis. A preliminary check has been done to avoid duplication of information (i.e., the same information published on YouTube has been reposted on social media)

Source: our elaboration

Semi-structured interviews. To ensure the accuracy (i.e., reliability and validity) of the data retrieved, the authors collected supplementary data through key-informant interviews, recognized as an essential data source in marketing and management research (Homburg *et al.*, 2012). Six industry experts have been selected based on their industry knowledge and familiarity with the segment of HC - Michelin starred restaurants. The interviews were conducted during the period from May 18 to June 9, 2020, to provide a holistic view (Eisenhard and Graebner, 2007). All semi-structured interviews were conducted in Italian, using online meeting platforms such as Zoom and Teams. The interviews lasted between 42 minutes to an hour and 32 minutes; they were digitally recorded and transcribed. At the beginning of each interview, the authors introduced and explained the ethics of the study and the research scope; however, they kept a neutral attitude and did not make any presumptions or define the topic. An interview protocol was developed supported by nine open-ended questions. Questions were designed to provide us with a clearer understanding of the themes that emerged from the Netnography analysis. They were mainly focused on the following: ‘*Could you tell us the main implications of the COVID-19 crisis on Italian starred restaurants?*’; ‘*What are the reactions of the starred chefs that you consider the most suitable to face the crisis?*’

Then, a narrative interview method was adopted, which can contain topics from the immediate context, which may produce unanticipated insights (Eriksson and Kovalainen, 2015). This encouraged the interviewees to talk freely and uninterruptedly. When necessary, more detailed questions were posed to enhance the understanding of their thoughts concerning the general organization of starred restaurants and to the specific strategies developed by them during the crisis. This elicited further conversation to develop a detailed description of the case. Table 3 introduces the key-informants, their short bio, and the date and duration of the interview. As for the chefs, in the first column, an identification code has been created to identify each key-informants.

Tab. 3: Key informants' description

id ¹	Key-Informant	Short Bio	Date	Interview's duration h= hour; ' = minutes
KL_1	Roberta Garibaldi	Professor of Tourism at the University of Bergamo, her researches mainly focus on enogastronomic tourism. She is member of the Board of Advisors and certified Ambassador for Italy of the World Food Travel Association, as well as a member of the World Gastronomy Institute and IGCAT - International Institute of Gastronomy, Culture, Art and Tourism.	May 18	'55
KL_2	Chiara Patitucci	Marketing Communication Manager at chef Niko Romito group.	May 19	'42
KL_3	Fulvio Marcello Zendrini	Professor of Food Marketing at the University of Gastronomic Sciences of Pollenzo and the Niko Romito Academy, he is senior Advisor in Marketing and Communication for several preeminent Italian food brands.	May 20	'51

¹ The first letter (K) identifies the role of key-informant; the number identifies the specific case.

KL_4	Antonio Paolini	Economic journalist and food&wine critic, he has been the coordinator of the food guides of the 'Gambero Rosso.' With more than 39 years of experience, he wrote and co-wrote tens of national restaurant and wine guides and various books on food&wine. He is in the management committee of the 'Guida Espresso' and among the coordinators of Vini Buoni.	May 21	1h '18
KL_5	Valeria Raimondi	Professional journalist, she is Managing Editor for the Italian branch of FineDiningLovers.com, an international magazine endorsed by S. Pellegrino and Acqua Panna. Daily updated, the site is dedicated to food & beverage, the culture of taste, and conviviality all around the world.	May 25	1h '32
KL_6	Andrea Grignaffini	Food and wine journalist for the main sector magazines, he teaches food and wine for various university courses. He is the curator of the Wine Guide and vice-curator of the Espresso Group Restaurant Guide.	June 9	1h '24

Source: our elaboration

3.3 Data analysis

The analysis of data followed an inductive and iterative process (Strauss and Corbin, 1998). Specifically, the paper investigated the Italian Michelin three-starred chefs and the several domains in which it was possible to extract examples of response strategies against COVID-19. The authors independently assessed the various data sources to form a comprehensive understanding of the cases. Procedurally, at the beginning all the data have been organized in order to facilitate comparison. This allowed the authors to comprehensively identify the various elements related to response strategies against COVID-19. Next, the authors discussed their interpretation of the data within the context of searching for any similitudes among the chefs' response strategies, hence developing a preliminary understanding of the strategies implemented to manage the crisis caused by the COVID-19 pandemic. Finally, as described by Eisenhardt (1989), a further series of iterations have been conducted to refine the emerging findings and better identify the theoretical foundations of the arguments.

4. Findings

Using the lens of effectuation theory that suggests retrieving means from the individual and company levels as well as from the business ecosystem, findings have been organized and thus analysed distinguishing three levels in which to group the Italian Michelin three-starred chefs' response strategies: organizational level, industry level, and business ecosystem. While at the organization level there are means coming from the individual and the company, the business ecosystem has been split in industry and ecosystem levels to underline the actions developed by the chefs both to their industry and to the society as whole.

The following sub-sections explain the main themes for each level supported by the quotes extracted from the empirical analysis. The three different levels here presented derived by the comparison of the results of empirical analysis with the literature examined. Additionally, this comparison is more useful to highlight the principal themes for each of the three different levels.

Additional illustrative verbatim are listed in table 4 helping to reinforce the understanding of the themes mentioned above.

Tab. 4: Selection of quotes from the empirical analysis

Level	Themes	Chef (C)	Key-informant (KI)	Other sources (OS)	Illustrative verbatim	
Organization	Chef's creative personality	C_7			"During this strange period, I exercise, listen to music and read a lot. I am also working on new dishes. This is an opportunity to cultivate my creativity."	
		C_3			"This obliged stop imposes us a moment of reflection. I used this time to meditate, read, study, experiment."	
	Human resources			OS	Chefs are very focused on guarantee maximum safety for their entire team. The internal organization of the brigade will undergo transformations in order to work in total safety.	
	Technology	C_11			The basic idea of the videos - taken directly inside the chef's home - was to "share with the public how they are locked together in the house, doing what the emergency has taken away from us."	
			KI_3		"Social Media have been a powerful communication channel able to maintain relationships with his international community. This experiment is interesting because it pushes chefs to a different type of language and instruments".	
	Business model				OS	During the lockdown, he closed his three starred restaurant, but left his grocery store ('Ingredienti') open, offering a limited menu for curbside pick-up.
			KI_4		Several three-starred chefs have launched new services that were unthinkable for HC before the Covid-19 crisis. For example, 'Spazio' by C_5, 'Piola' by C_4, 'Franceschetta58' by C_6 implemented the delivery and take-away, which are almost always offered by their sub-brand secondary operations or so-called satellite restaurants, launched over the years by most three-starred chefs.	
		C_5			"A continuous innovation process helps restaurants enhance barriers to imitation. As always, also in this terrible time, I have never stopped investing in research and development for the creation of new business formats. For example, I am about to inaugurate temporary stores for the sale of gastronomic products born in my laboratories."	
					OS	Three-starred chefs have to be considered entrepreneurs, oriented to develop necessary lateral thinking by identifying alternative solutions.
	Industry	Coaching		KI_5		"Three starred restaurants are not just culinary temples of art but also outstanding organizations where the chef plays the pivotal role of influencer."
C_10					"I just feel the duty to share the bitterness of this moment because so many colleagues see in us starred chefs a point of reference, a model, sometimes a source of inspiration."	
Leadership		C_8			"Guidelines for compliance are urgently needed, and so is cash, to stay financially viable. Not in the form of credits and taxes or debt to banks because after three months of accumulated liabilities, it is difficult to imagine getting into further debt."	
					OS	The highest priority for restaurateurs was to receive an action protocol from the Government with clear guidelines on the necessary adjustments to the restarting of the operation. Without such a document, it does not make much sense to invest in making modifications and long-term planning.
Ecosystem	Client		KI_1		"As travel has been stopped and it will restart slowly, HC restaurants will be called to a more local approach - adjusting the accessibility and style of the experience for local gourmants and community."	
		C_5			"To celebrate the twenty years of our cuisine, I developed a special edition of our menu with great classics at a reduced price. This was a special occasion to talk about the research that I have always pursued through my creative work and to thank the numerous clients that follow us and support also in this difficult time."	
	Local suppliers	C_10			"It will be necessary to emphasize the value of what we buy and the people we do commerce with, their sacrifice to produce, transform and offer us raw materials. Develop new roads, much more tiring but more true and purer, also based on the geographical context in which we are."	
		C_4			"Italianness will be more and more important with tributes to the tradition and seasonality of the products."	
	People's well-being				OS	C_2 participated in the project called '#distrattimavicini', (distracted but close together) a live broadcast on Facebook on the page of Aisla, the Italian Association of Amyotrophic Lateral Sclerosis. From his home kitchen in the Marche region countryside, he provides a special cream soup made of cabbage, potatoes, and leek, tasty for all, but specially designed for the needs of people with difficulties in swallowing food and liquids.
					OS	C_4 launched the distribution of hot meals and bread to the city canteens for the homeless.
		C_7			"With my brigade, we have cooked meals for healthcare personnel, patients, and auxiliaries".	
			K_6		"Michelin-starred chefs are deeply involved in several philanthropic activities that target medical and frontline workers as well the community in general with particular attention to helpless people."	

Source: our elaboration

4.1 *The organizational level*

Findings confirmed the creative personality of the three-starred chefs so that the lockdown represented, for most of them, “a period of thinking, reflecting, and creating” (C_5). They had the opportunity to grant themselves time for creative work. At the same time, it emerges how “three-starred chefs are more entrepreneurs than just artists” (KI_6). Findings reveal how also in time of crisis, chefs put much effort on their human resources, technology, and more in general to their business model. Human Resources are essential to three-starred chefs. This value is well expressed by KI_5: “The chef is the star of the restaurant, but he/she would not get anywhere without a close-knit staff, especially in top restaurants. A starred restaurant looks like an orchestra, meaning that the success of the restaurant highly depends on all its components”.

Three-starred chefs manifested a generally clever approach towards innovation and new technologies. In fact, about the agile use of new technologies, useful is the case of C_11: With its ‘Kitchen Quarantine’, the chef has had much resonance to become the recipient of the Webby Special Achievement Award 2020. It is a series of videos in English posted on Instagram focused on the preparation of dishes with his wife and sons.

The role of the business model is fundamental: “This crisis highlighted the power of the business structure that most of the three-starred chefs have been able to create and it represents the first driver that supports the chefs to overcome this particularly difficult situation” (KI_5). The relevance of this topic is reinforced by KI_2: “the continuing search for value through the exploitation of business opportunities allows these chefs to create a sophisticated mix of business formats as well as a complex network of relationships that help them to better react to the COVID-19 crisis because they have a business model highly flexible and agile to be adapted to complexity, uncertainty, and changes”.

4.2 *The industry level*

The restaurant sector has suffered one of the most ferocious blows it has never lived. Nevertheless, three-starred restaurants are “the ones that will recover faster and better. This means that their action has to be voted to support the entire category acting as a coach in a team” (KI_1). KI_1 explains her thought about this point: “Legitimization represents the first main challenge for HC chefs. Legitimization has to be nourished over time. There are several examples that explain also in this pandemic crisis how Michelin-starred chefs are involved in several initiatives to support their sector”. The leadership role also emerges in confront to the Government. During the crisis, the highest priority for restaurateurs was to receive an action protocol from the Government with clear guidelines on the necessary adjustments to the restarting of the operation. Among the possible interventions, they asked “for simplification of government regulations for the restaurant management, much more now that they have to guaranty customer satisfaction and profitability of the business” (KI_6).

4.3 *The ecosystem level*

This section begins by describing the role three-starred chefs feel they have in the ecosystem they live in which relationships with stakeholders have a greater significance. The most evident is related to their relationship with the client. This means a new audience and clientele, as KI_5 stated: “New and different clients compared to the traditional ones. Even if international clients return, in the beginning, HC restaurants will have more national clients”.

COVID-19 has accelerated the process of glocalization, and C_5 well highlights this: “this season has brought to fore how important is to work with our local suppliers”. A further concept that emerged from the different sources analysed is the people’s well-being. In this regard, C_5 explained: “for the reopening, we must all work with a common purpose and have as a priority the well-being of the people, respect for nature, the interpretation of our work as a message of pleasure,

and physical and moral health". This concept is corroborated by others such as KI_5, who stated: "the choices HC chefs make in their restaurants will decide the future of the food system and will, therefore, be passed on to everyone". It follows that three-starred chefs worked to embrace socially responsible values or using the words of C_6, "we have started a humanistic culinary revolution that involves the entire social life."

5. Discussion

This paper investigated the reaction of the Italian three-starred chefs to the challenges generated by the COVID-19 pandemic crisis in its prodromal phase. With regards to our sample, it arises how in a turbulent and unpredictable operating environment, such professionals tend to react to the crisis reorganizing the available resources and employing new ones to the point of reinventing their entire business model. It appears to be in line with effectuation theory (Sarasvathy, 2001) when states that entrepreneurs following the effectuation approach use their currently available resources (means) and take action based on potential outcomes of the allocation of these means, allowing for a more flexible approach.

Starting from this highpoint, our findings revealed how the Michelin starred chefs have developed a complex system able to actively induce, support and manage the creative activities leading to a continuous flow of valuable ideas that can be turned into innovations (Presenza *et al.*, 2018). Highlights have remarked how R&D initiatives are fundamental for three-starred chefs also in time of crisis. For example, findings revealed how chefs have made great use of technologies, not only to improve labour efficiency, but also to provide safety culinary experiences. Similarly, opportunities also emerged in favour of ghost or virtual kitchen capability. Delivery and take-away asked them for reinventing themselves as logistics operations, using software to organise their work (i.e. track orders on different delivery platforms) or experimenting with containers and menu items designed to travel. Thus, findings are in line with Vargas-Sanchez and López-Guzman (2015, p. 32) that state "starred chefs are professionals who are accustomed to taking risks deriving from hybridisation, that is, from the combination of different elements of knowledge to create something different".

The creative playgrounds on which HC chefs can create culinary innovations require them to be able to manage the development of their business model over time (Svejenova *et al.*, 2010) and so "to adapt and evolve if they want to be successful in the short- and long-term" (Ottenbacher and Harrington, 2007, p. 3). It follows that HC chefs are continually challenged to implement their business model to discover and introduce innovative culinary concepts and techniques. Findings reinforced this idea and emphasized how chef's entrepreneurial mind-set allows him/her to be able to make complex real-time decisions in problematic scenarios. Chefs need to master the artistic and creative skills and must have a strategic entrepreneurial vision. Besides, they need strong business judgment and appropriate managerial capabilities to face unpredictable external events.

Specifically, the chefs' resilience might positively contribute to successfully deal with the crisis focusing on the "capacity to enhance flexibility, improvisation, and endurance" (Boin *et al.*, 2010, p. 11). The COVID-19 pandemic did not stop the artistic role of those chefs. The analysis highlighted how creativity is a specific element intrinsic to the Italian three-starred chefs' DNA. It emerges how the chefs' creativity can help to ensure that their businesses remain viable in the face of adversity, stimulating several changes and discovering new opportunities (Martinelli *et al.*, 2018), and creating value in dealing with the consequences produced by the crisis (Kaufman *et al.*, 2020). Therefore, creativity represents a pivotal gear for chefs not just in stability's periods but also in turbulent ones. Finally, the research allowed displaying the increasing social involvement of those chefs. Several three-starred chefs demonstrated to be actively involved in special social projects, such as donations and offering of free gastronomic meals for both vulnerable populations and health professionals. These philanthropic activities targeting the well-being of the community explain their role as social actors as already expressed by Batat (2020) that underlines the role of

Michelin-starred chefs as social entrepreneurs. It refers to explore and find new products/services, new ways to meet social needs which are not satisfactorily met by the market or the public sector, or tackling societal challenges, empowering people, and creating new social relationships and models of collaboration. These are considered an important opportunity to connect with citizens and stimulate a better quality of life (Altuna *et al.*, 2015). It is gained through various resources and capabilities such as reputation, expertise, credibility, history, networking (Batat, 2020) and been supported by a sense of authority, accessibility, and the possession of specialized knowledge and skills (Giousmpasoglou *et al.*, 2020). In this vein, they appear as skilled coaches being source of inspiration through the deep influence on the gastronomic system (Zopiatis and Melanthiou, 2019). Along the same line, findings have identified a further role - that of Ambassadoring. Findings indicate that ambassadoring activities are central for promoting the gastronomy industry as a whole. In particular, they are vital in handling the interface between this sector and the government, emphasizing the political power of Michelin-starred chefs (Batat, 2020).

To sum up, findings highlighted how the COVID-19 pandemic crisis pushed HC chefs to extend their action beyond technical and economic dimensions to include a larger set of issues, such as societal engagement and sector support. It results in line with Kotlar *et al.* (2018) that call for implementing wide-ranging strategies able to chase a multi-dimensional notion of firm.

6. Conclusions

This paper explored the response strategies system against COVID-19 and analysed it for the three-starred chefs using Italy as the specific context. It provides empirical evidence of the complex mix of response strategies three-starred chefs have been able to put in place in time of crisis. Organized in three levels of interventions (organization, industry, and ecosystem), strategies highlight how these chefs possess dynamic capabilities that are specific to the luxury gastronomy sector confirming the research of Batat (2020). In fact, they manifested several examples that explicit their ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments. This leads to several theoretical contributions aligned with the entrepreneurial effectuation theory. This theory calls for a shift away from managing for a relatively predictable future towards developing flexible and speedy responses to unpredictable, non-linear change (Farazmand, 2017). Three-starred chefs work selecting alternatives in the constantly search for balancing internal resources and capabilities with the opportunities coming from the external environment. All of that emphasizes how effectuation theory represents a further contribution to the debate on crisis management. Other approaches such as disaster management state that “entrepreneurs have to base their action on investments in systems, databases and network structures need to be made to develop a culture of learning from prior knowledge and also from current best practices” (Oktari *et al.*, 2020, p. 2). By contrast, effectuation theorizes a framework of decision making in uncertain situations (Jiang and Ruling, 2019) that counteracts with the more traditional causation approach where processes take a particular effect as given and focus on selecting between resources to create that effect (Sarasvathy, 2001).

Results have two main implications for future theorizing and research. The first is in line with the effectuation theory because Italian three-starred chefs demonstrated to follow an effectual logic so that they rely on their available means (creativity, knowledge, resources, networks) to exploit and take advantage of opportunities as they are recognized or created (Chandler *et al.*, 2011). Second, findings tell that three-starred chefs unheeded the affordable loss principle that together with flexibility and experimentation represent the bases of the effectuation approach. In fact, during the COVID-19 pandemic, they frequently placed the needs of the people and the community before theirs. It is in line with Batat (2020) that proposed to extend the social bricolage entrepreneurial thinking (Alkire *et al.*, 2019) theories also to luxury restaurants that during this pandemic have done the proof to “play a social role and improve the collective and individual well-being while sustaining their businesses” (p. 5).

From a practitioner perspective, the study has implications for the entire restaurant industry. Effectuation maintains that in highly uncertain and dynamic environments, target customers can only be defined ex post through whoever buys a product or service. Goals are shaped and constructed over time and are sometimes formed by chance. Instead of focusing on goals, the entrepreneur exerts control over the available set of means - the things over which the entrepreneur has control (Sarasvathy, 2001). At the individual level, this includes personal knowledge, skills, and social networks. At the firm level, means include physical, human, and organizational resources (Barney, 1991).

Despite its contribution to the existing literature, this study is not free of limitations. First, the identified responses should be investigated in further quantitative approaches to check their robustness. Second, being exploratory, the study focused just in one country and thus it is recommended that future studies expand the research by targeting restaurants from different cultures. It can help to develop a broader portrait of the phenomenon also related to the level of crisis generated by Covid-19 in the specific context. As this research has been based on netnography analysis, secondary data and interviews with key-informants of the sector, authors mainly adopted a “sector perspective” as they need to contextualise the phenomenon and identify its main futures. Acknowledging these limitations, further investigations can use this ‘structuring’ work and focus on the micro-scale level of chefs by conducting interviews to explore the motivations to adopt the specific strategies and to focus on the learned lessons from this crisis. It would be interesting to analyse the impact of these strategies in the medium and long-term and how these implemented strategies are perceived by their competitors (two starred restaurants and worldwide three starred restaurants) to verify some isomorphic behaviours (DiMaggio and Powell, 1983).

Further works may also investigate other luxury industries to understand if there are similarities among them or there exist peculiarities that make them different. All of these highlights also suggest to direct future studies to develop deeper explanations and rigorous observations on how luxury’s entrepreneurs develop their crisis relief efforts and how these can be analysed through the lens of the effectuation paradigm.

Finally, further research will have to focus on the other face of the restaurant industry that represents the vast majority of the sector in many countries of the world and, certainly, in the Italian context. In fact, this context is mainly characterized by small and micro (and most often family-run) firms with a kaleidoscope of typologies of offers. In this case, it is opportune to underline their scarce resources comparing to starred ones as well as turnover such as to secure the very existence of the company in time of crisis. It follows that the investigation of these small and micro firms requires ad-hoc qualitative and quantitative analyses.

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Should I stay or should I go? Organizational resilience of Italian SMEs companies during COVID-19 lockdown

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Abstract

Objectives. COVID-19 pandemic, more than previous external shocks, hit all the business without geographic borders. Italy has been the first in Europe experimenting the diffusion of the virus that exposed the economic vulnerability of its companies, especially SMEs, that operates in non-essential business that faced challenges of quickly shutdown. Our paper aims at identifying and describing different profile of resilient companies, to understand different approach to pandemic crisis.

Methodology. To understand the difference in resilience profiles, we have observed the behavior of a sample of Italians SMEs working in non-essential business activities soon after the start of pandemic crisis.

Findings. Empirical cases presented in the study helped us to identify 4 different resilience profiles characterized not only by the rapidity in reaction but also by the strategic engagement of crisis' response.

Research limits. General inductive approach is not as strong as some other analytic strategies. Our results are related to the understanding of an extraordinary situation, hardly to replicate.

Practical implications. Empirical findings provide suggestion to position business in order to positively react to struggling times and to be more resilient in the future and it could offer interesting insights to understand under which conditions SMEs can survive through crisis and to define the suitable policy intervention to recover regional economy.

Originality of the study. Our study analyses SMEs companies' resilience during the crisis differently from previous ones that analyses just ex ante or ex post reactions and generally are focused on larger enterprises.

Key words: resilience; crisis; COVID-19; entrepreneurship; SMEs; Italy

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1. Introduction

The COVID-19 disease was first identified in December 2019 in Wuhan, the capital of China's Hubei province, and has since spread globally, resulting in the ongoing pandemic, as WHO announces the 12th of March 2020.

The incredible number of deaths generated by the disease and the measures adopted by the governments, necessary to contain the virus have triggered an economic downturn, creating the basis of an unprecedented crisis. At this point, there is great uncertainty about its severity and length.

As policymakers around the world struggle to combat the rapidly escalating COVID-19 pandemic, they find themselves in uncharted territory. Unfortunately, throughout much of the world, it has been already too late to contain COVID-19 in its infancy, and policymakers are struggling to keep up with the spreading pandemic (Pisano, 2020).

The approaches adopted by governments to reduce contagions by Coronavirus across the world are very different. Some governments are limited their activities in issuing recommendations on social distancing for part or all of the country, while others, following the Chinese experience, have acted to restrict all non-essential internal movements, closing all the non-essential business activities (lockdown).

Italy has been the first country in Europe experimenting the massive diffusion of the virus and the Italian government has called to take a series of decisions that have no precedents. In a matter of weeks (from February 21 to March 22). Italy went from the discovery of the first official COVID-19 case to a rapid growth of the contagion curve. This situation pushed the government to issue a series of decrees that gradually increased restrictions from specific territorial areas ("red zones") to the prohibition of all movements of people within the whole territory, and the closure of all non-essential business activities.

Within this very short time period, the country has been hit by nothing short of a tsunami of unprecedented force, punctuated by an incessant stream of deaths. It is unquestionably Italy's biggest crisis since World War II.

The COVID-19 has exposed the economic vulnerability of Italian companies, especially SMEs, that operates in non-essential business areas that faced challenges of quickly shutdown.

Literature documents that SMEs, especially the ones working in traditional industry, find very difficult to insure against crisis due to the shortage of financial and infrastructural resources but also to the lack of managerial expertise and to the risk avoidance culture of their CEO (Ingirige *et al.* 2008). Despite these general problems, some Italian SMEs has shown an extraordinary ability to respond to the shock generated by COVID 19.

Unexpected events and abrupt changes often surprise organizations, however, case and anecdotal evidence exemplifies that some organizations are more successful in responding to unexpected, abrupt and/or 'extreme' events than others under similar circumstances (Fiksel *et al.* 2015; Gittell *et al.* 2006). Literature defines the ability to respond to the unexpected events transforming the risks in opportunities as resilience.

Crises, such as those suffered through COVID-19, have led entrepreneurs to confront challenges and threats and resilience provides a useful framework for studying how a system recovers from the impact suffered (Kitsos and Bishop, 2018; Castro and Zermeño, 2020).

The term 'resilience' has been used at the organizational level to describe the inherent characteristics of those organizations that are able to respond more quickly, recover faster or develop more unusual ways of doing business under duress than others (e.g. Sutcliffe and Vogus 2003; Vogus and Sutcliffe 2007) or the capacity to cope with unanticipated dangers after they have become manifest (Wildavsky 1988, p. 77).

In this vein, studies seem link resilience only to the rapidity of reaction, anyway the other element that is needed to be considered is the intensity of reaction. Companies that react firstly at the negative events are not necessarily the ones making those profound changes useful to survive in the long term. In other word resilience is not only a matter of time but it is also linked to the intensity of strategic change. This is particularly true for small and medium enterprise (SMEs).

Researchers have found that SMEs suffer the most in times of crisis and are the least prepared of all organizations (Ingirige *et al.* 2008). In particular, authors affirm that compared to large companies, SMEs react more rapidly to the negative events (Sullivan-Taylor and Branicki, 2011) but lack of necessary skills and capability in pursuing changes that have effect in the long term (Ates and Bititci, 2011). However, several companies even the smallest ones, showed an intense reaction to crisis, quickly reorganizing their production facilities and distribution, defining new strategic intentions with a long time horizon.

Coherently, adopting an inductive methodology that starts from the observation of the behavior of the Italian SMEs during the COVID crisis, our paper aims to contribute to the literature on entrepreneurial resilience attempting to answer the following research question:

RQ: Have SMEs shown entrepreneurial resilience to COVID-19 pandemic? There were differences in terms of speed and intensity of reaction to crisis among SMEs?

To provide evidence for our research questions, we selected ten companies from the list of organizations that have obtained the allowance to officially produce PPE (Personal Protective Equipment) for citizens of Campania region. This convenience sample is based on the need to understand entrepreneurship resilience and compare companies' strategic behavior during challenging time.

The paper offers several theoretical and practical implications.

The length of the manifestation of the COVID affection, the gradually changing of the government's strategy and the fact that similar situation has manifested before in other countries like China indeed create a unique condition, giving entrepreneurs the opportunity to understand what has been happened.

This extraordinary situation that has no documented equivalent in the entrepreneurship literature (Kuckertz *et al.*, 2020) gives the opportunities to analyse the reaction of the companies during the crisis, differently from other catastrophic events that often act in few moments not leaving the companies the possibility to understand and consequently plan their strategic response.

Consequently, our study offers an interesting point of view observing companies' behavior during the crisis differently from previous ones that analyse ex-ante or ex-post reactions. Accordingly, we are able to give a longitudinal analysis of firms' resilience that is particular interesting because inherent resilience evolves through creative transformation and the entrepreneurial identification and exploitation of opportunities (Cutter *et al.*, 2008).

Moreover, the crisis management literature has not dealt in depth with small business response to disasters and also studies on resilience are usually focused on large and/or high-reliability organizations (e.g., Bode *et al.*, 2011).

In addition, this stream of research often is focused on resilience behavior in specific situations, like terrorist attacks (e.g. Branzei and Abdelnour, 2010), war (e.g. Bullough *et al.* 2014) or natural disasters (e.g. Cutter *et al.*, 2008), and especially in specific geographic domain, such as developing countries or US.

Our paper instead is focused on SMEs that represent a particular set to analyses because both structural feature of the company and entrepreneur personal orientation are able to influence company's response to crisis.

Last but not least our paper gives a unique interpretation of entrepreneurial resilience because evaluate not only the rapidity to answer to the adverse events but also the intensity of the reaction.

Indeed, resilience is not only a matter of quickness, but it is embodied in the notion of bricolage, the ability to create order out of disorder and fashion a solution on the spot, from the resources available (Doern *et al.*, 2019).

A strong reaction intensity means that, even SMEs can be able to combine their limited resources and design a long term answer to crisis, demonstrating the capabilities to plan strategic changes during challenging times.

However, the paper suffers the limitation of the poor generalizability, due to the unexpected and unpredictable events, usually explored in crisis management studies.

The remainder of the papers will be articulated as follows: in the first paragraph we describe the concept of the organizational resilience as described in the literature and the limitations of the existing studies, in the second paragraph we describe the methodology and the dataset; in the third paragraph we present the results of the case study analysis, in the last paragraph we define a model that describe the different profiles of resilience; then in the last paragraph we summarize the paper implications and limitations.

2. Theoretical Background

The concept of resilience has been mostly regarded in disaster management studies as an important factor ensuring continuity, sustainability, and future success in the case of disruptive events (Kantur and Say, 2015; Martinelli *et al.*, 2018). The term resilience is used in a wide variety of fields that include ecology (Walker *et al.* 2002), individual and organisational psychology (Barnett and Pratt 2000, Powley 2009), supply chain management (Sheffi and Rice, 2005), strategic management (Hamel and Valikangas 2003) and safety engineering (Hollnagel *et al.* 2006). Although the context of the term may change, across all of these fields the concept of resilience is closely related with the capability and ability of an element to return to a stable state after a disruption. When the notion of resilience is applied to organisations, this definition does not drastically change. Resilience is therefore related to both the individual and organisational responses to turbulence and discontinuities (Bahmra *et al.*, 2011).

In a comprehensive literature review on the topic, Linnenluecke (2017) recognized that resilience has been studied in different fields that developed their own definitions, theories and understandings of the issue (Linnenluecke, 2017).

Many studies indeed have started to analyse the role of entrepreneurship and enterprise resilience in developing regions affected by war and terrorism (Bullough *et al.* 2014; Branzei and Abdelnour 2010).

The term resilience is evoked increasingly in studies of entrepreneurial individuals and organizations (e.g. Ayala and Manzano, 2014; Reinmoeller and Van Baardwijk, 2005).

Hence, ‘resilience’ has been used at the organizational level to describe the inherent characteristics of those organizations that are able to respond more quickly, recover faster or develop more unusual ways of doing business under duress than others (e.g. Sutcliffe and Vogus 2003; Vogus and Sutcliffe 2007) or the capacity to cope with unanticipated dangers after they have become manifest (Wildavsky 1988, p. 77). Annarelli and Nonnino (2016) identify four wide research fields in literature on organizational resilience: (1) resilient design of organizations and the management of internal resources for resilience, (2) resilient design and management of external resources, actions and processes for resilience (e.g. relationships and links in supply chains, supply networks or industries), (3) static resilience (i.e. strategic initiatives for resilience linked to operational management of internal and external resources) and (4) dynamic resilience (i.e. dynamic capabilities of managing disruptions and unexpected events). In entrepreneurship domain, Korber and McNaughton (2016) identified six different streams of research that analyses the intersection of resilience and entrepreneurship.

The first four focus on preparedness in the face of potential disruptions: resilience as an ex ante, inherent characteristic of entrepreneurial individuals and firms that arises from different adjacent factors; psychological resilience that reinforces entrepreneurial intentions: entrepreneurial behavior that fosters organizational resilience, and entrepreneurial firms (and individuals) as enhancing regional economic or community resilience.

The other two set of studies are rather focused on post-disruption view of resilience and explore what happens after a disturbance has occurred, namely the resilience that enables individual entrepreneurs to bounce back from failure or to survive tough times (e.g. Hayward *et al.*, 2010), and resilience as a dynamic process of adjustments of individuals, firms, and macro-level entities to new contextual circumstances (e.g. Dewald and Bowen, 2010).

In a similar work Doern et al. (2019) analyzes the link between entrepreneurship and crisis through a literature review. These authors mention that entrepreneurs' responses to crises depend on several factors such as experience, the stage of development and the stage of the crisis.

Accordingly, the resilience is static, when founded on preparedness and preventive measures to minimize threats' probability and to reduce any impact that may occur, and dynamic, when founded on the ability of managing disruptions and unexpected events to shorten unfavorable aftermaths and maximize the organization's speed of recovery to the original or to a new more desirable state (Annarelli and Nonino, 2016; Conz *et al.*, 2017; Korber and McNaughton (2016)). Therefore, this dynamic view of resilience - that analyses how companies are able to face in a timely and appropriate manner to an unpredictable negative event- some authors have linked resilience essentials with the concept of time. They also see a lack of studies focusing on how entrepreneurs and small businesses learn from these events, how they handle crises and how they incorporate change management.

The literature on resilience suggests that there is a need for constant, proactive and ever quicker approaches to change (Bolton, 2004), before the case for change turns out to be urgently inevitable (Hamel and Valikangas, 2003). Actually, resilience represents the level of preparedness of organization to change by rapidly redeploying and reconfiguring its technical and organisational resource base, thus enabling a quick response to unpredictable changes within its operating environment (Sine and David. 2003). Consequently, it is agreed that resilience is a distinctive organisational capability (Stoltz, 2004, Barton and Christianson, 2006), that is underpinned by an organisation's ability to change timely, rapidly and easily (Vickers and Kouzmin, 2001).

In this vein, studies seem to link resilience only to the rapidity of reaction, anyway the other element that is needed to be considered is the intensity of reaction.

Companies that react firstly at the negative events are not necessarily the ones making those profound changes useful to survive in the long term. In other word resilience is not only a matter of time but it is also linked to the intensity of strategic change. This is particularly true for small and medium enterprise (SMEs). Researchers have found that SMEs suffer the most in times of crisis and are the least prepared of all organisations (Ingirige *et al.* 2008). In particular, authors affirm that comparing to large companies SMEs lack the necessary skills and capability in pursuing long-term strategic (Ates and Bititci, 2011) but relative strength was found in the area of rapidity (Sullivan-Taylor and Branicki, 2011).

Our paper starts from these considerations to explore better the resilience in the SMEs considering their reactions to the COVID19 pandemic. Moreover, to better explore this phenomenon we decide to describe different profiles of SMEs considering not only their rapidity in answering to the crisis but also the intensity of that strategic change they have realized.

3. Methodology

This study applied a multiple case study method to further analyze entrepreneurial resilience (Eisenhardt, 1989) during challenging time in Italy.

The primary purpose of the inductive approach is to allow research findings to emerge from the frequent, dominant or significant themes inherent in raw data, without the restraints imposed by structured methodologies.

The general inductive approach provides an easily used and systematic set of procedures for analyzing qualitative data that can produce reliable and valid findings.

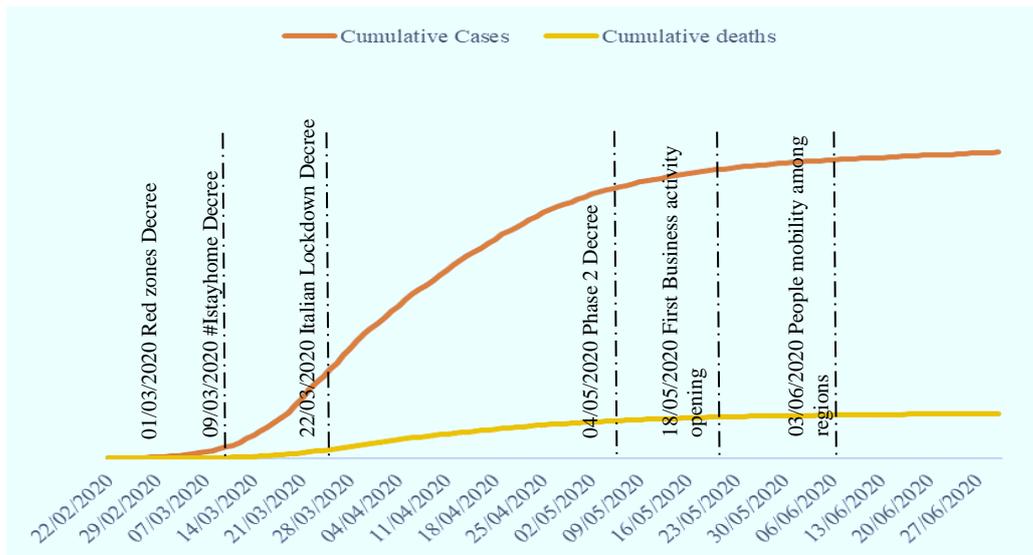
A case study is one of the most appropriate means of conveying the reality of a strategic situation and is ideal for investigating studies dealing with company management and organization, where there is a need to explain complex causal relations (Yin, 2014) or analyses longitudinal processes of change (Eisenhardt, 1989).

Moreover, a multiple case study method was useful in determining which selected case studies provided the required experience for entrepreneurs by using a horizontal comparison (Yin, 2013).

3.1 Case selection, data collection and processing

During the lockdown we have observed different strategic behavior among SMEs that operate in non-essential economic activities. Some of them have totally revolutionized their business changing their products and business model, others instead have only disguise their business in order to avoid the limitations imposed by the lockdown, some entrepreneurs have instead left their company at the mercy of the events accepting in a passive manner the restrictions imposed by the law.

Fig. 1: The spread of COVID-19 virus in Italy and government measures to contain it



Source: our elaboration

To understand and classify the different level of resilience that characterized SMEs behavior toward pandemic crisis, we have observed a convenience sample of Italian SMEs working in non-essential business activities from the beginning of COVID-19 lockdown.

Italian government issued a series of decrees that gradually increased restrictions from specific territorial areas (“red zones”) to the prohibition of all movements of people within the whole territory, and the closure of all non-essential business activities (Figure 1).

The Italian government has defined as non-essential business activities all the productive activities throughout the territory that is not strictly necessary, crucial, indispensable, to guarantee us essential goods and services. Naturally, companies that operate in essential businesses keep working during the lockdown, without changing their strategy. These “soldier” companies are those belongs to food, pharmaceutical or health care industry.

Instead, companies that operates in “non- essential” productive activities showed different reactions to the crisis.

Our analysis is focused on companies located in Campania region. Choosing a defined territory is necessary, because in the first stage of the pandemic different regions have adopted different policies due to a different number of contagions. Among the Italian regions the Campania is the one that has adopted the most restrictive policies.

In particular, we define our convenience sample starting from the list of companies that have obtained from the regional government the allowance to change their business activity to officially produce PPE (Personal Protective Equipment) for citizens. The official list had 4 different releases, and in each release the number of companies inserted increased.

In this study, we selected ten companies among the ones present on such list with the aim to understand and try to classify the different level of resilience showed during pandemic crisis. The

selection is driven by data availability and by study's purpose, namely the need to understand resilience in different industry and compare companies' strategic behavior besides their core business.

Data has been gathered from different data sources: companies' information from annual reports, corporate websites and AIDA, the Bureau van Dijk database that offers comprehensive and detailed business data and financials across Italy and entrepreneurs' information from magazines, social media (such as LinkedIn) and AIDA.

4. Resilient behavior of SMEs in Campania region

This section introduces companies as well as the key findings from the mapping, analysis and results of case studies. Basic information about core business, financial and crisis reaction of selected case studies are shown in table 1 and hereinafter presented in detail. All the companies present less than 20 employees and a turnover under 5.000 thousand of Euros.

The majority of companies in the convenience sample has been involved in face mask production, others on hand sanitizer or Ethyl alcohol manufacturing; only one had produced Non-woven seat cover.

Several SMEs have manufacturing of fabric, clothes and apparel, or wholesale of finished fashion products the main core business; two companies distill, rectify and blend of spirits and one is involved in coffee processing.

Except Company G, a new business venture born in the spring of 2020 to face the pandemic challenge, all the SMEs in the sample are family firms, in some cases - like for Company D - with a long family tradition.

In these family SMEs, often the entrepreneur acts also as a CEO of the company, demonstrating that the strategic and operating path of the company follow its entrepreneur's willing.

Tab. 1: Basic information of companies included in the sample

Company	Core business (before COVID-19 pandemic)	PPE	Reaction to Crisis	Founded	Turnover (2019) in th. of €	Employees (2019)	Net Income in th. of € (2019)	ROE (2019)	CEO & Owner	Family Firm	First Generation
A	Liqueurs and spirits production	Hand Sanitizer	18th of march	1858	1926,666	12	29,482	16,15%	Yes	Yes	No
B	Textile	Face Mask	21st of march	1948	945,225	4	27,967	71,2%	No	Yes	No
C	Liqueurs and spirits production	Ethyl alcohol for surface and Hand Sanitizer	end of March	2008	4.885,98	15	105,39	4,64%	Yes	Yes	Yes
D	Textile	Face Mask	end of March	1885	1038,142 (2018)	11 (2018)	5,257 (2018)	1,47% (2018)	Yes	Yes	No
E	Textile	Face Mask	end of March	1955	211,384	6	0,677	14,54%	Yes	Yes	Yes
F	Coffee capsule processing	PVC Face mask	2nd of April	1956	5.030	19	384	41,12%	Yes	Yes	No
G	DPI production	Face Mask	April	2020	n/a	n/a	n/a	n/a	No	No	n/a
H	Textile	Non-woven face mask	20th of april	1938	226,156 (2008)	7	3 (2008)	19,24%(2018)	Yes	Yes	No
I	Textile	Face Mask	5th of May	1950	841,237	2	25,132	14,82%	No	Yes	No
J	Manufacturing	Non-woven seat cover	16th of May	1991	622,641	14	8,241	3,47%	Yes	No	n/a

Source: our elaboration

Company A

The first company in the sample is a family firm founded in 1858 and currently in its fifth generation. The founder was very close to the Royal House of the Bourbons for which he produced an herbal elixir at the end of the meal. The company soon became the fulcrum of the economy of a small town close to Caserta, which until then had been based on agriculture. Nowadays, thanks to the guidance of the last descendant of the family, the company has managed to establish itself on the international market for the excellence of its products. The company had constantly innovated

and fine-tuned product life cycle, trying to respect the tradition that has always linked the company to its land.

During the pandemic, the company had strongly suffered the lockdown but decided to produce hand sanitizer as soon as the Campania region called for help. Thus, as soon as the official authorization has been received, the 18th of march, the company had reconverted its plant.

The new product has been launched to the market the 23th of april through the social media channel and the 27th of april appeared to market with a new brand.

The reconversion of production plant, allowed the company to re-open their gate: the hand sanitizer gel has been distributed through different channels (drugstores, pharmacies and e-commerce website) and in different sizes.

Despite the idea to reconvert liqueur production into hand sanitizer gel started during the very first days of pandemic situation, the new product has been launched as soon as the company successfully plan, design and organize new production.

Company B

Company B operates in textile industry and used to trade clothing and accessories closed Naples.

This family firm counts 4 employees and is at third generation. After the war, the CEO of that times decided to convert pre-industrial scale with small production chains developing the potential of the artisans who grew up in the "shops". Nowadays, after the activation of an industrial packaging plant, the brand produce and distribute in Italy, in various European countries, in the USA and in Japan. As soon as the COVID-19 pandemic spread, the company started to produce face mask in their production plant even before receiving official authorization. Face mask are put on the market immediately after, on their physical distribution channel and using online website. The company used immediately their production facilities by converting clothes production into face mask manufacturing, putting their product on the market just after the 21st of march. The time of reaction has been really fast, allowing company to carry on with its activities.

Company C

Company C has been founded officially in 2008 in Caserta and represents a benchmark for the production of traditional liqueurs and Spirits in Italy.

It has a modern production plant, among the best equipped and functional currently present in the industry allowing a production which ranges from traditional Italian liqueurs and spirits to the full range of international ones.

The company has been always oriented to new trend and innovation, continually including new products. During COVID-19 pandemic, the company has never lockdown its activity but the approach to pandemic crisis has been really slow and required a step-by-step involvement.

The first aim of the company has been to protect all the employees from the virus, either to defend their health and to reduce the risk of working pandemic transmission. The company provided an immediate plant sanification, equipped all the employees with PPE and provided them with health insurance against COVID-19 disease since the 18th of march.

The company has then reacted to government call to produce hand sanitizer gel by partially reconfiguring its plant around the end of march.

The first product launched on the market has been the lemon flavor alcoholic solution (70%) vaporizer that could be used to sanitize surface and physical things. Since the first COVID-related product, the company has started to constantly introduce new product on portfolio since the middle of May: alcohol at 70-90% for cleaning and disinfecting surfaces and hand sanitizer gel in different size for different distribution. Nowadays, the company does not offer anymore its disinfecting product on the website. It means that the involvement into pandemic crisis had due primarily to help the region to hinder the shortage of such products or contemporarily to keep open their production facilities.

Company D

The company was founded in 1885 as a commercial enterprise operating within the traditional silk sector in the San Leucio area, created by the Bourbons already in 1770.

Reached the fifth generation, the company combines the experience and the expertise of workers with technologically advanced and innovative facilities that produce jacquards, brocades, damasks, liseres, and taffetas that furnish the distinguished residences in the world. Actually, one of the owners of the company is also its CEO and he is born on 1984, the fifth heir of the firm.

Since the beginning of pandemic crisis the company has been really active, supplying fabric to local workers and sub-contractor to produce face masks, donated to local church to be given for free at the beginning, and since the month of May distributed to local drugstores. Thus, reaction to crisis has been sufficiently fast, considering that since the end of march the company started to move to keep going its activities and avoid lockdown. The speed of reaction is probably due to the fact that the company's core business is to manufacture fabrics and textiles for luxury markets, an industry seriously hit by COVID-19 stop. Thus, the company, risking to lock its production during the pandemic, found out a way to carry on its productions.

Company E

Company E started its activity in 1955 on a small town close to Avellino and used to manufacture wool clothing and apparel.

The entire staff, that focuses heavily on innovation through a continuous search for new fabrics and technologies, produces and sells 100% made in Italy knitted items of the highest quality sold in Italian boutiques and also abroad such as in Riga and Tokyo.

Thanks to the production know-how, handed down from generation to generation, also being contractor of other companies, the organization decided to launch new brand in 2009.

Among the end of march and the beginning of April the company decided to use its production facilities to realize face masks. In particular, they decide. The company, that propose a face mask with antibacterial and waterproof features, offered its products directly to the market and also acted as a supplier of public authorities and police.

Company F

Company F has been founded in 1956 and operates into the business of Coffee processing and other solvable drinks. The company had recently enlarged its plant built in 1975 in order to be updated and to fulfill the growing demand of its products. The brand is well known for the quality and traditional flavor of its coffee, but in the same time for the capability to constantly innovate their products, introducing new coffee flavor, new coffee format, such as capsules or pod. The company has decided to change its activity since the very beginning of COVID pandemic crisis. The CEO of the company highlighted the importance to use its facilities to help communities, creating a valuable network that would have helped not only company's workers but the inhabitant of the whole region. He also decided to donate a great amount of respirator mask to the Campania region.

Indeed, the company started to produce PVC Face masks with two filters, thus not the common surgical ones.

The filtering system has been designed exploiting the know-how developed to produce coffee capsule filter. The outcome of this idea has been really effective: the thermoplastic polymer makes the face mask really comfortable and in the same time, the double filter ensures a great protection both for the wearer and the other people. The mask is also washable and reusable, changing filters after 6/8 hours of usage. The mask Defender has been presented the second of April and officially launched through company's social media the 16th of April. The company decided for an indirect distribution, using retail stores in 80 pcs packages (filter included).

Company G

Company G is a new venture that starts its activity on 2020, soon after the spread of COVID-19 pandemic. The core business of the company is the production of face masks.

The company represent a joint venture between a textile company based in the neighbor of Naples and an Italian debt recovery company. The former company operated since and the 1988 in the clothing value chain and that reconverted all the production plant to PPE production, namely face mask.

The start-up covers all the value chain of mask production and delivery using the operational facilities of the former company. Considering that this case represents a business transformation, the time required to restructure the organization structure also at legal level has been longer. This company reconversion seems also to be a definitive choice, since the company changed its business model and core business definitively.

Company H

The history of the company H began in 1938 thanks to the initiative of its founder who decided to specialize its business in the creation of tailored shirts. Thanks to his initiative, the company become larger and starts to coordinate the work of numerous carefully selected and trained workers.

As soon as the pandemic spread in Italy and the face mask started the shortage of face masks in the region, the company declared to be ready to bring its help.

However, the shirt factory has started to sell its own Non-woven face mask the 20th of April, since it was waiting for the official regulatory protocol, in order to start the production consistent with it.

Actually the company have collaborated with an Italian firm specialized in Non-woven fabric through a spin-off. In his peculiar case, the company H has not completely left its core business, but had gave its know-how in textile industry to create the spin-off that is specifically addressed to face mask production.

Company I

Company I operates since 1950 in the textile value chain, proud of their made in Italy tradition in design and production. Located in the neighborhood of Benevento, the company has a significant operational structure from cutting to ironing.

As soon as the pandemic crisis was starting, the company decided reconvert their production facilities to produce certified face mask. However, total plant reconversion has been completed on 5th of May and shared through company's social media.

The company provide several line of face mask and give to customer the opportunity to customize the product. Final distribution, that is particularly addressed for B2B customers has been organized through e-commerce.

Company J

Company J is a company based in a small town close to Salerno that manufactures parts and accessories for motor vehicles and relevant engines, among the other to the Italian automotive company FCA. It also produces cargo nets for the aeronautical sector, also from scratch or provide a reparation service them from breakage and abrasion.

The company control all the phases of the value chain, from the early design phase, the creation of prototype, a customer solution on real models, up to the turnkey realisation of the product, by defining the best technical and budgetary solutions.

Starting from the 16th of May, the company gave its contribution to COVID pandemic, by producing a new version of seat cover made by non-woven fabric. Company's response to pandemic crisis has been quite slow. The rational at the basis of this slow reaction is due to the final destination of this specific product, not suddenly needed during the lockdown period but related with the starting of economic and transportation activity.

5. Discussion

The narrative case studies explored in Campania region helped us to understand that SMEs differently reacted to the crisis showing different level of resilience.

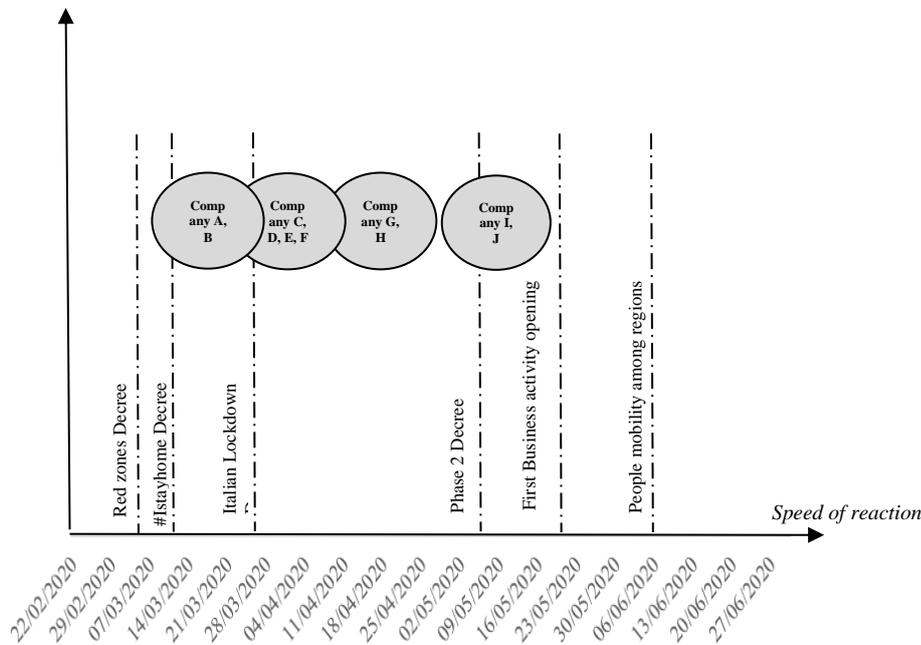
These different reactions to crisis could derives from several factors. Some studies demonstrated that differences on entrepreneurs’ identity influenced how they enacted and construed the adversity to which their firms needed to respond (Powell and Baker, 2014; Sheperd et al, 2019).

Linnenlueck. and McKnight (2017), instead, by identifying different entrepreneurship approaches to disaster focused the attention on macro-level features that affected the so-called “community-resilience”, namely the properties of robustness (withstanding stress without degradation), redundancy (accessing to excess capacity), rapidity (responding in a timely fashion) and resourcefulness (identifying problems and mobilizing resources) (Norris *et al.*, 2008).

With regard to rapidity, it is evident that not all the companies reacted in the same time, showing a different level of resilience to pandemic crisis.

The official list of companies authorized to produce PPE provided by Campania region had 4 different releases and in each release the number of companies inserted increased: thus, it is evident that these companies showed different speed of reaction to the crisis.

Fig. 2: Companies’ reaction during COVID-19 crisis according speed of reaction



Source: our elaboration

As is it shown in figure 2, companies A and B were the firsts that immediately reacted to the crisis, showing a huge level of resilience as soon as the first lockdown decree has been issued.

Other companies consequently reacted during the next days, trying to adapt themselves to the incumbent regulation. Companies I and J have been the last ones that officially respond to the crisis, where the Phase 2 of pandemic management have started.

Looking in depth the case explored in the analysis, it also appears that, although different in time, selected companies showed a different strategic approach to the crisis.

Some companies react promptly to lockdown but their reaction it is only a way to maintain their business open without a real reconversion of their business models, other companies instead have transformed the restrictions imposed by the pandemic in an opportunity to rethink their activities and invest in a new business in some cases permanently (figure 3). In other words, some companies

tried to maintain the status-quo by trying to manage the “business as usual” in unusual situation, while others found a different approach towards doing business (Doern et al., 2019).

Indeed, some of the companies that react firstly at the negative events spend a lot of efforts in order to keep open their activity, implying a profound changes useful to survive.

For instance, company C started to use its production facilities to provide alcohol and hand sanitizer. This reconversion required not only a plant re-organization but also the change of the current business model. Having launched a specific brand to sell denatured alcohol, sanitizer for food and hand sanitizer, the company showed a strategic interest into crisis reconversion, using the COVID- 19 pandemic as a boost to enlarge its product portfolio. Therefore, intensity of company reaction has been really high, considering that the choices made in time of crisis seems to have effect also in the long term.

Some others, (Company B, D & E) suddenly reacted to the crises deciding to produce PPE products but with a weak intensity of reaction, in other words not changing their business model. Among the of companies present into the list of Campania region official providers of PPE, the majority of them fall in this category, mainly operating into textile industry.

They have been able to suddenly react to the emergence since their intervention on the crises did not required different assets, technologies or know-how from the one already owned.

All these companies showed a great charitable aim in their actions, but the involvement into the production of PPE is due to the need to maintain their plants opened.

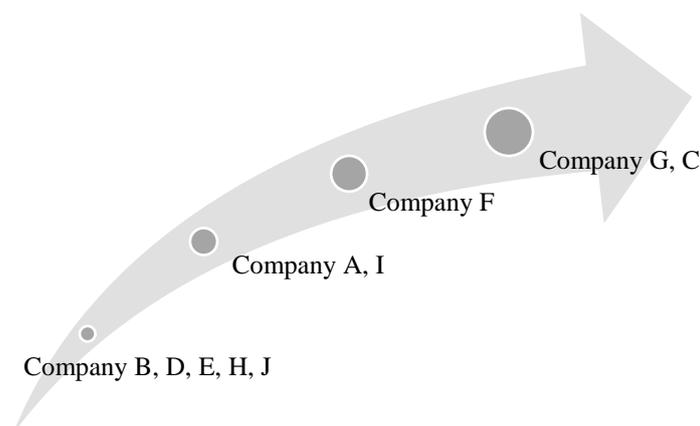
Also taking a look on the companies that reacted slower to the pandemic crisis it is possible to identify a different level of strategic intensity.

In particular, Company H and I both involved in clothing production, waited to launch their own models of face mask, even if it doesn't require great change in line production.

In the same way, Company J that produces customized industrial upholstery, started to produce non-woven seat cover only in May. In this case, the choice to postpone production change could be due to the specific destination of its products, intended for public transportation that during the lockdown has been reduced. However, the production of non-woven seat cover doesn't entail a strategic change to company's core business and actually the product is not present on company's portfolio anymore.

The intensity of the resilience shown by these companies is weaker than the companies that, despite did not radically change production and business model, quickly reacted to the crisis.

Fig. 3: Companies' reaction during COVID-19 crisis according intensity of reaction



Source: our elaboration

A different level of resilience can be recognized in companies F and G, that waited longer time to react to the crisis but their reaction has been related to huge strategic or technological change.

Company F, for instance, reacted to the crisis by producing a brand new product far from its current core business. The production of PVC mask required at first a relevant level of reactivity into the research of suitable solution of pandemic problems and, consequently, a change in production lines.

The experience of company G is partially different, even from the other companies that operate in the same industry. The company already operated in a textile industry, showing a great level of similarity of face mask production with previous core business.

However, the company created with a credit recovery firm a new venture specifically intended to produce PPE for the market, contributing with its production know-how.

Thus, the longer time needed to react to the crisis is due to satisfy all the official obligations required to company's transformation. Furthermore, the reconversion of the company seems to be a permanent choice, implying a completely change in strategic direction in terms of core business and business model.

Started from the critical analysis of the selected cases, we discovered that the time of the reaction to the negative events is not enough to understand the companies' resilience but it is necessary to take into account also the intensity of reaction.

Consequently, we define a model that identifies 4 types of companies profiles according their specific behavior and the timely in which they occur. The speed of reaction measures the rapidity of SMEs strategic change, considering the different stages of Covid crisis temporally delimited by the issuing of different decrees (as shown in Figure 4).

The intensity of the firms' reaction, instead, take into account the relevance of strategic change and it is linked to the technological and market relation of the new products/business to the SMEs previous activity.

Thus it is possible to classify 4 different kinds of SMEs resilience (Figure 4):

- a) "Firefighters": SMEs that have strategic reacted to the crisis since from the first phase, deciding to completely change their business model. This kind of strategic reaction is symptom of a preemptive strategy but could also be dangerous in the long term if it is not enough planned or shared at the whole organizational level;
- b) "Engineers": SMEs that showed strategic reaction in a later stage deciding to completely change their business model. These SMEs have taken the opportunity of COVID-19 to reorganize their companies and have waited for taking the time to plan their strategic intervention. Thus, the company that fall in this cluster showed a strong involvement into Pandemic reaction but, compared with firefighter a slower reaction speed;
- c) "Actors": SMEs that have rapidly reacted to the crisis but without really changing their business model. They have disguised their business in order to avoid the lockdown but they were go back to their common activity when the lockdown is finished. These company seemed to have quickly reacted to the crisis but, considering that they have made few changes to specific business model, at the end of lockdown they keep going on their core business;
- d) "Waiters": SMEs that waited the end of the first COVID-19 crisis stage to react. They decided to start their transformation only in the last stage of the crisis without a specific plan, so that transformation is just temporary, since they are going to keep on with traditional business activity at the end of lockdown period. Low level of commitment and a very slow transformation took place on these companies, where strategic reaction to crisis has been just temporarily.

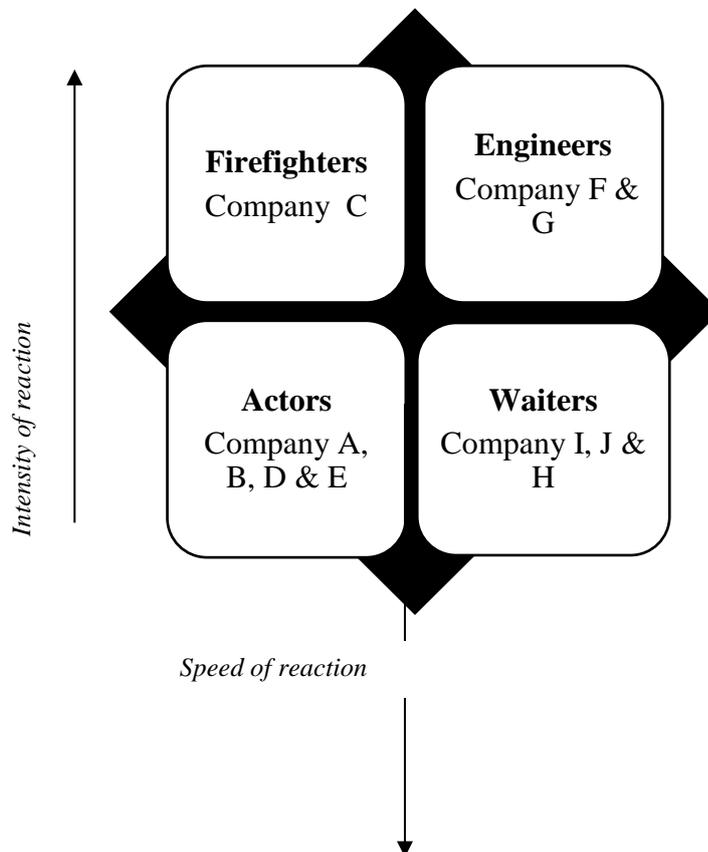
The identification of different resilience profiles demonstrates the importance of the level of preparedness of organization to change by rapidly redeploying and reconfiguring its technical and organizational resource base to the original or to a new more desirable state, thus enabling a quick response to unpredictable changes within its operating environment (Sine and David. 2003).

However, empirical cases also show the ability of some company to plan a strategic change of their business from the resources available (Doern et al., 2019). In that case, entrepreneurial

resilience is related to the ability to create order out of disorder (Doern et al., 2019) and could require higher intensity of involvement.

This result is against the widely believe that SMEs lack resilience and the necessary skills and capability in pursuing long-term strategic (Ates and Bititci, 2011). The stronger reaction's intensity shown by some of the selected companies demonstrate that even SMEs can be able to combine their limited resources and design a long term answer to unexpected event.

Fig. 4: Resilience profiles according the speed and the intensity of reaction



Source: our elaboration

6. Conclusion

COVID-19 pandemic, more than previous external shocks, hit all the business without geographic borders. Italy has been the first in Europe experimenting the diffusion of the virus that exposed the economic vulnerability of its companies, especially SMEs, that operates in non-essential business that faced challenges of quickly shutdown.

Compared to larger companies, SMEs may have usually less flexibility in dealing with the costs these shocks entail. Moreover, given the fewer resources and existing obstacles in accessing capital, the period over which SMEs can survive the shock may be more limited than for larger firms. However, several Italian SMEs has shown an extraordinary ability to respond to the shock generated by COVID 19. Our paper aims at identifying and describing these different reactions of SMEs to the pandemic crisis considering the concept of resilience. At organizational level the “resilience” is related to the inherent characteristics of those organizations that are able to respond more quickly, recover faster or develop more unusual ways of doing business under duress than others (e.g. Sutcliffe and Vogus 2003; Vogus and Sutcliffe 2007) or the capacity to cope with unanticipated dangers after they have become manifest (Wildavsky 1988, p. 77).

Starting from this ex-post concept of resilience and observing the behavior of some SMEs located in Campania, our paper shows that resilience is not only a matter of time but largely depend on the intensity of changes realized by companies.

In particular, we observe that some SMEs reach suddenly to lockdown but their reaction it is only a way to maintain their business open without a real reconversion of their business models, other companies instead have transformed the restrictions imposed by the pandemic in an opportunity to rethink their activities and invest in a new business. Starting from this assumption we define a model that identifies different resilient profiles according the speed and the strategic intensity of reaction to crisis.

This paper offers valuable academic implications. From the theoretical standpoint, it suggests the importance to study crisis management with the lens of resilience, since it shows how a system recovers from the impact suffered (Kitsos and Bishop, 2018; Castro and Zermeño, 2020). It is coherent with the idea that entrepreneurial activity in the context of a crisis is not just to recover 'business as usual', but require a new way, sometimes creative manner of doing business.

Moreover, it enlarges current literature on organizational resilience, that usually is focused on the analysis on ex-ante or post reactions to crisis of large enterprises.

Indeed, the empirical results provide evidence against the widely believe that SMEs lack resilience and that they are disproportionately impacted by a wide range of external shocks (Branicki et al., 2018). It could represent an attempt to enlarge this emerging body of research analysing how entrepreneurs respond to crises identifying different resilience profiles that can be found in SMEs by analysing companies' behaviour during the crisis.

Moreover, it gives a unique interpretation of entrepreneurial resilience because evaluate not only the rapidity of the answer to the adverse events but also the intensity of the reaction, by profiling different resilience typologies.

A strong reaction intensity means that, even SMEs can be able to combine their limited resources and design a long term answer to crisis, demonstrating the capabilities to plan strategic changes during challenging times.

Inductive analysis provides also several practical implications, such as it gives suggestion to position business in order to positively react to struggling times and to be more resilient in the future.

It demonstrates that during challenging times to move forward, it will not be enough to wait for things to go back to normal, but it is important to balance quick response to the shock with the readiness for new entrepreneurial opportunities, leaving room for the unexpected positive outcomes of this turbulent period (Giones et al., 2020).

The study results could offer interesting insights to understand under which conditions SMEs can survive through crisis and to define the suitable policy intervention to recover regional economy.

However, our study presents some limitations, which provide insights for future researches.

The paper's limitations are mainly linked to the qualitative nature of our study and the specific topic analysed. Considering the nature of case study, results provided by this research cannot be regarded as generally applicable or generalizable.

With regard to the specific topic analysed, the limited generalizability is due to the unexpected and unpredictable events usually explored in crisis management studies. Moreover, in order to evaluate the effectiveness of different resilience profiles, it could be interesting analyse if and how selected companies overcame pandemic crisis.

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Innovating in the fourth industrial revolution: disentangling trends and trajectories

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Abstract

Objectives of the paper: *This study aims to analyze the existing literature on Industry 4.0 in business and management, with a focus on innovation context. It identifies gaps in the current research knowledge and offers trends and trajectories for further research on the topic.*

Methodology: *A systematic literature review has been conducted on Industry 4.0 and innovation. We identified four themes that epitomize the current development of the literature on the topic.*

Findings: *This review highlights four six main relevant topics in management literature related to the fourth industrial revolution: 1) machines and industrial internet; 2), people and data; 3) production and consumption; and 4) Employment in the digital era. Furthermore, it identifies research gaps and highlights four emerging research themes for future researchers: 1) safety; 2) digital identity, privacy and traceability; 3) a new concept of city; and 4) sustainable mobility.*

Practical implications: *Our review on the literature will help organizations to align their innovation processes to current development of the technologies that feature Industry 4.0 revolution.*

Limitations of the research: *This study has a limitation in terms of its empirical dimensions. The future studies may conduct a meta-analysis of articles on industry 4.0 in innovation space.*

Originality: *Research on industry 4.0 and innovation is still at the embryonic stage. This study is a pioneering effort to review the existing themes that epitomize research on the topic and identify research priorities for scholars and practitioners.*

Key words: *Fourth industrial revolution, Industry 4.0; Big Data; Digital transformation.*

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1. Introduction

In the last years we have witnessed a process of technological change which presents some characteristics typical of what are normally defined as periods of combinatorial innovation (Brinjolfsson and McAfee, 2014). The entrepreneur of the digital era has today at his disposal a set of standardized components (software, protocols, interfaces, languages) that can be reshuffled and assembled in infinite combinations in order to create new products, services or processes. The basic unit of the digital age is the bit, an atom of information that does not dry up and that can be easily duplicated, combined and spread all over the world at the speed of light. This is the main difference that makes this technological revolution different from the previous ones. Today it is the beginning of a new phase and the rise of a fourth industrial revolution deeply different from the previous ones.

Differently from what happened in the past, it is thanks to the intangibility of the bit that it is easier, faster and less expensive to recombine elements and to produce new solutions, thus expanding the number of potential innovators. The most different ideas can see the light in a garage or in a college residential hall (with very poor initial investments) and then they can hugely expand in a few weeks' time through communities of innovators, thanks to the pervasivity of the Broadband Internet. Going through the list of the first ten world most capitalized companies, we can see that the first three (respectively Apple Inc., Microsoft and Google) are less than 40 years old, they have built their business around the elaboration of the digital information and they have been established in a garage.

Digital technologies activate contamination and convergence dynamics in the most different fields of the "analogic" world (Negroponte, 1996). TV, radio, cinema, photography and commercials are media that saw the light in the previous industrial revolutions (thanks to the combination of mechanics and electricity) and that in a few years' time have completely turned digital and have entered with new languages the social networks, the true new media of the Internet age. The energy field is moving towards a new smart metering and smart grid conception, while new means of urban and interurban transportation based on the sharing concept are imposing themselves on the streets of the entire world (car/bike sharing, and car-pooling),

New instruments are allowing the companies of the old economy to improve their processes and to innovate their business models by acting on different levels: as a back-office improvement instrument, as a new channel to provide the market with new products and services and as technological incentive for a change in the business model itself. However, it is not always a voluntary innovation: it is often a compulsory choice, in order to avoid the disintermediation by native digital start-up competitors, in a moment in which the ability to generate and handle the information coming from the physical world is often an opportunity to obtain long-lasting value.

The purpose of this article is to develop a discussion around the main topic and emerging trends regarding technologies underlying the fourth industrial revolution. To reach this goal the authors conducted a literature review considering the impact that technologies underlying the industry 4.0 have on business and management literature. This approach allowed the authors to develop a bird's-eye view of the most relevant topics in management and of the future trends and trajectories to be addressed.

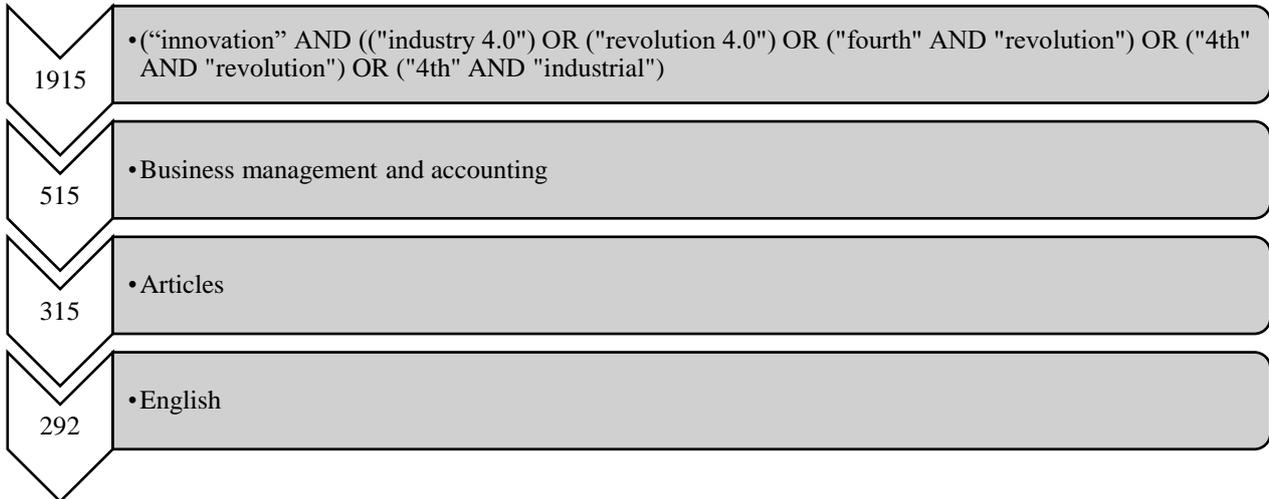
Results allowed us to identify four main relevant topics in management literature related to the fourth industrial revolution: 1) machines and industrial internet; 2) people and data; 3) production and consumption; and 4) Employment in the digital era. Moreover we identified four future trends and trajectories: 1) Safety; 2) digital identity, privacy and traceability; 3) a new concept of city; and 4) sustainable mobility.

2. Methodology

Following previous research (Dagnino *et al.*, 2021; Del Sarto *et al.*, 2018), we organised our literature review into several steps (see Figure 1). We included all papers published from 2016 to

2020 as 2016 is commonly considered as the year in which we witnessed the rise of the fourth industrial revolution. We considered the database Scopus because it is considered one of the main exhaustive academic databases. To target the fourth industrial revolution domain the following terms were considered: innovation, industry 4.0, revolution 4.0, fourth, revolution, 4th, revolution, 4th, industrial. Moreover, in order to increase the focus of results, we created the following query: TITLE-ABS-KEY (“innovation” AND (“industry 4.0”) OR (“revolution 4.0”) OR (“fourth” AND “revolution”) OR (“4th” AND “revolution”) OR (“4th” AND “industrial”))).

Fig. 1: Literature review logic flow



Source: Authors

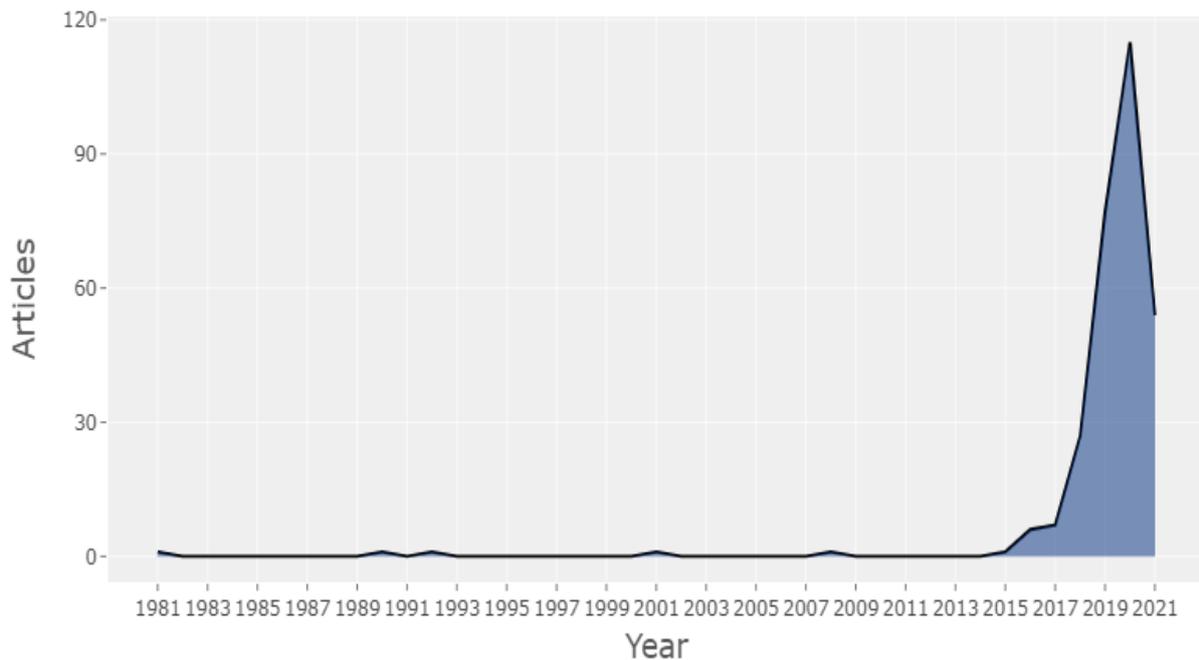
Tab. 1: Logic Flow chart used to find and select articles

Description	Results
Timespan	1981:2021
Sources (Journals, Books, etc)	152
Documents	292
Average years from publication	1.87
Average citations per documents	13.36
Average citations per year per doc	3.48
References	16520
DOCUMENT TYPES	
article	292
DOCUMENT CONTENTS	
Keywords Plus (ID)	920
Author's Keywords (DE)	945
AUTHORS	
Authors	820
Author Appearances	896
Authors of single-authored documents	50
Authors of multi-authored documents	770
AUTHORS COLLABORATION	
Single-authored documents	51
Documents per Author	0.356
Authors per Document	2.81
Co-Authors per Documents	3.07
Collaboration Index	3.2

Source: Authors

As reported in Table1 we included 1915 papers in the Identification step. During the Screening step we selected only paper aiming at exploring the phenomenon through a business and management perspective. This allows us to select 515 papers in the business management and accounting field. Among those documents we selected then only the articles published in academic journals, thus excluding conference papers, book chapters, books and reports. In this step we selected 315 Articles. In the last step we selected only papers in English. The end of this procedure allowed us to build a sample of 292 papers. After that, we created an Excel workbook and coded the content of each article by its author(s), journal title, subject area, investigated area, number of citations, subtopics, and methodologies (Petticrew, 2006). Two of the authors have independently read the abstracts and introduction of each article to ensure that the articles fitted the established criteria. Moreover we performed some analysis though the Bibliometrix software. In particular we show in figure 1 the annual scientific production on the topic, highlighting that since the 2015 we have seen a significant increase of published papers.

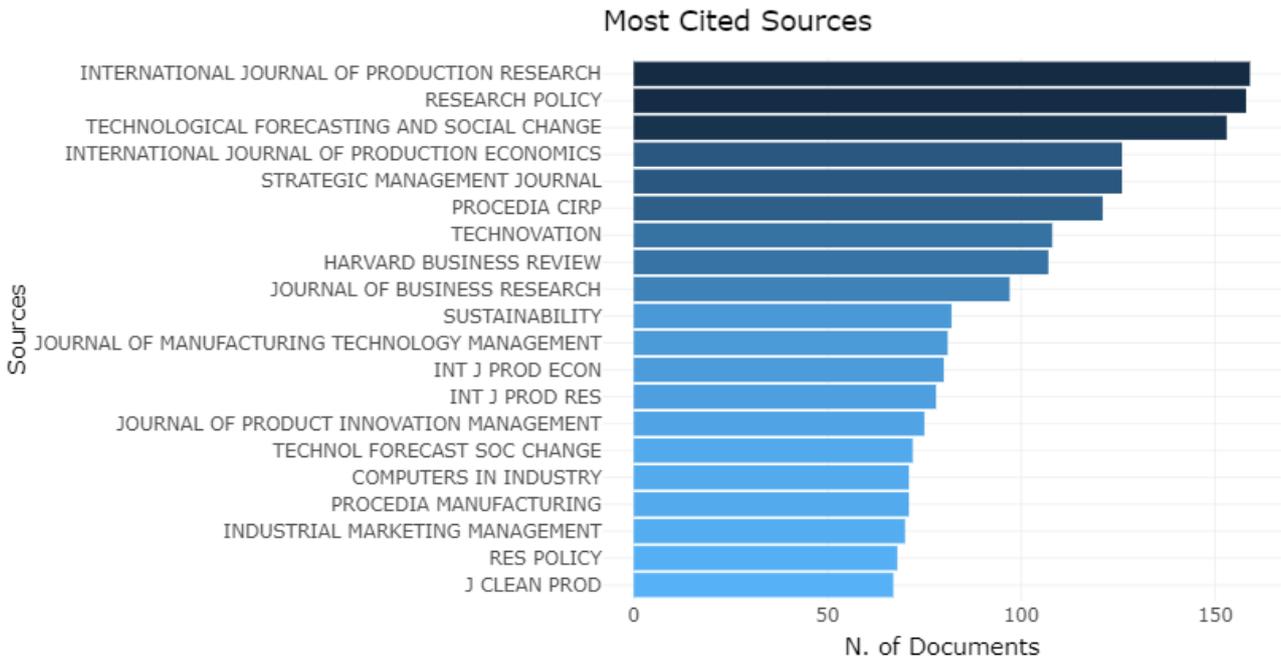
Fig. 2: Annual scientific production



Source: Authors

Figure 3 and Figure 4 report the most cited source and the most relevant sources respectively. The first refers to the number of citation received by the journal whereas the second refers to the number of document of each journal present in the sample. As shown by figure 3 the most cited sources are international journal of production research, research policy and technological forecasting and social change. The most relevant source is represented by technological forecasting and social change, which published a number of papers on the topic close to 40.

Fig. 3: Most cited sources



Source: Authors

Fig. 4: Most relevant sources



Source: Authors

Finally, we reported in table X the most cited documents. These papers are crucial for the identification of main topic and future trends and trajectories. Based on own reading of such documents authors have deeply understand the topic and discussed it in a plenary section together.

Tab. 2: Most cited papers

Title	Total Citations	TC per years
Rothwell, R. (1992). Successful industrial innovation: critical factors for the 1990s. <i>R&d Management</i> , 22(3), 221-240.	845	28.167
Li, L. (2018). China's manufacturing locus in 2025: With a comparison of "Made-in-China 2025" and "Industry 4.0". <i>Technological Forecasting and Social Change</i> , 135, 66-74.	237	59.25
Müller, J. M., Buliga, O., & Voigt, K. I. (2018). Fortune favors the prepared: How SMEs approach business model innovations in Industry 4.0. <i>Technological Forecasting and Social Change</i> , 132, 2-17.	237	59.25
Sung, T. K. (2018). Industry 4.0: a Korea perspective. <i>Technological forecasting and social change</i> , 132, 40-45.	140	35
Ślusarczyk, B. (2018). Industry 4.0: Are we ready?. <i>Polish Journal of Management Studies</i> , 17.	121	30.25
Trantopoulos, K., von Krogh, G., Wallin, M. W., & Woerter, M. (2017). External knowledge and information technology: Implications for process innovation performance. <i>MIS quarterly</i> , 41(1), 287-300.	115	23
Frank, A. G., Mendes, G. H., Ayala, N. F., & Ghezzi, A. (2019). Servitization and Industry 4.0 convergence in the digital transformation of product firms: A business model innovation perspective. <i>Technological Forecasting and Social Change</i> , 141, 341-351.	111	37
Xu, M., David, J. M., & Kim, S. H. (2018). The fourth industrial revolution: Opportunities and challenges. <i>International journal of financial research</i> , 9(2), 90-95.	97	24.25
Ardito, L., Petruzzelli, A. M., Panniello, U., & Garavelli, A. C. (2019). Towards Industry 4.0: Mapping digital technologies for supply chain management-marketing integration. <i>Business Process Management Journal</i> .	84	28
Reischauer, G. (2018). Industry 4.0 as policy-driven discourse to institutionalize innovation systems in manufacturing. <i>Technological Forecasting and Social Change</i> , 132, 26-33.	82	20.5
Büchi, G., Cugno, M., & Castagnoli, R. (2020). Smart factory performance and Industry 4.0. <i>Technological Forecasting and Social Change</i> , 150, 119790.	77	38.5
Ayres, R. U. (1990). Technological transformations and long waves. Part I. <i>Technological Forecasting and Social Change</i> , 37(1), 1-37.	68	2.125

Source: Authors

3 The fourth industrial revolution: main topic in management literature

3.1 Machines and industrial internet

According to Professor Erik Brynjolfsson of MIT Sloan, data management can be considered as the modern equivalent of the microscope. Just as 400 years ago the invention of the microscope allowed to see and to measure organisms with infinitesimal precision, tomorrow we will be able to know what is happening in details and in real time, thanks to all those plants, energetic networks, engines and workplaces provided with sensors (Bonilla *et al.*, 2018). In 2012, General Electric created the term "Industrial Internet" to describe the set of the ways in which Internet can be applied to the improvement and innovation of the production processes, announcing also investments equal to 1.5 billion dollars in three years in new technologies based on sensors connected to the network, useful for the monitoring of industrial machines (Calabrese *et al.*, 2020). The aim of this initiative is obviously to enable the company to supply the technical solution and at the same time to sell monitoring software services. In fact, design and post-sale services constitute today almost the half of the total income of GE; by quickly reporting, transmitting and elaborating information about the machines, it is possible to foretell and prevent malfunctions, avoiding particularly expensive post- costs. Accordingly, the application of sensors for the remote control inside jet engines helps to understand which one of the 20.000 engines in service on the aircrafts will probably need maintenance, avoiding to the airlines to spend money in non-projected interventions. Ten thousand sensors have been scattered all over the GE batteries factory in Schenectady (New York) in order to optimize productivity and to reduce product defects, discovering the causes through software analysis.

The use of sensors combined with multifunction robots is allowing many businesses to evolve rapidly. Talking to the investors in 2017, Jeff Bezos (founder and CEO of Amazon) announced that he would push to a progressive automation of the storage in the company, in order to increase the

productivity. The first remote controlled robots have begun to be more and more common in the fast-food restaurants for the production of food (Oltra-Mestre *et al.*, 2020).

However, if the placement of sensors inside the machines and the use of robots do not represent an innovation in the industrial world, the real revolution is represented by the ability to extract real time knowledge from the network of sensors, analysing them by linking different data streams (Agarwal and Brem, 2015). This new ability is beginning to offer interesting value appropriation opportunities and constitutes the base for a new kind of services (Rothwell, 1992).

In order to develop these new services, new competences are becoming crucial: the information workers are the new white collars, whose expertise span from data analysis to data visualization. It has been estimated that, only in the United States, the number of data experts necessary to meet the new demand of information workers is at least of 140.000 people, coordinated by 1.5 million of data managers.

This new information workers are employed in the most different fields, even in the traditional ones. As an example, more and more utility companies operating in the energy distribution field are making agreements with NEST, a company which acquired by Google and which became famous for its smart thermostat. In order to limit the huge expenses typical of the summer peaks, energy suppliers are creating algorithms able to turn off automatically the air conditioners of NEST users in a selective and smart way (the NEST thermostat uses the history and the weather data to foresee the temperature and it is also able to understand if the user is at home or not), Therefore, energy suppliers avoid buying expensive megawatts from the daily auctions market, producers avoid building additional plants used only during the peaks and the final user benefits from a discount on the bill, almost without noticing it.

Besides a qualified new labour force able to manage the information coming from plants, machines and devices, the ability to stipulate strategic alliances with other industrial subjects (Newcos) it is fundamental for the incumbent companies. If there will be a diffusion of a new entrepreneurial culture open to the potential of digital, automation, data crunching and data fusion and to more and more cooperative and Open innovation processes, it is highly probable that the combination between efficiency and increase in productivity introduced by the Industrial Internet will lead to an increase in the world GDP of 10-15 trillion dollar within the next twenty years (Evans and Annunziata, 2012),

The process of innovation through recombination can be easily connected to the paradigm of Open Innovation, but it needs a common digital language that enables companies to cooperate through the 5G network (Aijaz, 2020; Rao and Prasad, 2018). It is not easy to transform the language of companies, since it is embedded into each different corporate culture that makes employees to use their own internal communication codes, and speak the same language. It happens in the IT systems just as it does for people. Therefore, new ventures specialized in the creation of interfaces able to connect the companies' information systems through the creation of software "bridges" start to be common. This is the case of Apigee, a start-up established in 2004 in San Jose, California, specialized in the development of the API (Application Programming Interfaces), APIs are a software gateways that expose the information flows to the external world (and vice versa), allowing the combination of information and the production of new value. Only thanks to these "communicative joints" the various companies, allowing clusters of faraway enterprises to co-create value, could recombine information flows and re-invent their business models.

Sensors, actuators, the use of a new common language and more and more open innovation processes are the necessary ingredients for the companies to evolve and to stay competitive in the digital era (Hizam-Hanafiah and Soomro, 2021). The access to a next generation network able to satisfy the needs of every single business represents a necessary but not sufficient condition for the innovation of the Italian and European industrial system. It will also allow the research of new distribution channels and an increase in efficiency, productivity and interaction between enterprises.

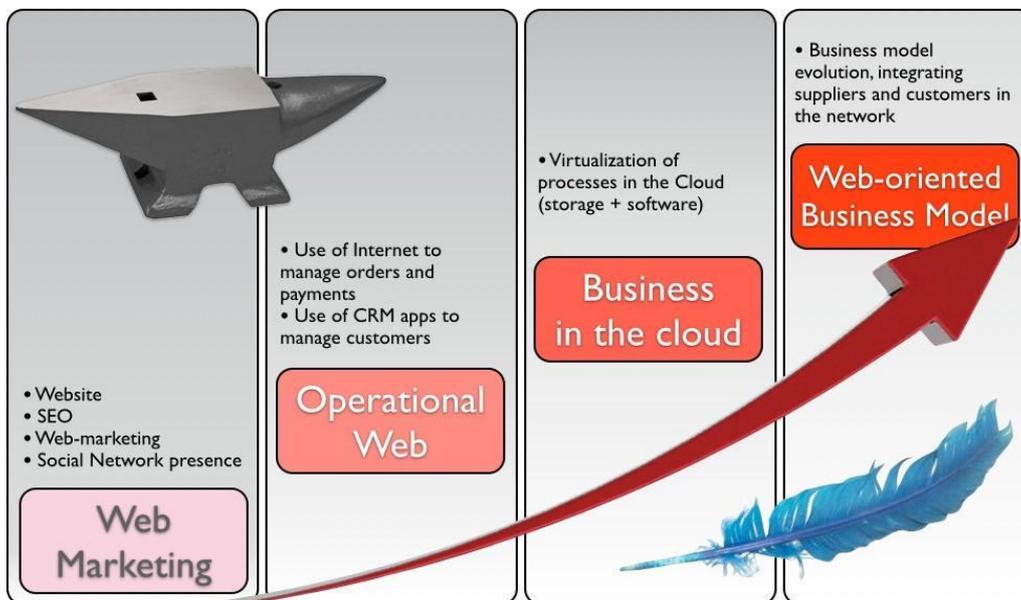
In Italy as in Europe, the SME (Small and Medium Enterprises, up to 250 employees) represent the 99% of the companies. In Italy, these enterprises produce the 70% of the total income, employing the 80% of workers⁸. If the diffusion of a base Internet connection in Europe is close to

the 100%, the use of the medium in the European enterprises and in particular in the Italian SME is still very low (BCG, 2018), The level of digital education of the enterprises is not high enough.

Being online does not only mean having a website, but also being able to combine and use the information provided by the network to catch new business opportunities. In the last three years, online-active enterprises have registered an increase in the incomes (+1.2%) and in the employees the 73% of the companies has employed new people against a contraction of the business for the other. An important information concerns the conditions of use of the Internet by online-active enterprises: the greatest part of companies has focused on the first phase of the innovative process. Around the 60% of them has instead focused on SEM investments (Search Engine Marketing) followed by e-mail commercials and use of social networks. Only one online-active business out of two uses virtual orders and payments.

If we put the SME in the four phases of integration of the network conceptualized in the picture, the greatest part of them would be situated between the first two steps, in which the Internet is only used as a supplementary instrument in the as-is activities of the company and as a simple showcase (Müller *et al.*, 2018; Somohano-Rodríguez *et al.*, 2020), In order to maximize the direct and indirect externalities coming from the network, the evolution which companies have to point at concerns the complete integration of the 5G network in the business, followed by the virtualization of the intangible activities and a consequent decrease in the expenses. A fourth evolutionary step sees the company changing its own business model according to the potential offered by the instrument. This will be possible thanks to the expansion of the customers' number and to a positive attitude towards the productive ecosystem, also interacting in the perspective of Open Innovation with other enterprises and discussing with the most active customers (lead users) thanks to special platforms built for this purpose. Obviously, not every company will be able to follow this path to the end, according to the field in which they operate, to their dimension or to their investment ability. However, it is important for each company to be conscious of the potential offered by the medium, in order to be able to consider the opportunity during the negotiations.

Fig. 5: The role of digital technology within the company business: an evolutionary perspective ()



Source: authors

3.2 People and Data

Electronic data constitute a plentiful resource, easy to produce (and to reproduce) and to be moved around. In every moment, billions of people contribute to generate new information, which

is continuously piled up and combined in order to generate new knowledge. This trend is impressive: the per-capita ability to store information has doubled every 40 months starting from the 80's (Hilbert and Lopez, 2011). Nowadays, it is almost impossible for an individual not to generate information: even if we do not possess electronic devices, we are in a constant interaction with them, which happens automatically or on our own will. The simple action of taking the car to go shopping to a mall is expressed into new produced and elaborated information (bar codes, points on the fidelity card, credit card payments, parking tickets, control of limited traffic zones etc.),

The new data analysis opportunities, together with the process of technological convergence, allow each individual with a smartphone to collect more and more information about the external world and about his/her own behaviour and biomedical parameters. For example, by analysing data coming from the smartphones accelerometers it is possible to estimate the kind of activity that we are doing (walking, cycling, driving) and by integrating this information with heartrate it is possible to calculate the number of calories, but also to track the distance, the gradient of the road, the number of steps and the average speed (Li, 2018).

Thanks to a sharp decrease in the cost of sensors, boosted by the mass diffusion of the smartphone, more and more new and cheap tools dedicated to the quantified self (the use of technology for the acquisition of data such as input and physical/mental performance starting from the daily life of the individual) are quickly spreading. It has been estimated that the market of smart wearable devices, which includes watches and bracelets with sensors, will reach the value of 50 billion dollars in the next 3-5 years¹⁰. It is not a coincidence that Google, Apple and Samsung have already launched specific platforms for the collection and the analysis of individual data (Google Health, Apple Health, Samsung S Health) and that they have already launched life logging devices.

A first interesting field for life logging is health and wellbeing. Today, seven adults out of ten in the United States keep their health under control. Unfortunately, it is difficult to give a scientific value to the data collected by wearable sensors, because the collection itself is not made on any scientific basis (Ayres, 1990). However, we can expect positive progresses in the next years, as mechanisms based on gamification (the use of gaming techniques in real life contexts) contribute to stimulate virtuous behaviours, making the data collection a social and funny experience. As an example, this is how the platform Nike+ works: here are directed those training data coming from the various devices possessed by the user (a bracelet, a sensor in the running shoes, a smartwatch), who is then motivated in order to achieve daily objectives that he/she can share with a community. Similar instruments are beginning to spread also in several companies in order to increase the employees' productivity and reduce the turnover. Today, we are used to asking our doctors a huge number of specific information that measure our health in a specific moment of our life: radiographies, blood or sight tests. In the future, the doctor will be able to analyse (through software) a film, a sequence of measurements more or less continuous in time, correlated and freed from the surrounding "noise" thanks to special algorithms (Ardito *et al.*, 2019).

3.3 Production and consumption

The impact of the digital economy on the real economy is strictly connected to a growing flexibility of the business models. Thanks to new methods for the production of goods and services, companies can move more dynamically in the value chain, holding new positions and discovering new markets, by evolving their business propositions. Behind the deep changes that are characterizing this historical period, it is possible to find some macro topics (Sung, 2018).

A first aspect to be considered concerns the process of servitization that has characterized numerous business activities (Frank *et al.*, 2019). The term servitization identifies an increase in the value of a good thanks to the creation of service components, often included in a bundle with the product itself. This concept, introduced in management literature by Vandermerewe and Rada (1989), expresses a continuum of solutions, in which the service component can be an appendix of the product or it can also be predominant with respect to the product component (Oliva and Kallenberg, 2003). The reasons that made traditional businesses think in this way date back to the

necessity of stabilizing and de-centring cash flows, balancing the effects connected to mature markets and to adverse economic cycles. The Broadband Internet has changed many products into services or immaterial goods. Just see what has happened in the music industry, where in a few years' time we have moved from CDs to the mp3 format to services that use a monthly subscription model such as Spotify or Apple Music. The new medium has redefined not only the format but also how we listen to music: today it is possible to rely on customized playlists or to listen to a selection of tracks created by a user on the other side of the earth. The same has happened to the film industry with Netflix and it is progressively happening in fields connected to logistics and distribution of physical convenience goods (Amazon Prime). Services can also be the incentive to stimulate the product sales, as it happens in the telephone market where the smartphone is servitized by TELCOs, in order to increase the retention rate (Baines *et al.*, 2009),

In the digital universe, software is being able to replace in a few years' time many activities carried on by previous technologies (optics, mechanics, and electronics) and to define a real new kind of language (Manovich, 2013) and new value exchange dynamics. The tendency to associate or even substitute the sale of goods with (virtual) services leads to an endless increase in the availability of catalogued resources, creating new consumption phenomena: one of these is called long tail effect. Differently from sales models that follow the Pareto rule, where the 30% of catalogued products generates the 70% of the income, the proliferation of virtual goods highlights that a consistent sales portion is composed of a multitude of niche products, each of them sold in small quantities. In 2008, the 37% of the books sales on Amazon was not composed of best sellers, but of minor titles, which in 2000 represented only the 20% of the sales (Brynjolfsson *et al.*, 2003). The same effect has been observed in the software download market. A wider availability of catalogued goods is expressed into a surplus for the consumer, and this surplus is partly re-invested, generating virtuous effects on the economy.

The concept of marketplace itself, a physical space where sales take place, has evolved and it has been replaced in many sectors by Internet platforms. Car rentals, travel agencies and assistance centres have been replaced partly or totally by online platforms such as Booking.com, Expedia, Rentalcars and Livehelp. With the spread of online and multisided selling instruments, the role of the classic commercial platform has evolved from the bazar-model (one-to-many sale) to the marketplace. Here, dematerialized goods are sold from "many" to "many" and pricing strategies move towards revenue models that, thanks to the minimum duplication and distribution costs and to a global market, play on the revenue-sharing, freemium and on try&buy mechanisms, in order to maximize the diffusion of the product in a super-populated market. Data are quite clear: the 91% of the apps downloaded from the Apple App Store and Google are free, while the 17% of the total income comes from in-app purchases. This amount will probably be tripled by 2017.

Side by side to the servitization process, a new behaviour of the consumer is gradually imposing next to new business models. Consumers are used to considering goods not only as objects that they can exercise exclusive property on, and for this reason they join new niche markets and communities oriented to the sharing and optimization of resources, in order to generate new value with both profit and non-profit purposes. Platforms such as BlaBlaCar allow millions of European passengers to find a car lift spending less than a train ticket, and drivers to recover money to meet their travel expenses. Bookmooch allows users to share books, Airbnb to rent a room at a very low price, Couchsurfing helps the interchange of beds and Homeexchange.com to change a house with another family for the holidays.

The collaborative economy represents a new kind of socio-economic system based on trust mechanisms (such as the feedback between users) and on the fact that the value of a good can increase both for the individual and the community, if the information about that good is properly shared. Some economists, such as Jeremy Rifkin, see in the collaborative commons the natural evolution of the concept of capitalism, assuming in the next 50-100 years a gradual transition of the entire economic structure towards the new paradigm based on the sharing of common resources. It is the return to a sort of barter, empowered, enriched and made safe by the ICT (Rifkin, 2014),

While the concept of property goods is still far from a decline, it is the nature of the goods itself

that is evolving too thanks to the potential offered by the Broadband Internet. In the digital era, it is possible to produce objects with the same efficiency of the mass scale production, being also able to customize the single product, tailoring it on the needs of every single customer (Salvendy, 2001). It is a specificity called mass customization and it is now limited mainly to digital products, in which behind a general-purpose physical structure it is possible to customize the software in order to meet the demand segmentation. Mass consumption products which are highly standardized, such as smartphones or PCs, are actually different in the hands of each consumer or business thanks to the patchwork of software installed that allow different kinds of use (the Apple Watch is a clear example of a mass market product that is heavily customizable, both on the physical and on the software side),

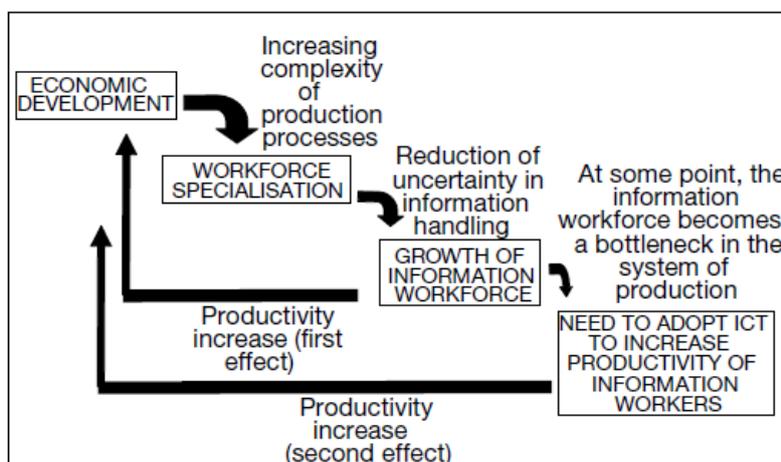
Thanks to the automation into the assembly line, even other physical properties are converging to this new principle. The automotive sector, for example, is reaching incredible flexibility levels, with robots that can be dynamically programmed and with interchangeable parts that allow the creation of different varieties of the same car without any efficiency loss. Similarly, the division of Caterpillar that is responsible for clothing and shoes can shape each shoe according to the specific feet size of each customer, thanks to robotized cutters connected to the Internet. A further technological jump will be represented by the standardization and improvement of 3D Printing techniques that will allow the use of different materials in order to build customized objects, subverting the production of physical goods.

3.4 Employment in the digital era

Commonly, the image of the robot that substitutes the worker in the assembly line represents the most evident effect of a digitalization that, together with the mechanization, the evolution of the automation industry and the use of the Internet, has allowed enterprises to innovate their own productive processes. In order to understand the deep effects of the Broadband Internet on occupation, it is necessary to think about some dynamics that connect technological innovation to work (Neumann *et al.*, 2021),

Concerning occupation, society is moving towards what is commonly known as information society (Porat, 1976). Today in Europe more than the 50% of the labour force is composed of information workers, who elaborate, transfer or produce information. The relation between economic development, ICT technologies and increase in the number of information workers can be explained according to Katz's graph (Katz, 2009),

Fig. 6: ICT diffusion and growth of information workers: causality model (Katz, 2009),



Source: Katz, 2009

At first, the economic development leads to an increase in the complexity of the production processes, which require a specialized labour force. Thus, enterprises look for employees able to

handle information correctly in order to manage goods production and service supply. Then, the growth of the information workers becomes a bottleneck for the system: their number cannot increase endlessly (Ślusarczyk, 2018). Furthermore, the increase in the complexity of the information itself constitutes a second issue. This makes enterprises innovate their own technologies (and their business models), adopting solutions that increase the productivity of the labour force and making the elaboration of information easier. Therefore, it is possible to face both problems and the virtuous circle of economic growth is nourished.

The evolution of the Broadband Internet and its multiple applications in the industrial field (Industrial Internet) enter this process as a condition *sine qua non*, where technology is at the same time object of innovation and engine for the industrial innovation. Here, workers are asked to be skilled in the manipulation of information flows and to be constantly updated about the evolution of their own competence.

What will the impact on the labour force be? The achievement of a positive balance (occupational growth) appears again strictly connected to the penetration of the Broadband Internet. The more penetration grows, the more enterprises find a benefit in the multiple technological applications. Thinking about the adoption of technologies based on the Broadband Internet only as a way to increase the efficiency of the productive processes (with a negative effect on occupation) can only constitute a short-term reaction, often conditioned by the macro-economic situation. Growth has to be the medium/long-term objective, together with the ability of the enterprise to leverage on technologies to innovate its business processes (Chesbrough *et al.*, 2003). Only the companies that are able to fully exploit the benefits offered by the new technologies will consider the IT instrument as a resource, and not as a commodity, innovating in order to grow, differentiate and consequently increasing the labour force in the medium/long-term.

In addition to an “evolutionary” process concerning incumbent companies, many new entrepreneurial realities are obviously “native digital”. Here, new professional figures will be employed. Part of the remaining labour force could also be absorbed by new companies that could act as outsourcers, thanks to the possibility of carrying out remote services for other enterprises. Where will these enterprises be? In addition to some considerations concerning taxation and labour costs, a necessary condition will be the availability and a guaranteed quality of the IT infrastructure.

A first study carried out by Fornefeld has summarized and quantified the different components that have an impact on occupation (see picture), showing some empirical results based on case studies (Fornefeld *et al.*, 2008). It is a synthesis and quantification attempt, which paves the way to further and necessary researches on the subject. In addition to some evaluations on the redistribution of the labour force²³, it is also important to think about the new work methods that characterize more and more the information workers. Where will the information workers operate? Technology has a direct impact on labor. Since the 80’s, digital technologies have overbearingly entered companies, bringing efficiency and a progressive de- materialization of a growing number of activities. Then, Internet started to allow companies to be spread on the territory and to share information thanks to the access to common databases. In the 90’s, customers and suppliers started a telematic communication with companies, allowing producers to improve the supply chain and the distribution channels, and buyers to purchase products without the presence of a sales network located in the territory. With the development of strong broadband networks and the mobile connection, the process is now accelerated. The role of the employee is evolving accordingly: many tasks that do not require physical interaction with machines or people can now be completed from everywhere, far beyond the physical collocation of the company. It is the so- called telework, or remote work, a new common practice able to bring substantial benefits both to the company and to the worker.

Thanks to the telework, companies can save on fixed costs, re-shaping the volumes of their physical structures. The presence of hot desking is more and more common. These are a sort of workspaces that can occasionally be reserved by the worker who needs to go to the main office. This has to be added to a series of improvements connected to transports from/to the main office (and consequent paybacks) that increase the wellbeing of the worker, who can save time, and have a

positive impact on the environment. Only in the USA, savings in terms of gasoline (responsible for the greenhouse effect) due to non-displacements account for 247 million tons of CO₂ emissions.

According to a U.S. based survey, the 41% of the workers declares that there are different activities in their job that could easily be carried out from home, as they do not require the physical presence in the office²⁵. In this sense, telework is considered as a forefront instrument, able to have a positive impact on the image of the company itself, and as an engine for an increase in productivity. Totally, between those workers who think telework is possible, the 68% would take into consideration a flexible job (1-2 days a week) and the 58% a full-time telework.

Some problems in this new practice, which leads to a dispersion of the employees, concern the development of the employee's career and the impact on the organizational structure of the company itself, together with a greater difficulty in transmitting the company values (employer branding activity) and the necessity of increasing data protection.

In order to support this social evolution, it will be essential to develop a new digital culture for the organization of the company, together with new tools and specific investments aimed at increasing the safety of Broadband Internet networks.

4. Future trends and trajectories

The economic and social benefits of the digital economy are numerous and they have a pervasive impact on many aspects rule the life of people, enterprises and Countries. In the previous sections, some key topics have been analysed and the way in which new technologies can play a leading role for the society's virtuous development has been pointed out. In order to maximize these benefits, it is necessary to focus on the elimination of technological obstacles to digital innovation, focusing on problems that can corrupt the efficiency of the technological innovation by producing negative relapses, if underestimated. In this section, we are going to show some directions for further research on the topic.

4.1 Safety

An entire pillar of the European Digital Agenda is dedicated to the networks' safety. With the virtualization of the greatest part of the economy and the dependence of the totality of services to people and enterprises on the Internet, it is fundamental to protect networks from new kinds of criminals, who operates from home and who are experts in breaking firewalls and opening bugs in the informative systems (Reniers, 2017), The so-called cyberattacks concern both privates and enterprises, especially those operating in sectors with a high content of intellectual property. Last year the number of business cyberattacks had a growth of the 14%, in comparison to the previous year, with peaks of the 600% in sectors such as pharmacology, chemistry, agriculture and mining, and of the 400% in the oil & gas sector.

If systems cannot guarantee a proper safety level and data protection, the entire digital innovation produced by the Broadband Internet will come to the standstill, with a consequent unsuccessful use of the systems and waste of resources. CISO (Chief Information Security Officers) highlight alarmingly that only the expenses for the protection of the IT systems constitute the 20-30% of the investments, slowing down innovation. The old protection measures were implemented when the companies' servers collected the whole information, but now they are not enough anymore, as the information technology perimeter has enlarged with the adoption of the BYOD (Bring Your Own Device) and of cloud solutions.

The lack of competences in the companies to face the topic is even more alarming: this leads numerous enterprises to invest blindly and in complete solitude. As the safety level of a network is equal to the lowest safety level offered by its knots and as systems are more and more connected and technologically complex, the problem of cyber security has to be tackled from a different perspective (Xu et al., 2018).

It has to be faced not from the single company point of view but by taskforce that reunites technology suppliers, regulators, agencies in charge of controls and fees, connectivity suppliers and the representatives of the various companies. Only if precise responsibilities and roles are detected by the policy maker it will be possible to prevent thefts and violations in the data domain. Only if platforms could be strong enough and safe from unwelcomed intrusions, companies will use the new cloud systems and the virtuous benefits mentioned in the previous sections will see the light. McKinsey esteems that the global economic value fluctuation, depending on the networks level of strength, will vary between 9 and 21 trillion Dollars in the period 2014-2020.

4.2 Digital Identity, privacy and data traceability

A second delicate topic concerns the management of the digital identity, which is the combination of those modalities introduced to recognize properly who carries out operations and produces and diffuses the contents in the networks. The digital identity is a multi-level concept that has to guarantee a reliability level coherent with the context in which it is used (Trantopoulos et al., 2017). At the level of maximum security, it can be a sort of virtual identity card, which can be used in order to certify the numerous activities that individuals and companies carry out online. The topic of the digital identity is tightly connected to the topics of the necessary authentication to gain access to online services, of the authorization to carry out operations, of the digital counterpart, of eventual delegation mechanisms and of people's privacy. In an era in which is impossible not to leave a digital footprint, it is fundamental to understand which is the level of "stickiness" of the digital identity, and which information is shared (and how long) with the many entities along the networks' value chain.

The safeguard of the digital identity is a complex topic, as it introduces a requirement that contrasts with one of the paradigms of the digital revolution: the possibility to recombine bits and to copy data freely. This paradigm conflicts with the necessity to certify an individual univocally, without the possibility of duplication or identity cloning (Khan *et al.*, 2017). If this adds to the complications connected to safety explained in the previous paragraph, what comes out is a particularly tangled situation, both from a technological standardization point of view and from an ethical and legal one. While it is easy to control accesses to physical spaces and people's identity, the greatest part of online platforms (including Google and Facebook) draw ID without any formal mechanism that can guarantee the identity of the user in front of the display. The development of instruments such as OpenID Connect or Mobile Connect, based on the connection of the virtual identity to goods and services is in progress, in order to face these phenomena. However, what is happening today is that each supplier uses its own internal mechanisms to authenticate users' identities, with the indirect complicity of the lack of a shared and compulsory standard. This calls for the need of global policies on the topic.

Data tracking is another topic directly connected to the digital identity and consists of technologies that allow univocally the control of the information flows, in order to trace the chain behind every single operation and to favour the cooperation between multiple users on data streams. Data tracking is put into practice with protocols of data enrichment and with tool software that allow the rapid visualization of who had access to the information and when. Even if far from a standardization, data tracking protocols will soon be a key element, part of the semantic evolution necessary to the Broadband Internet in order to simplify and innovate the processes which enterprises and citizens are subjected to.

4.3 A new concept of city

Besides having an impact on economy and innovating the way in which enterprises and workers operate, the Broadband Internet becomes a fundamental element for the governance of the city itself (Nick *et al.*, 2018),

“The nineteenth century was a century of empires. The twentieth, a century of nation-states. The twenty-first will be the century of cities”. With these words, the mayor of Denver Wellington Webb talked to the audience during the American mayors’ conference. The current socio-economic evolution is leading to a progressive centralization of the national and supranational government in the role of policy maker and to an opposite de-centralization of the executive efficacy, linked to the current globalization process. Thanks to this evolution, many medium and large cities have become the real knots of the productive, social and economic network of the various countries, which are constantly looking for new solutions to face the numerous problems connected to the services management and the public facilities. The digital revolution is obviously one of the factors that have favoured the evolution of the city from outskirts of power to autonomous subject, able to innovate (Campbell, 2012). Thanks to new instruments enabled by the Broadband Internet, contamination processes between different cities will allow a more and more frequent interchange of best practices and knowledge between close and distant cities. This virtuous contamination is essential in order to guarantee an inclusive growth and to start joint innovation practices.

Today, the smart city has to be seen as an urban space ruled by a farsighted local policy. With the help of digital technologies it tackles the challenges of globalization and economic crisis with an attention to social cohesion, to the diffusion and availability of knowledge, to freedom and direct access mobility, to the quality of the natural and cultural environment (Niger, 2012). Thanks to the Internet, cities are not alone, but are inserted in a network of peers where they can share competences, best-practices and talents, where innovation becomes viral and is adapted according to the local specificities (Gurjanov, *et al.*, 2020; Nick *et al.*, 2019). As it is confirmed by Johannes Hahn, member of the European Commission and head of the office for the Regional Policies, “looking beyond and developing the ideas of tomorrow’s cities has become important at any level. The development of the city will determine the development of Europe”. These are cities with a digital and connected nervous system and they find in technology an instrument able to reconfigure the existent attraction mechanisms towards companies and citizens. In the following paragraphs, three examples of sectors where cities can invest to gain attractiveness are presented. In the next years, Europe could point at these sectors (among many others), which see cities in the front row as engines for creating a better future, more participated, inclusive and fair.

4.4 Sustainable mobility

The growing concentration of the population has brought to a relentless and progressive saturation of the urban road network that, especially in the European capital cities, had been planned at the time of chariots. City planners have now to reorganize infrastructures and find new ways for the management of urban flows, mixing the concept of property and sharing, in order to maximize the efficiency and to reduce the environmental impact.

New digital instruments are a valid allied for the management of people and goods flows: they allow the precise and real-time monitoring of the traffic situation, the management of car parks and openings and the creation of Limited Traffic Areas. Furthermore, they can help to fine trespassers electronically, to intervene quickly in case of emergency and to optimize the frequency of the public transports and the traffic lights intervals according to the specific moment of the day, favouring the flow of vehicles (Alptekin *et al.*, 2020). However, the challenge is much more complicated, and it includes a complete re-mapping of the mobility infrastructure, including digital nerves inside the viability, transports and logistic systems. It is a complex process, which requires a long-term vision and the development of new private-public partnership. However, to see everything in watertight compartments and connecting many electronic systems without an overview, can produce the opposite effect, increasing the informative entropy, complicating people’s lives and forcing them to move between different “silos”. For this reason, in a city/platform it is fundamental for data to be more and more open and shared, always respecting people’s privacy. In addition, each system has to be built according to a modularity defined beforehand, in which data can be produced and managed respecting common standards (Frank *et al.*, 2019).

Next to a top-down approach, in which data collection is planned, operated and ruled by a public corporation, it is possible to find a bottom-up modality. Why would someone invest in the improvement of the road network by putting sensors on traffic lights when every driver possesses a smartphone full of every kind of sensors? Services such Google Maps already work in this way, locating weak points and car crashes and estimating the distance time according to data coming from private devices. Uber leverages on smartphones' GPS signal to connect passengers with drivers.

In addition to humans carrying a connected phone, vehicles can also be moving sensors, able to transmit traffic, temperature, road surface and traffic lights data using the smartphone as a hub to receive and send information.

The evolution of urban mobility will be also complemented with the introduction of the automatic guided vehicles, such as the Self Driving Cars. The combination of precise satellite location services, the deployment of 5G low-latency networks and the improvements in computational capabilities and LIDAR systems are the technological bricks that will support the development of this sector, which has quickly taken a curtain talk in the last few months. An ubiquitous broadband connectivity and the ability to split the computing load between on board local processing and remote elaboration in the "cloud" will be the possible discriminating factors for the future market success or failure of this category of products and services.

5. Conclusions

The fourth industrial revolution is leading to fully automated and interconnected industrial production. The new digital technologies will have a profound impact in the context of four development guidelines: the first concerns the use of data, computing power and connectivity, and is divided into big data, open data, Internet of Things, machine- to-machine and cloud computing for information centralization and storage (Del Sarto *et al.*, 2021). The second is that of analytics: once the data has been collected, it is necessary to derive value from it. Today only 1% of the data collected is used by companies, which could instead obtain advantages starting from "machine learning", that is, from machines that improve their performance by "learning" from the data gradually collected and analyzed. The third direction of development is the interaction between man and machine, which involves "touch" interfaces, increasingly widespread, and augmented reality. Finally, there is the whole sector that deals with the transition from digital to "real" and which includes additive manufacturing, 3D printing, robotics, communications, machine-to-machine interactions and new technologies for storing and using energy in a targeted way, rationalizing costs and optimizing performance (Reischauer, 2018).

In the coming years, technological and demographic factors will profoundly influence the evolution of the labor market. Some (like cloud technology and flexibilisation of work) are influencing the dynamics right now and will do so even more in the next 2-3 years. The effect will be the creation of 2 million new jobs, but 7 will disappear at the same time, with a net negative balance of over 5 million jobs. Italy comes out with a draw (200,000 jobs created and as many lost), better than other countries such as France and Germany. At the level of professional groups, the losses will be concentrated in the administrative and production areas: respectively 4.8 and 1.6 million jobs destroyed. According to the research, the financial area, management, information technology and engineering will partially offset these losses.

The 4.0 Factory, daughter of the fourth industrial revolution, is made up of machines that are completely interconnected with each other, which communicate with each other and carry out self-diagnostics and preventive maintenance (Büchi *et al.*, 2020). In particular, the maintenance of machinery by the machinery itself, thanks to the IoT, will exceed that of humans in quality, capacity and speed. Advances in technological evolution will lead factories to autonomously predict the degree of production failure, to adopt the best prevention measures and to implement self-repairing actions. Furthermore, as explained in Industry 4.0. Men and machines in the digital factory, in

Factory 4.0 the flexibility of the plants will be such as to allow the products to be customized according to the individual customer. Robots will work in contact with humans and from humans they will learn in a natural way. The workflow can be reproduced in a virtual way, therefore before physically preparing it in the workshop, to verify its behavior in the abstract and enhance its performance. The factory will know how to procure energy without waste and at the lowest possible cost, in a word it will be smart.

With this paper we identified trend and trajectories that could be useful for managers dealing with such a revolution. In particular we aim at providing them “food for thought” and inspiration to rethink their managerial style within such an emerging landscape. By conducting a state-of-the-art review of the literature, it extends our understanding of Industry 4.0 and identifies four main relevant topics in management literature related to the fourth industrial revolution: 1) machines and industrial internet; 2) people and data; 3) production and consumption; and 4) employment in the digital era. Furthermore, it reveals the contours of a fragmented landscape that raises four major intriguing avenues for future industry 4.0 inquiry: 1) safety; 2) digital identity, privacy and traceability; 3) a new concept of city; and 4) sustainable mobility.

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Exploitation and exploration within and across the lenses of a stakeholder: the cross-boundary ambidextrous domain

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Abstract

Objectives. Referring to the concepts of stakeholder domain, this study analyzing the tends of a firm to balance the exploration/exploitation towards internal/external stakeholder domain (i.e., cross-boundary ambidextrous domain), “ In particular, the paper observes the impact of stakeholder domain on financial, non-financial and innovative firms performance.

Methodology. For the study, financial, non-financial and innovative data relating to companies listed in the Fortune 500 were collected, over the period 2010-2018. After a content analysis on firm non-financial reports, a series of hierarchical regression analyzes were performed.

Findings. Results confirm that cross-boundary stakeholder domain positive impact on firms financial, non-financial and innovative performance.

Research limits. Future research could modify the sampling strategy considering companies belonging to specific industries, or geographical contexts. Finally, analyzes with time lag greater than one year could be performed.

Practical implications. This study provides a strategy for addressing the challenge in managing the interests of both internal and external stakeholders. Furthermore, it suggests to managers how to reconcile different needs to create value, make resources more efficient and obtain benefits.

Originality of the study. This paper proposes an innovative theoretical framework investigating exploration, exploitation, and a balance within and across the two to responds to the challenge of understanding the management of ambidexterity theory in inter-organizational contexts and outside the traditional domains of knowledge.

Key words: ambidexterity; exploitation; exploration; stakeholder domain; cross boundary ambidexterity; innovation

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1. Introduction

The concept of exploration-exploitation has been extensively explored in the literature concerning numerous organizational fields, such as technology and innovation (Greve, 2007; He and Wong, 2004; Tushman *et al.*, 2003), strategic alliances (Koza and Lewin, 1998; Lavie, 2017; Tushman *et al.*, 2003) and human resources (Beckman, 2006), and also at several levels of analysis, including the domain level (Lavie *et al.*, 2011; Russo and Vurro, 2010) and inter and intra-organizational ones (Lavie and Rosenkopf, 2006; Lin *et al.*, 2007; Rothaermel, 2001). In light of the mutually advantages of exploration and exploitation, the literature agrees that preserving a balance between the strategies is critical to the survival and success of businesses, but the balancing is not trivial. The literature on how to balance exploration and exploitation has led to disparate results, and some authors have discussed temporal, structural, contextual, or paradoxical ambidexterity. However, the emerging line of research that arouses heated debate is that which is based on the concept of domain. The latter is a condition of equilibrium foresees that the companies commit themselves to structure without excluding exploration and vice versa. From this perspective, exploration, and exploitation are not simultaneously from the same organizational unit or domain, the balance derives from the ability of firms to manage exploration and exploitation in each domain. The studies oriented towards domain perspective, show that such activity enables organizations to achieve better performance results (Zhao *et al.*, 2019). Moreover, the research has produced inconsistent evidence because most of the studies examined ambidextrous practices focusing on a single perspective, which refers independently on exploration and exploitation, or external exploration and exploitation, disregarding the balancing opportunities across boundaries of the firm. Russo and Vurro (2010) were the first to cross this border. They define cross-boundary ambidexterity as the capacity of a firm to take benefit of balancing exploration and exploitation across its boundaries. Referring to the concepts of stakeholder domain, it was analyzing the tends of a firm to balance the exploration/exploitation towards internal/external stakeholder domain. In particular, the ability of a firms to manage internal/external exploitative/explorative stakeholder domain is namely as cross-boundary stakeholder orientation. This paper defines the need to introduce a new domain in which firms can achieve ambidexterity and observes its impact on financial, non-financial and innovative performance. To do this, the companies listed in 2018 in the Fortune 500 are examined, while the hypotheses are tested by running panel regression models covering the years 2010-2018. In particular, the longitudinal analysis explains the impact of cross-boundary strategies on company performance at time T+1. This approach to the separation of internal and external stakeholder domains offers new understandings into the benefits companies can derive from the balance between exploration and exploitation. Finally, this paper responds to the challenge of understanding the management of ambidexterity theory in inter-organizational contexts and outside the traditional domains of knowledge. In the following section, the literature review, the research hypotheses, and the methodological strategy are proposed. Discussion of the findings and possible implications from the study are also discussed.

2. Theoretical background and hypotheses

2.1 Internal/external exploitation/exploration in stakeholder domain

Exploitation strategies relate to aspects such as sophistication and productivity, while the exploration to aspects such as conducting tests and investigation (March, 1991). The term ambidexterity refers to the balance of these two opposing things, a balance that can occur over time and between different organizational areas. By improving both efficiency and innovation in daily operations, ambidextrous firms can both adapt and be responsive to current and future changes (Gibson and Birkinshaw, 2004). Although there is a broad consensus on the need for a balance between exploitation and exploration, and on the relative advantages that come with it, the debate

on the tensions that companies are called to manage and, on the difficulties, associated with such a difficult task is heated. The joint management of the two strategies requires both different organizational structures and processes (Burgelman, 2002), different strategic thinking, and contrasting time horizons (March, 1991). Consequently, the two strategies appear to be incompatible with each other, in term of same strategic area, procedures and time. The first reason for the conflict concerns the allocation of resources since the resources are scarce, companies should decide how to allocate them. Another reason is given by the self-reinforcing nature of the two strategies: the successes deriving from exploration will lead to greater exploration and the challenges of exploitation to greater exploitation. Despite the underlying tension, the synergistic balance could avoid the disadvantages of obsolescence that arises from exploitation and the lack of capacity for returns deriving from exploration. Thus, companies must know how to balance the two. The still open question is how this balance can be achieved. Although the researchers have proposed several solutions, it would seem that the use of an organizational domain is a proposal appreciated in innovative and relational vision of firms (Koza and Lewin, 1998; Lavie *et al.*, 2011; Russo and Vurro, 2010). According to the traditional vision of March (1991), companies operate with market players (the stakeholders) within an open system in which it is possible to solve the main strategic and operational problems of companies, for example the need for innovation, financial and material resources. Appreciating the importance of internal/external influences (Afuah, 2000; Deeds and Rothaermel, 2003; Hagedoorn and Schakenraad, 1994), some authors have investigated ambidexterity outside/inside traditional corporate boundaries. For example, the relationship with stakeholders upstream or downstream of the value chain is a way to acquire or obtain access to resources, knowledge, and skills (Grant and Baden-Fuller, 2004; Mowery *et al.*, 1996). The integration of new knowledge, as a prerequisite of the two strategies, requires changes in networks and the communication of relationships both inside and outside the company (Henderson and Cockburn, 1994; Lavie *et al.*, 2011). Having this knowledge allows the company to manage innovation processes more effectively, including both exploration and exploitation. For example, a good company-customer relationship provides information benefits and thus this relationship helps companies create more successful product innovations during innovation processes, and a good company-employee relationships can help companies generate greater economic returns from innovation processes (Zhao *et al.*, 2019). This commitment to the relationship with the stakeholders encourages them to identify more strongly with the companies and therefore to show more organizational citizenship behaviors. Zhao *et al.* (2019) have shown that good customer and employee relationships help companies to increase exploration/exploitation efficiency. Moreover, their study shows that a better relationship with these two categories of stakeholders reinforces the positive effects of exploration/exploitation on company performance.

In this paper, it was jointed a more sustainable view of stakeholder orientation suggesting that companies, to be more competitive and innovative, should embrace the interests of all categories of stakeholders, and not just some specific ones. Based on the above discussion, this study adopts a sustainable view of the stakeholder-firms relationship based on a holistic view of the company's stakeholder orientation, which includes all categories of stakeholders considering the canonical distinction between internal and external ones. Keeping inter-organizational and intra-organizational relationships, through a stakeholder orientation vision, represents an appropriate theoretical background to investigate the exploration-exploitation framework and their respective balance. Stakeholder orientation would allow companies to exploit complementary resources, reduce risks, and promote the stability of company life. At the same time, it could represent a vector for absorbing knowledge and know-how from stakeholders (Rothaermel and Deeds, 2004). In this study, it is suggested that pursuing a strategy of orientation to internal and external stakeholders through exploration and exploitation can represent an innovative way to solve the question of how to achieve the domain of ambidexterity. However, it is known that the via domain perspective provides that equilibrium is reached in different domains and at different times. Thus, it is proposed that companies should specialize in one of the two strategies of exploration and exploitation, in different domains. That is, pursuing an internal/external stakeholder domain level and vice versa.

Being able to pursue the two strategies at the same time within a single stakeholder domain, therefore only towards internal or only external stakeholders, implies compromises linked to the ability to allocate the resources necessary to satisfy the needs and requests of those specific categories of stakeholders. At the same time, it requires the management of pressures deriving from the continuous changes in the needs and demands of stakeholders. Then, it was proposed that *cross-boundary ambidextrous stakeholder orientation* is the ability of a firm to take advantage of the opportunities of simultaneously balancing exploration and exploitation across internal (i.e., within stakeholder' boundaries) and external (i.e., outside stakeholder' boundaries) stakeholder(s), "Therefore, the tendency of companies to explore/exploit a specific stakeholder domain is offset by exploitation/exploration in the other stakeholder domain. Thus,

Hyp. 1a: The tendency to exploit towards internal (external) stakeholder(s) will be compensated by the tendency to explore towards external (internal) stakeholder(s);

Hyp. 1b: The tendency to explore towards internal (external) stakeholder(s) will be compensated by the tendency to exploit towards external (internal) stakeholder(s), "

2.2 The impact of cross boundary ambidexterity on firm performance

While there are several arguments, the most fruitful research argues that it is important for companies to focus simultaneously on these exploitation and exploration. He and Wong (2004) demonstrate that proportional trends in exploration and exploitation are a necessary condition for a firm to perform better than its competitors. The debate raised by the researchers explains that companies should both exploit skills, in terms of know-how and relationships, and explore new ways both of knowing how to do and developing new relationships. In this sense, Zhao *et al.* (2019) observed that the effects of exploration/exploitation on the performance of the company are subordinated to two types of company-stakeholder relationships. Using the principles of trust, reciprocity, and commitment (Freeman, 1984), the authors argue that good company-customer and company-employee relationships can encourage customers to share their utility functions and allow employees to make specific investments. At the same time, a good relation facilitates the transmission of information between companies and their stakeholders. According to the authors, owning information from customers allows companies to turn that information into product innovation, and thus, in turn, have more success. Specific investments in human capital would help companies update and refine their absorption capacity and improve exploration and exploitation effectiveness. According to the authors, good relationships with customers and employees help companies to generate greater knowledge and therefore greater economic returns deriving from the two strategies. Zhao *et al.* (2019), therefore, observed that the orientation to two specific categories of stakeholders mediates the relationship between exploitation/exploration and corporate performance without embracing a holistic view of stakeholders or even a vision of a balance between the two strategies.

However, it is important to understand how these strategies can balance themselves within different stakeholder domains. For example, Katila and Ahuja (2002) have shown that intra-organizational ambidexterity benefits companies by improving their ability to develop new products. Uotila, Maula, Keil, and Zahra (2009) and He and Wong (2004) also observed positive impacts of intra-organizational ambidexterity on financial performance. Lin *et al.* (2007) investigated inter-organizational ambidextrousness and found that ambidextrous training is especially advantageous for large enterprises due to the environmental conditions and the networks of relationships with which they interact. In other words, it is possible to recognize that investments in aspects related to exploration or exploitation activities developed at different levels can lead to similar results (Cockburn *et al.*, 2000). In consideration of the necessity for a balance between exploration and exploitation and the related difficulties within the same stakeholder domain (i.e., internal or external), this study embraces the vision proposed by Russo and Vurro (2010) that companies that exploit internally while exploring externally and vice versa, they achieve greater

benefits. There is evidence that balancing different domains can benefit firms. Therefore, it is positing that cross-boundary exploration or exploitation strategies are substitutive, leading to lower firm performance. Thus, the tendency toward overfocus exploitative (explorative) stakeholder orientation leads to negative firm performance (Hyp 2), “ In particular:

Hyp 2a: There is a negative contingent effect between exploitation (exploration) towards internal stakeholder(s) and exploitation (exploration) towards external stakeholder(s) and firm financial performance;

Hyp 2b: There is a negative contingent effect between exploitation (exploration) towards internal stakeholder(s) and exploitation (exploration) towards external stakeholder(s) and firm non-financial performance;

Hyp 2c: There is a negative contingent effect between exploitation (exploration) towards internal stakeholder(s) and exploitation (exploration) towards external stakeholder(s) and firm innovative performance.

On the contrary, ambidexterity will be pursued across organizational stakeholder categories (i.e., internal, or external stakeholders), with exploitation towards internal stakeholder(s) complemented by exploration complemented by exploitation towards external stakeholder(s), and vice versa. Thus, the tendency toward cross-boundary ambidextrous stakeholder orientation leads to positive firm performance (Hyp 3), “ In more detail:

Hyp 3a: There is a positive contingent effect between exploitation (exploration) towards internal stakeholder(s) and exploration (exploitation) towards external stakeholder(s) and firm financial performance;

Hyp 3b: There is a positive contingent effect between exploitation (exploration) towards internal stakeholder(s) and exploration (exploitation) towards external stakeholder(s) and firm non-financial performance;

Hyp 3c: There is a positive contingent effect between exploitation (exploration) towards internal stakeholder(s) and exploration (exploitation) towards external stakeholder(s) and firm innovative performance.

2.3 Cross boundary ambidexterity matrix

Additional attention is dedicated to the concept of cross-boundary ambidextrous stakeholder orientation, as expressed in hypothesis 1. The Figure 1 summarizes the possible permutations achieved by combining explorative stakeholder orientation and exploitative stakeholder orientation across internal/external stakeholder domain. Of interests are the first and the third quadrant of the figure. The first combines internal and external explorative stakeholder orientation. In contrast, the second one combines internal and external exploitative stakeholder orientation. Since the strategies are simultaneously focused within both internal and external domains, we expect them to have a continuing negative effect on a company’s performance (Hyp2), “ Conversely, we have complementary relationships along the second and fourth quadrant of the figure. In particular, the second combines internal explorative stakeholder orientation with external exploitative stakeholder orientation, while the fourth ones combine internal exploitative stakeholder orientation with external explorative stakeholder orientation.

According to previous definition, these two quadrants represent cross-boundary ambidextrous stakeholder orientation, which we view as the ability of a firm to take advantage of the balance of explorative and exploitative stakeholder orientation within firms’ boundaries and outside firms’ stakeholder boundaries. In this sense, we expect a positive contingent effect on a firm’s performance (Hyp3), “

Fig. 1: Cross boundary ambidexterity matrix

Orientation Towards Internal Stakeholder	Exploration	Overfocus Explorative SO (-) I	Cross-boundary Stakeholder Orientation (+) II
	Exploitation	Cross-boundary Stakeholder Orientation (+) IV	Overfocus Exploitative SO (-) III
		Exploration	Exploitation
		Orientation Towards External Stakeholder	

Source: our elaboration

3. Research design

A suitable empirical setting for testing the hypothesis is composed of the large-capitalization U.S. firms from a broad range of industries, as listed in Fortune 500 during the period 2010–2018. According to previous research, there are no studies that have discussed the impact of exploitation and exploration strategies around the world. Existing research has been used in the context of the sample countries. Therefore, this research closes the gap using global companies listed in Fortune 500. Besides, numerous studies have examined the Fortune 500 to investigate corporate responsibility behaviors (Direction, 2020; Kurt, 2019) or the link between innovation and performance of these companies (Singh *et al.*, 2020; Mukherjee, 2020). This allows us to deem the sampling strategy adequate for the study. The data collection consisted of free phases. In the first phase, the list of American companies indexed among the Fortune 500 listed in 2018 was optimized. In the second phase non-financial reports of the Fortune 500 were collected, in the period 2010-2018. The collection of reports took place through research on the websites of companies, both from online archives. Non-financial reports are a valid tool for dialoguing with stakeholders, the companies in these reports classify, map, and transmit all stakeholder-oriented initiatives. For this study, the importance of examining the stakeholder orientation of companies through the study of non-financial reporting is evident. In the third phase, innovative and financial e non-financial data were collected. Data on patents and patents citation was collected from Orbis intellectual property database. Economic, financial, and sustainable data were collected from Thomson Reuters’ Eikon database. In the final phases, through the identification code of each company, the data was optimized in a single database to carry out the set of analyses.

3.1 Variable definition

Based on the objective of the study, the analyzes were performed through two successive steps. The first set of hypotheses tests the ambidextrous boundary by internal and external exploration-exploitation, respectively, as dependent, and independent variables, and vice versa. For clarity, Table 1 summarizes the composition of the dependent and independent variables in the models that were developed to test hypotheses 1a and 1b, as well as the predicted signs.

Tab. 1: Balancing Hypothesis 1

	Hypothesis 1a		Hypothesis 1b	
	Model 1	Model 2	Model 1	Model 2
Dependent Variable	External explorative SO T+1	Internal explorative SO T+1	External exploitative SO T+1	Internal exploitative SO T+1
Independent Variable	Internal exploitative SO (+)	External exploitative SO (+)	Internal explorative SO (+)	External explorative SO (+)

Source: our elaboration

Then, the second and third set of hypotheses test the impact of overfocus exploitation/exploration in stakeholder orientation and the cross boundary ambidextrous stakeholder orientation, on firms performance, respectively. To explain the relation hypothesized, in the table 2 it was summarizing the possible models.

Tab. 2: Balancing Hypothesis 2 and 3

	Hypothesis 2		Hypothesis 3	
	Model 1	Model 2	Model 1	Model 2
Dependent Variable	Performance T+1	Performance T+1	Performance T+1	Performance T+1
Independent Variable	Overfocus in Exploitative SO (-)	Overfocus in Explorative SO (-)	Ambidexterity between internal exploitative SO and external explorative SO (+)	Ambidexterity between internal explorative SO and external exploitative SO (+)

Source: our elaboration

In each model, the dependent and independent variables were delayed by 1 year. Each variable is further described in the section that follows.

Dependent variable. Internal/ external explorative/exploitative stakeholder orientation.

To operationalize these variables, we content-analyzed firms non-financial reports, which contain evidence about of firms' relationships with their stakeholders. Firstly, we used content analysis to study the language, lexicon, and expressions most often used by the researcher to explain exploration and exploitation strategies (Combs *et al.*, 2011). Uotila *et al.* (2009), for example, based on the exploration and exploitation wordlists given out by March (1991), they developed a content analysis and operationalized exploration versus orientation towards exploitation in business activities. A thorough understanding of all meanings of these definitions was made possible by the study of the reference literature on exploitation and exploration. The search strategy selected studies with the words "exploitation", "exploration" or "ambidextrous" in the title or abstract in the papers in Business Source Ultimate provided by EBSCO and in the main research databases. In order to make the object of the research more explicit, for each study, keywords were identified that would explain the concepts of exploration and exploitation, by doing so it was possible to obtain two complete vocabularies referring to exploration and exploitation. The vocabulary of exploratory strategies included 76 words such as "disruptive", "emerging" and "pioneer"; the exploitative vocabulary comprised 79 words which included terms such as "existing", "inside" and "past". These vocabularies were used for analyzing and conducting the content analysis of non-financial reports.

Considering that the volume of content analysis data is generally high, qualitative data analysis software can simplify the analysis process. In this study, the MAXQDA 2020 software was used, which made it possible to query the textual content of non-financial reports and explore the data, as well as to analyze the interrelationships between words in the vocabularies built to define exploitation and exploration strategies and stakeholder categories examined in the report. The analysis was performed for each company and for each of the non-financial reports available between 2010 and 2018 and was developed in two stages: first all the reports were codified by correspondence to the groups of internal and external stakeholders, then the individual codifications were queried on the basis of the vocabularies for exploitation / exploration strategies. This process

has allowed us to understand the orientation of companies in terms of exploration and / or exploitation strategies towards the two macro categories of stakeholders.

Finally, based on previous research which focused on the disclosure of non-financial reporting in terms of stakeholder management (Vurro and Perrini, 2011), the results obtained from the content analysis were used to make the variable operational. In particular, the domains reference to exploitation or exploration strategies ant oriented towards internal stakeholders (shareholders, managers, and employees) and external stakeholders (external investors, competitors, suppliers, customers, local community, NGOs, and the natural environment), “ Therefore, internal/external exploitative stakeholder orientation is the volume of exploitative practices by firm i at time t toward internal or external stakeholder j relative to all the others that are in the same categories, adopted to involve them and/or satisfy their needs. The following formula was used:

$$\text{Internal / external exploitative stakeholder orientation}_{itj} = \text{exploitative practices}_{itj} \times \frac{\sum_{t=1}^8 \text{exploitative practices}_{itj}}{\sum_{t=1}^8 \text{exploitative practices}_{it}}$$

Where *exploitative practices*_{itj} is the total number of exploitative sentences by firm i for internal or external stakeholder j at time t ; $\sum_{t=1}^8 \text{exploitative practices}_{itj}$ is the sum of the number of exploitative sentences by firm i for internal or external stakeholder j for the period observed, and $\sum_{t=1}^8 \text{exploitative sentences}_{it}$ is the number of exploitative sentences by firm i for all internal or external stakeholders respectively for the entire period of analysis. Consequently, the measure of internal/external explorative stakeholder orientation is the variety of internal/external stakeholder-related explorative practices pursued by firm i at time t . The number of reported stakeholder areas for each internal/external stakeholder j is divided by the total number of possible exploration issues for that categories of stakeholder. The following formula was used:

$$\text{Internal / external explorative stakeholder orientation}_{itj} = \frac{\sum_{s=1}^n \text{frequency explorative practices}_{itj}}{\sum_{s=1}^n \text{explorative practices}_{itj}}$$

where $\sum_{s=1}^n \text{frequency exploration practices}_{itj}$ is the total number of explorative sentences used by firm i for internal or external stakeholder j at time t , and $\sum_{s=1}^n \text{explorative practices}_{itj}$ is the total number explorative sentences used by firm i for internal or external stakeholder j at time t .

Cross-boundary ambidextrous stakeholder orientation concerns the balance between the internal and external exploitative and external and internal explorative stakeholder orientations. Following the same strategies used to calculate the ambidextrous stakeholder orientation, cross-boundary ambidextrous stakeholder orientation was operationalized as the absolute difference between the internal/external exploitative and external/internal explorative stakeholder orientations. To facilitate interpretation, also the reverse measure was evaluated, wherein a higher value indicates greater cross-boundary ambidextrous stakeholder orientation. Moreover, as a robustness check, in was test both the absolute difference and the reverse score.

$$\text{Cross - boundary ambidextrous } SO_{it} = 1 - |\text{Internal / external exploitative } SO_{it} - \text{External / external explorative } SO_{it}|$$

Independent variable. In line with the aims of the research performance is considerate as a three-dimensional concept based on financial performance, non-financial performance, and innovation performance. *Financial performance* was calculated using market capitalization. This variable is measured by Thomason Reuters as the end market price multiplied by the ordinary shares outstanding at the end market price, which represents the closing price of the company’s shares on December 31. Following stakeholder theory, it was deemed appropriate to study *non-financial performance* as well. Thomson Reuters’ social and environmental performance measures were used, counted as an overall company score based on the information reported in the environmental, social, and corporate governance pillars with an overlap of ESG disputes. Finally, innovative services were calculated based on the company’s patent rate, specifically the number of patents granted per year of application. Since it takes time for companies to convert internal and external

learning into output (innovation performance), a two-year decay time was assumed (Powell *et al.*, 1996).

Control variables. Some firm-specific factors were included to check for the possible heterogeneity in the tendency to connect exploration and exploitation at the company and industry level. Consistent with prior investigations, was control the size of the firm, which has been shown to influence exploration-exploitation. *Firm size* was measured as the natural logarithm of the number of employees. It was checked the financial performance as the secure *solvency* as the ratio of debt to equity. Financial profitability was calculated as *return on equity* (Lubatkin *et al.*, 2006; Rothaermel and Alexandre, 2009). Sustainability effects were controlled for using two variables that affect financial, non-financial, and innovative performance. The first one is, *CSR reporting score* indicates the communication skills of companies that conduct corporate and social responsibility in everyday practices. The second sustainable control variable is *Environmental expenditures*, that is the total amount of environmental expenses all investments and environmental expenses for the protection of the environment or to prevent, reduce, control environmental aspects, impacts and dangers. These kinds of expenses are voluntary and discretionary and require the support of stakeholders. Furthermore, many studies (Chen *et al.*, 2015; DesJardine *et al.*, 2019; Dowell and Muthulingam, 2017; Flammer and Kacperczyk, 2016) have highlighted that companies often advertise these projects through institutional annual reports and that they represent a way for companies to show their responsiveness to stakeholder expectations. Therefore, it was considered important to control analyzes with this variable. Finally, the industry effect using double-digit US Standard Industrial Classification codes (*industry dummy variables*) was used to control for sector. Since this dummy variable is not statistically significant, it is not shown in the resulting table, thus facilitating the analysis of the rest of the information.

3.2 Estimation procedures

It was implemented a model applying *cross-section time-series* regressions with fixed effects that control for unobserved heterogeneity. It was found to be equivalent or superior to random effects models based on Hausman (1978) tests. Moreover, it was preferred a fixed-effects control that recommends that the related models explain within-firm variation over time rather than interfirm variation in performance. Besides, tests for multicollinearity showed that the maximum variance inflation factor (VIF) index in the simulations did not exceed the crucial amount of 10 (Kleinbaum *et al.*, 1998) After carrying out the necessary checks, regression analyzes were developed to test the three set of hypotheses. In each model, each dependent variable was lagged by a time. Table 3 presents descriptive statistics and the bivariate correlation matrix.

Tab. 3: Descriptive statistics and correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Size	1.011	1.293																
2 ROE	1.332	1.427	.492***															
3 Solvency	4.686	1.326	.0204	-.078***														
4 CSR Reporting	.331	.470	.224***	.338***	.030*													
5 Environmental Exp.	.365	1.37e+07	.021	.191***	-.001	.254***												
6 Internal Exploitative SO	1.275	278	.161***	.263***	.001	.421***	.139***											
7 External Exploitative SO	312	773	.173***	.273***	.014	.403***	.282***	.682***										
8 Internal Explorative SO	.843	1.332	.178***	.321***	.023	.504***	.192***	.776***	.662***									
9 External Explorative SO	.953	1.538	.197***	.338***	.029*	.506***	.250***	.695***	.772***	.912***								
10 AFF	.0444	.2061	-.184*	-.031*	-.003	.021	-.010	-.002	.001	-.002	-.000							
11 MAN	.3393	.4735	.057*	.186*	.022	.141*	-.031*	.123*	.105*	.154*	.144*	-.154*						
12 TCE	.1434	.3505	-.127*	.075*	-.007	.103*	.353*	.045*	.151*	.093*	.128*	-.088*	-.293*					
13 WRT	.1717	.3771	.145*	-.217*	-.023	-.167*	-.082*	-.126*	-.102*	-.156*	-.136*	-.098*	-.326*	-.186*				
14 F&S	.2868	.4523	.009	-.054*	.005	-.085*	-.160*	-.053*	-.138*	-.091*	-.124*	-.136*	-.454*	-.259*	-.288*			
15 Non-Financial Performance	.2868	.4523	.437***	.496***	-.012	.593***	.193***	.350***	.328***	.439***	.4352*	-.019	0.1894*	-.0173	-.074*	-.0093*		
16 Financial Performance	.458	2.688	.457***	.807***	-.008	.342***	.150***	.199***	.228***	.282***	0.2972*	-.053*	0.1145*	0.0449*	-.0195*	0.0468*	.554***	
17 Innovative Performance	2.335	1.431	0.3167*	.413***	.027	.235***	-.065***	.167**	.168***	.233***	0.2186*	-.0128*	0.5783*	-.0253*	-.0276*	-.0200*	.326***	.420***

*** p<0.01, ** p<0.05, * p<0.1.

Note: AFF is Agriculture, Forestry and Fishing; man is Manufacturing; TCE is Transportation, Communications, Electric; WRT is Wholesale and retail trade; F&S is Finance and services

Source: our elaboration

4. Results

Result presented in Table 4 introduce the regression results mentioned to the several models used in this study to test hypotheses 1. As above explained, both for hypotheses 1a and 1b it was carried out two model, one for each possible combination. Table 5 show the regression model regarding hypothesis 2a and 2b, relating the suggestion of negative impact of overfocus exploitation and exploration strategies on firms performance. Finally, Table 6 include the interaction terms to access simultaneously the theoretical model in terms of the influence of the cross-boundary ambidexterity on the overall firms performance (hypotheses 3a and 3b). Finally, a number of control variables were incorporated, a hierarchical regression procedure was implemented.

Table 4 refer to the case suggested through Hypothesis 1a and 1b that relate, respectively, the tendency to exploit and explore internally stakeholder domain to the tendency to explore and exploit externally stakeholder domain. It was found support for Hypothesis 1a when firms tended to balance internal stakeholder domain exploitation strategies with external stakeholder domain exploration strategies. In the model 1 the correlation between internal exploitative stakeholder orientation and external explorative stakeholder orientation is positive and statistically significant (P<0.01). The model 2 show the reciprocity relation, that is internal explorative stakeholder orientation and external exploitative stakeholder orientation which is positive and statistically significant (P<0.01). On the other hand, Hypothesis 1b is reported in the model 1 and 2, which are supported as proved through investigation of the relation between internal/external exploitative stakeholder orientation and external/internal explorative stakeholder orientation (P<0.01).

This means that the tendency to exploit and explore within firms boundary (with internal stakeholder) is composed by the explore and exploit outside firms boundary (with external stakeholder). This means that the theoretical concept of cross boundary stakeholder orientation is confirmed.

Tab. 4: Result regression analysis (Hyp. 1)

Hypothesis 1a (T + 1)				
	<i>Model 1</i>		<i>Model 2</i>	
	CV	External Explorative SO	CV	Internal Explorative SO
Internal Exploitative SO		.121***		
External Exploitative SO				.037***
Size	.145**	.149**	.147**	.131**
ROE	.121***	.101***	.120**	.116***
Solvency	.001	-.001	.001	.001
Dummy sector	Included	Included	Included	Included
CSR Reporting	.704***	.601***	.615***	.506***
Environmental Exp.	1.061***	9.79***	5.571**	1.011
cons	-2.172**	-1.914***	-2.307***	-2.180
R-sq:	.3938	.5485	.3535	.5176
Number of obs.	2774	2774	2774	2774
F test	F(398,2370)=4.75	F(398,2369)=3.42	F(398,2370)=5.00	F(398,2369)=3.72
Hypothesis 1b (T + 1)				
	<i>Model 1</i>		<i>Model 2</i>	
	CV	External Exploitative SO	CV	Internal Exploitative SO
Internal Explorative SO		1.154***		
External Explorative SO				.226***
Size	.459	.353	.044	.016
ROE	.304*	.184	-.062	-.093
Solvency	.002	-2.490	.001	-.001
Dummy sector	Included	Included	Included	Included
CSR Reporting	2.254**	1.534***	.632***	.410***
Environmental Exp.	-2.140	-2.490	1.530**	1.770**
cons	-5.499*	-3.555	1.441	1.956
R-sq:	.1970	.3676	.2106	.3634
Number of obs.	2774	2774	3136	3136
F test	F(398,2370)=7.76	F(398,2369)=6.41	F(401,2729)=5.60	F(401,2728)=4.36

*** p<0.01, ** p<0.05, * p<0.1.

Source: our elaboration

Table 5 presents the results of the hypotheses 2a and 2b that required testing the effects of cross-boundary ambidexterity on firm overall performance. The set of Hypothesis 2 posits that internal exploitation and exploration represent a similar strategic intent on the part of external exploitation and exploration activities, respectively, since they are by nature substitutes. Thus, substitutive activities are expected to have a negative impact on the financial, non-financial, and innovative performance of the firm. It was found statistically significant support for this set of hypotheses. In particular it was found negative and significant correlation with a p-value <0.05 regarding the hypothesis 2a, that test the impact on financial performance. Concerning the hypothesis 2b and 2c, that test the impact on non-financial and innovative performance, it was found negative and significant correlation with a p-value <0.01.

Tab. 5: Result regression analysis (Hyp. 2)

Hypothesis 2a	Financial performance T+1		
	CV	Model 1	Model 2
Overfocus exploitative SO		-.028**	
Overfocus explorative SO			-.006**
Internal Exploitative SO		-.001	
External Exploitative SO		.004**	
Internal Explorative SO			.033**
External Explorative SO			.027*
Size	.419***	.319***	.414***
ROE	.200***	.163***	.195***
Solvency	.001*	.001	.001***
Dummy sector	Included	Included	Included
CSR Reporting	.121***	.154***	.094***
Environmental Exp.	-2.661**	-6.310**	-2.860**
cons	16.461**	-1.914***	16.546***
R-sq:	.4268	.3339	.4322
Number of obs	2706	2031	2706
F test	F(391,2309)=29.97	F(240,745)=26.61	F(391,2306)=30.12
Hypothesis 2b	Non-Financial performance T+1		
	CV	Model 1	Model 2
Overfocus exploitative SO		-.016***	
Overfocus explorative SO			-.461***
Internal Exploitative SO		.451***	
External Exploitative SO		.119**	
Internal Explorative SO			2.119***
External Explorative SO			1.010**
Size	6.881**	6.889***	6.738***
ROE	3.199***	.116***	2.949***
Solvency	.030**	.030**	.031**
Dummy sector	Included	Included	Included
CSR Reporting	5.668***	5.214***	4.664***
Environmental Exp.	1.540***	1.051***	1.360***
cons	-62.701***	-2.180	-61.143**
R-sq:	.4124	.4270	.4447
Number of obs	2774	2774	2774
F test	F(398,2370)=13.37	F(398,2367)=13.04	F(398,2367)=12.87
Hypothesis 2c	Innovative performance T+1		
	CV	Model 1	Model 2
Overfocus exploitative SO		-.011***	
Overfocus explorative SO			-.022***
Internal Exploitative SO		.009	
External Exploitative SO		.017**	
Internal Explorative SO			-.027
External Explorative SO			.175***
Size	.684***	.679***	.666***
ROE	.122***	.119***	.109***
Solvency	.002*	.002*	.002*
Dummy sector	Included	Included	Included
CSR Reporting	.186***	.152***	.127***
Environmental Exp.	-1.790	-1.810	-1.890***
cons	-5.499*	-3.116	-2.882***
R-sq:	.1235	.1278	.1301
Number of obs	2031	2031	2031
F test	F(296,1729)=138.42	F(296,1726)=39.10	F(296,1726)=140.22

*** p<0.01, ** p<0.05, * p<0.1.

Source: our elaboration

Finally, the last set of hypotheses 3a, 3b and 3c suggest that ambidexterity across internal exploitative and explorative stakeholder domain over external explorative and exploitative stakeholder orientation complement one another, thus having a positive effect on the overall performance of the firm. Table 6 reveal a positive and statistically significant effect ($P < 0.01$) of the interaction between internal exploitative stakeholder orientation and external explorative stakeholder orientation, and a positive and statistically significant effect ($P < 0.05$) of the interaction between internal explorative stakeholder orientation and external exploitative stakeholder orientation, on financial performance of the firm (Hyp.3a). The cross-boundary ambidextrous stakeholder orientation has a positive and significant effect also on non-financial firms performance. The result shows a positive and significant effect both for the model 1 ($P < 0.01$) and model 2 ($P < 0.05$) also for hypothesis 3b. Finally, also hypothesis 3c is verified ($P < 0.01$). Thus, the impact of cross boundary ambidextrous stakeholder orientation on financial, non-financial and innovative performance is validated.

Tab. 6: Result regression analysis (Hyp. 3)

Hypothesis 3a	Financial performance T+1		
	CV	Model 1	Model 2
Cross-boundary ambidextrous SO		.010**	.034**
Ambidextrous SO		.172	.172**
Size	.419***	.406***	.404***
ROE	.200***	.192***	.193***
Solvency	.001*	.001***	.001*
Dummy sector	Included	Included	Included
CSR Reporting	.121***	.105***	.104***
Environmental Exp.	-2.661**	-2.230	-2.190*
Cons	16.461**	16.665*	16.668***
R-sq:	.4268	.4353	.4397
Number of obs	2706	2706	2706
F test	F(391, 2309) = 29.97	F(391,2307) = 30.08	F(391,306) = 30.12
Hypothesis 3b	Non-Financial performance T+1		
	CV	Model 1	Model 2
Cross-boundary ambidextrous SO		.402***	.072**
Ambidextrous SO		.4171***	4.513**
Size	6.881**	6.592***	5.738***
ROE	3.199***	2.986***	3.342***
Solvency	.030**	.028**	.026***
Dummy sector	Included	Included	Included
CSR Reporting	5.668***	5.220***	9.141**
Environmental Exp.	1.540***	1.650**	1.610***
Cons	-64.701***	7.884***	-54.477***
R-sq:	.4124	.4316	.4963
Number of obs.	2774	2774	2774
F test	F(398,2368)=11.24	F(398,2368)=12.98	F(398,2368)=13.37
Hypothesis 3c	Innovative performance T+1		
	CV	Model 1	Model 2
Cross-boundary ambidextrous SO		.027***	.075***
Ambidextrous SO		.250**	.259**
Size	.684***	.640***	.640***
ROE	.122***	.105***	.107***
Solvency	.002	.001***	.001***
Dummy sector	Included	Included	Included
CSR Reporting	.186***	.160***	.155***
Environmental Exp.	-1.790	-9.670	-8.920
cons	-3.155**	-2.536**	-2.576**
R-sq:	.1235	.1300	.1413
Number of obs.	2031	2031	2031
F test	F(296,1729)=138.42	F(296,1729)=139.46	F(296,1729)=139.03

Source: our elaboration

5. Discussion and conclusion

This research aimed to empirically test whether, how, and with what impact on performance, companies can explore and exploit in specific stakeholder domain, leveraging across internal and external “stakeholder boundaries”. Hypothesis 1 suggested that companies in the network of relationships with their stakeholders, balance the adoption of exploitation and exploration strategies between stakeholder domains. In particular, hypothesis 1a assumed that firms balance exploitation strategies within the domain of internal stakeholders with exploration strategies within the domain of external ones. The inverse causality hypothesis assumed that firms balance exploration strategies within the domain of internal stakeholders with exploitation strategies within the domain of external ones. The analyzes carried out support the intuition of the misalignment of the two strategies of exploitation and exploration within the domain of internal and external stakeholders.

This means that organizational efforts in order to meet the needs of stakeholders must be managed in a complementary way between the stakeholder domains. For example, if the company focus on the exploratory relation with the employees (for example by adopting creative practices), it should adopt an exploitation strategy with external investors (for example, it could act in a standard way with them). And vice versa, if the company emphasis exploratory strategy with the supplier (for example by generating a new process), it should adopt an exploitation action with a manger (for example it could act with a routines).

Hypotheses 2 present the hypothesis that the company’s inability to manage strategic alignment between stakeholder domains would cause a negative impact in terms of financial, non-financial and innovative performance. The results support the hypothesis of a negative impact on the overall performance of the company due to an overfocus in the exploitation or exploration strategy. The literature regarding the two strategies generally agrees that too much efficiency or too much effectiveness cannot guarantee the success of the company. This orientation is also confirmed in the case of the domain of internal or external stakeholders. Companies that uniquely focus on a single strategy, only on exploitation or only on exploration, within the two domains of the internal and external stakeholders, frustrate their strategic efforts. The company, for example, should avoid adopting a hierarchical behavior with managers and at the same time with suppliers. On the contrary, it should avoid managing relations with shareholders independently and with competitors in an unpredictable way. The results show that the companies that act as in the proposed examples, obtain negative effects in terms of overall results.

The last set of hypotheses supports the counter hypothesis of the previous investigation set. Indeed, it is assumed that the misalignment of the two strategies of exploitation and exploration outside the boundaries of the stakeholders has a positive impact. In other words, the company’s propensity to manage the innovative strategies between the internal stakeholder domain and the external stakeholder domain in a complementary manner has a positive impact on the overall performance of the company. The organization thus reaches what is defined as cross-boundary ambidextrous stakeholder orientation, i.e., ambidexterity will be pursued across organizational stakeholder boundaries (i.e., internal, or external stakeholders). Again, the hypothesis that the stakeholder domain functions as an isolation mechanism is supported. Taking up the previous cases, the firms should adopt a hierarchical behavior with managers if act in an unpredictably with supplier; or should manage relations with competitor hierarchically and do something of unpredictable with shareholders. These cases are just some of the examples to explain how the company’s ability to manage the cross-boundary ambidextrous stakeholder orientation leads to positive results in terms of financial, non-financial and innovative performance.

Finally, this study also wanted to investigate the effect of the movement of time both of the compensation mechanism (Hyp.1), and of the impact on the performance of strategic alignment (Hyp. 2) and misalignment (Hyp.3) between the internal and the external stakeholder domain.

5.1 Theoretical and practical contribution

By providing a new perspective on how balance exploratory learning and exploitation activity in the context of organizational domains, this study contributes to the ongoing discussion of the concept of domain ambidexterity in the literature on innovative management. This study introduces the concept of cross-boundary ambidextrous stakeholder orientation defined as the ability of a company to use its stakeholder orientation, understood as the relational ability to listen, engage, satisfy, and integrate the interests of stakeholders, to simultaneously balance exploration and exploitation to the beyond its traditional stakeholder borders. In other words, companies should learn to manage relationships with their stakeholders by hosting in their strategic choices the requests and needs of both internal and external stakeholders, so they must reconcile exploration and exploitation outside their traditional borders.

This study responds to the emerging requests of numerous scholars who have advocated a conceptualization, operationalization, and contextualization of exploration and exploitation both in the inter-organizational and intra-organizational context, recognizing the importance of observing and studying the trade-offs between domains and borders organizational.

The results offer important managerial implications. Realizing a strong stakeholder orientation, then building strong and stable relationships with internal and external partners, allows you to maximize the value creation process associated with the balance between exploration and exploitation through ambidexterity. The study provides an alternative strategy to face the challenge in managing stakeholder interests and in the ability of companies to reconcile different needs to create value, make resources more efficient, and obtain benefits. For example, companies may decide to direct their efforts by exploiting and consolidating the existing relationship with internal stakeholders and, at the same time, explore relationships with new or with the same external stakeholders.

The proposed management model which is based on the concept of cross-boundary ambidextrous stakeholder orientation provides input into stakeholder interest management that managers should consider. In this sense, the study suggests a new perspective on the balance between exploration and exploitation or in the context of balance between the domains of internal and external stakeholders. Given the advantages of simultaneously pursuing efficiency and effectiveness, as well as the related difficulties due to the scarcity of resources available to create value for all stakeholders, and the conflicting organizational pressures, managers have an alternative balancing option at their disposal, namely achieving ambidexterity. beyond company borders.

The results of the analyzes show that the cross-boundary ambidextrous stakeholder orientation creates financial, non-financial, and innovative value for companies, therefore it can create value for all categories of stakeholders by triggering a virtuous circle of reciprocity.

5.2 Limits and future research

Although the study answers numerous questions still open in the debate in the literature on managerial innovation and ambidexterity, further research could support the evidence cited above. First of all, it would be interesting to understand how the dynamics of stakeholder domains apply to different entrepreneurial contexts. Future research on contexts of small and medium-sized enterprises would be useful to understand the portability of the theoretical and operational constructs of internal and external stakeholder domains, considering the hypothesis of their mutual balance. The specific characteristics of these enterprises could lead to unexpected results that both the theory and the practitioners cannot fail to consider. Furthermore, the specific traits underlying the characteristics of the two exploration and exploitation strategies could bring out interesting results if approached or supported by a qualitative strategy. This study aimed to test the achievement of cross-boundary ambidextrous stakeholder orientation and its consequences on performance in a holistic view of stakeholder orientation. The investigation of individual stakeholder domains both at an inter-organizational level and outside traditional boundaries is left

room for future research. Future research, for example, could identify which of the two strategies, exploitation, or exploration, it would be preferable to pursue considering the stakeholders individually (customer, manager, business, financial institutions, and so on) and the respective impact in terms of performance.

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Explorative and exploitative innovation in cross border r&d alliances Organizational Antecedents of Ambidexterity in Dutch and German SME's in a Interreg funding region

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Abstract

Objectives. We investigate explorative and exploitative activities of 86 SMEs participating in funded cross border R&D Alliances in a specific European funding region (Interreg-V-A- Program, European Union) in Germany and Netherlands. We argue (a) that innovation activities are positively related to cross border collaboration, and (b) that ambidexterity may arise from structural or contextual ambidexterity. We shed light on the impact of balanced organizational culture on the balanced interplay between explorative and exploitative innovation activities by applying the configuration model of organizational culture as a frame of reference.

Methodology. The quantitative research is designed to assess explorative and exploitative innovation activities, cross border collaboration and performance. We conduct descriptive statistics, T-Test and correlation analysis.

Findings. SME's are challenged to coordinate the interplay between explorative and exploitative innovation activities at the same time. Innovation activities are positively related to cross border collaboration and performance. Contextual ambidexterity is the more applicable concept for SMEs in this context, but we argue to set a complementary cultural balancing in interaction to ambidexterity to ensure also a culturally base of legitimacy.

Research limits. This ongoing study is limited to SMEs and organizational practices. The investigation of cultural values and the extension of the sample (e.g., Academia) would put further insights to this topic.

Practical implications. Major actors participating in funded cross border R&D Alliances, in particular senior management, should conceptualize a balanced culture beyond boundaries to foster innovation activities.

Originality of the study. A balanced interplay between exploration and exploitation activities requires dynamic cultural equilibrium.

Key words: Explorative Innovation; Exploitative Innovation; Ambidexterity; R&D Alliances; Cultural Values

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1. Introduction

SME's are required to generate constantly new competitive advantages in order to ensure long term survivability in complex and dynamic environments by balancing the exploration of new possibilities and exploitation of old certainties (March, 1991). 'Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation' (March, 1991, p. 71). 'Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution' (March, 1991, p. 71). Various literature argues that a firm has to become ambidextrous by pursuing both explorative and exploitative innovation strategies simultaneously. Organizations that engage in exploration are likely to find that they suffer the costs of experimentation but without gaining many of its benefits. Conversely, organizations that engage in exploitation are likely to find themselves trapped in stable equilibrium. Thus, it is reasonable to assume that ambidextrous organizations are more likely to create added value and competitive advantages than organizations where one of these strategies is pursued at the expense of the other (March, 1991). However, ambidexterity is associated with difficulties. Explorative innovation and exploitative innovation do not only have different characteristics in terms of their expected values, timing and risk taking (March, 1991), but also requires dynamic cultural equilibria. The paradox is, however, that these require different strategies, organizational structures, processes and capabilities to engage in exploitation to improve current viability and equally focus on exploration to ensure future viability. Pursuing explorative and exploitative innovation activities simultaneously is challenging for SMEs due financial constraints and information asymmetries, difficulties to identify and connect to appropriate knowledge partners and networks at the local, national, European and global levels.

The main questions which guide our research are:

1. How do SMEs participating in funded cross border R&D Alliances innovate?
2. Which organizational antecedents can help SMEs to coordinate the interplay between explorative and exploitative innovation activities?

In our ongoing study we specifically focus on explorative innovation and exploitative innovation regarding digital transformation in small and medium-sized enterprises¹ (SMEs), participating in funded cross border R&D Alliances in the European Interreg V-A region between Germany and the Netherlands by shedding light on the interplay between innovation activities and cultural dynamics. European Territorial Cooperation (ETC), better known as Interreg, is one of the two goals of cohesion policy and provides a framework for the implementation of joint actions and policy exchanges between national, regional and local actors from different Member States. Interreg A (under subject of this study) is focused on cross-border collaboration. In this particular study we focus on the Interreg V- A program (2014-2020) between Germany and the Netherlands. All SMEs in this study were funded by the European funding body Interreg-V-A (European Union) under the open project of Digipro with the aim to support cross border collaboration in R&D to with reference to digital technologies. One of the major priorities of this program is to increase innovation in form of products, services, processes and business models in sectors relevant for the border region and to reduce the barrier effect of the borders. Despite the unique research setting of the European cross-border funding region, we argue that our preliminary findings may be generalizable to geographic systems in other parts of Europe as well. The role of funding in R&D has been researched by many scholars, and findings suggest a positive relationship between funding and R&D expenditure. The role of R&D alliances in that respect is widely accepted and fits with the open innovation paradigms (Chesbrough, 2003).

¹ According to EU guidelines, SMEs can be defined as firms with fewer than 250 employees and an annual turnover not exceeding 50 million euros and/or an annual balance sheet total not exceeding 43 million euros (European Commission, 2005)

2. Theoretical background

2.1 Explorative and exploitative innovation

There is a growing body of research contributing to the knowledge of the balancing between explorative and exploitative innovation activities since March's (1991) pioneering article. An innovation can be defined as 'any idea, practice, or material artifact perceived as new by the individuals involved. ... As long as the idea is perceived as new to the people involved, it is an innovation, even though it may appear to others to be an 'imitation' of something that exists elsewhere' (Zaltman *et al.*, 1973, p. 10; Van de Ven, 1986 p. 591f.). Explorative innovation is the capability to explore new possibilities and involves the challenging of new markets which creates a high level of risk. The outcome of explorative innovation activities are radically new products, structures, processes, services and skills (Benner and Tushman, 2003; Mueller *et al.*, 2013). Exploitative innovation is based on improvements and refinements of existing products, services and skills which mainly aim at penetrating existing markets (Jansen *et al.*, 2006; He and Wong, 2004; Benner and Tushman 2003, p. 243; Mueller *et al.*, 2013). Organizations that are able to pursue simultaneously both explorative and exploitative innovation activities is known as ambidexterity (Gibson and Birkinshaw, 2004; O'Reilly and Tushman, 2004). In order to ensure long-term survivability, organizations are forced to generate competitive advantages, which underscores the importance of ambidexterity, to respond to multiple environmental conditions (Birkinshaw and Gupta, 2013; Tushman and O'Reilly, 1996; Jansen *et al.*, 2006).

A central debate in the literature is on how organizations achieve ambidexterity (Gibson and Birkinshaw, 2004; Lubatkin *et al.*, 2006; Jansen *et al.*, 2006; O'Reilly and Tushman, 2008; Jansen *et al.*, 2009; Birkinshaw and Gupta, 2013). Two streams of research on the antecedents of organizational ambidexterity are relevant for our study to derive practical implications for SMEs to coordinate the interplay of exploration and exploitation: (1) Structural ambidexterity focusing on organizational design, (2) Contextual ambidexterity focusing on alignment and adaptability.

Structural ambidexterity emerges from structural separation of exploration and exploitation in independent, but weakly integrated units to cope with the competing demands faced by the organization for alignment and adaptability. Highly specialized employees either in exploration or exploitation, different goals and strategies as well as different reward systems are found to be essential for structural separation. The integration and balancing of the exploration and exploitation units to ensure the alignment to the overall goals are predominantly driven by senior management (Tushman and O'Reilly, 1996).

Contextual ambidexterity emerges when senior management is able to create context within the same unit without separating explorative and exploitative activities. To achieve contextual ambidexterity, a context which is characterized by a combination of an appropriate level of performance management (discipline and stretch) and social elements (trust and support), is needed to simultaneously achieve necessary alignment (exploitation) and adaptability (exploration) to ensure long-term success (Gibson and Birkinshaw, 2004).

While prior research has established the importance of balancing exploration and exploitation activities for organizational performance in order to ensure long-term survivability (He and Wong, 2004), how it is best achieved is not fully understood (Jansen *et al.*, 2006; O'Reilly and Tushman, 2013). We therefore used this conceptualization in our research context in terms of distinguishing how SMEs innovate in the context of funded R&D Alliances.

H1: SMEs participating in funded cross border R&D alliances score higher in explorative innovation than exploitative innovation.

H2: Explorative innovation activities in R&D Alliances are positively related to cross border collaboration.

H3: Exploitative innovation activities in R&D Alliances are positively related to cross border collaboration.

H4: Explorative and exploitative activities are positively related to performance.

H5: Explorative and exploitative activities are positively related to digital transformation.

In the growing body of innovation literature, the importance of social structure and the role of cultural balancing is still neglected. In the current status of our ongoing study, we refer to institutional and cultural theories to shed light on the importance to conceptualize cultural equilibria beyond boundaries for balancing explorative and exploitative innovation in SMEs participating in R&D Alliances.

2.2 Institutional theory and cultural theory

Institutional theory is a powerful theoretical approach to shed light on cultural dynamics when analyzing organizational change through innovation behavior in the context of SMEs participating in cross border R&D Alliances. ‘It encompasses a large, diverse body of theoretical and empirical work connected by a common emphasis on cultural understandings and shared expectations’ (David *et al.*, 2019). Whereas classic organization theory stresses the idea that organizations are dominated by rational actors and their largely management driven interests, institutional theory emphasizes the social structure and external influences in an organizational field.

Institutional theory asserts the influences of the systems surrounding organizations that shape organizational and social behavior (Scott, 1995). According to Meyer and Rowan (1977) organizations as open systems are embedded in an institutional context, suggesting that organizational structures and procedures are reflections of environmental expectations. Organizations adapt practices and design formal structures to the ‘rational myth’ to gain and maintain legitimacy of their decisions and actions. From this point of view, it can be concluded that organizational structures and patterns of behavior are more shaped by institutional conditions, rather than efficiency criteria, to gain legitimacy for the survivability of the organizations. These influences are manifested in formal and informal institutions (Peng *et al.*, 2008; Dikova *et al.*, 2010). Formal institutions (North, 1990) are established and constituted by laws and regulations (e.g., European Union). Informal institutions are related to cultural and normative pressures which guide social behavior (Powell and DiMaggio, 1991; Scott 1995). The institutional theory assumes that organizations adapt and react to their institutional environment by isomorphic processes to gain legitimacy (Suchman, 1995, p. 574).

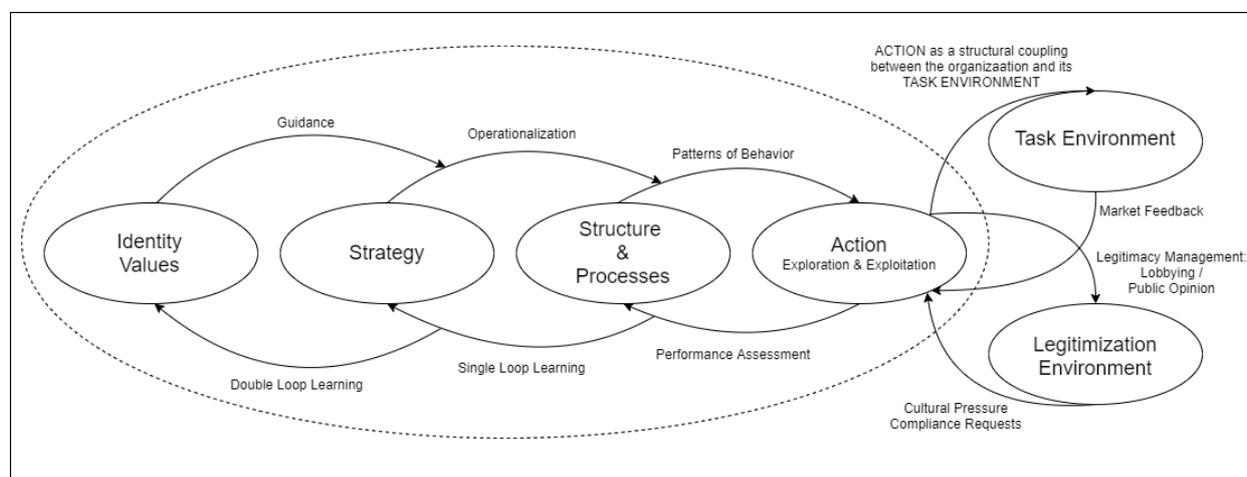
Scott (2001) identified several categories of relevant levels of analysis commonly used in relation to institutional theory - such as society and the organizational field - and argued that the key underlying dimension is the scope of the phenomena encompassed. Organizations operate under cultural pressure in line with their societal values in order to be recognized as a member of society (Sagiv and Schwartz, 2007). Hofstede emphasizes the differences between national values (Hofstede, 1980; Hofstede, 2001) and organizational practices (Hofstede *et al.*, 1990). Organizational culture differs at the level of practices, whereas national culture differs mainly at the deeper level of national values.

Institutional theory is not limited to national boundaries. It assumes an institutional field as a contextualized space where different organizations involve themselves in relation to matters relevant to them (Wooten and Hoffman, 2008), such as innovation practices. This reflects the considerations of both culture and innovation scholars to conceptualize culture and innovation beyond national boundaries. When differences in innovation practices are investigated in context of cross border R&D Alliances, the effects of cultural practices on innovation practices are likely to vary, compared to the national level of analysis. While at the national level cultural practices are likely to affect innovation practices indirectly through conforming effects in relation to formal institutions (Caprar and Neville, 2012) considered within cross border R&D Alliances, they are likely to have a more direct influence on innovation practices. On the one hand, this is due to the cultural embeddedness of innovation practices in cross border R&D Alliances. While cross border R&D Alliances do not represent formal entities, commonalities in cultural practices might affect

companies' innovation behavior. On the other hand, this is due to the weaker impact of formal institutions at the level of R&D Alliances compared to the country level of analysis. We argue that the level of analysis at which differences in innovation activities are accounted for will result in varying effects of cultural practices on innovation.

The configuration model of organizational culture (Yazici, 2015; Dauber *et al.*, 2012) provides a multidisciplinary approach for studying national values, strategy, structure and patterns of behavior as well as the impact of external environments in an organizational field (Figure 1). This framework has been chosen as an appropriate frame of reference to shed light on the cultural effects on organizational antecedents of ambidexterity (Jansen *et al.*, 2006, Tushman and O'Reilly 1996, Gibson and Birkinshaw, 2004). The configuration model of organizational culture represents a significant step forward to a more holistic, comprehensive and interdisciplinary approach to cultural dynamics in organizations by synthesizing seminal work in the fields of organization theory and culture theory (e.g., Argyris and Schön, 1974; Amburgey and Dacin, 1994; Chandler, 1962; Child, 1972; Schein, 1985, Hatch and Cunliffe, 2006; Meyer and Rowan, 1977; Harris and Ruefli, 2000; Whittington, 2001).

Fig. 1: Configuration model of organizational culture (Yazici, 2015; Dauber, Fink and Yolles, 2012)



We argue that innovation practices (Action) are tightly coupled to change by constantly balancing the interplay between the exploitative and explorative innovation activities. Innovation behavior is influenced by cultural dynamics of the internal and external environment and vice versa (e.g., national culture). The paradox that is associated with ambidexterity, however is that explorative and exploitative innovation activities may require different mindsets, strategies, structures, processes and skills to generate competitive advantages in their task environment (markets) and constitute a culturally supported base of legitimacy (Yazici and Karabag, 2019, Dauber *et al.*, 2012).

3. Research method

It is important to note that our ongoing study was originally designed for practical purposes to evaluate the outcome of the funding project Digipro within the Interreg-V-A-Program from the European union over the project period 2017-2021. In the evaluation of the program, scientifically interesting constructs were found, resulting in this ongoing study. Due to scientific and practical interests we extend our research to gain more knowledge about the effect of cultural dynamics on explorative and exploitative innovation activities in R&D Alliances (e.g., Jansen *et al.* 2006, Gibson and Birkinshaw, 2004; O'Reilly and Tushman, 1996; Cameron and Quinn, 2006).

The quantitative research design aimed mainly to analyze the group differences and the relationships between explorative innovation and exploitative innovation (Jansen *et al.*, 2006) in the context of German and Dutch SMEs participating in funded cross border R&D Alliances in a

European funding region. The data were acquired by surveying members of senior management and highly skilled professionals in SMEs across knowledge-intensive industries.

We relied on established constructs whenever possible. We developed items to analyze cross border collaboration and digital transformation responding to the problem of the diversity of measurements in digital transformation and cross border research. In interviews we asked for five goals which are perceived as important regarding digital transformation and cross border collaboration. The goal suggestions were transferred to a short form and ranked according to their importance. The rank orders were compared to each other. Finally, three goals regarding digital transformation (1. implementing digital strategy, 2. digital transformation of structures and processes, 3. digital business model) and four goals regarding cross border collaboration (1. joint business activities, 2. network, 3. R&D Alliances, 4. long-term partnerships) which are of high importance could be identified and classified into two categories to be included in a questionnaire. Extensive pre-tests with both researchers and practitioners were carried out in order to ensure the validity of our questionnaire (we also conducted a factor analysis, which results in the conceptualized factor structure). The pre-tests resulted in changes with regard to wording and layout. The newly developed items were translated into German and Dutch.

Explorative and exploitative innovation was measured adapting the validated items proposed in Jansen *et al.* (2006) for our purpose. This scale is widely used in research studies on a firm level (Jansen *et al.* 2006). The items were originally written in English. The items were translated into Dutch and German. As far as we know, the explorative and exploitative innovation scales have never been tested in context of cross border R&D Alliances.

The survey was distributed among the participants in three steps. First, we sent an invitation letter to explain the reason for our survey and ensure the legitimacy, then we send 166 invitation links to our survey via email. To guarantee a high response rate we contacted the SMEs randomly by telephone to invite them. We omitted 80 data sets, due to missing data, suspicious response patterns and inconsistencies in answers. Finally, 86 data sets were useful for further analysis (response rate 52%).

The data were collected with an online questionnaire (SoSci) and analyzed with SPSS, Version 25. All items were scaled on a five-point Likert scale from 1 (do not agree at all) to 5 (completely agree). The primary data analysis techniques employed by this study are descriptive statistics, reliability test (Cronbach 1951, $\alpha \geq 0.60$ is accepted), analysis of variance (T-Test) and correlation analysis. The T-Test is used to test for mean differences between two independent groups (Germany and Netherlands). If data violate the assumptions of the T-Test, then the Mann-Whitney-U test will be used to verify the mean differences. The homogeneity of variances was tested by the Levene test. Normality was tested by Kolomogorov-Smirnov. Due to the central limit theorem, the sampling distribution will be normal or nearly normal, when the sample size is large enough ($N > 30$). To avoid method bias (Van de Vijver and Tanzer, 2004) clear instructions for answering the items were given to increase the familiarity with the used response procedure. The relationships between explorative innovation, exploitative innovation, cross border collaboration and digital transformation were tested by using Pearson's Correlation (one-tailed).

4. Results

We analyzed the quantitative feedback of 86 senior managers and highly skilled professionals in SMEs participating in funded cross border R&D Alliances in a specific funding region in Germany and the Netherlands.

We conducted a T-Test for our four scales to analyze group differences. The Levene test as a precondition of T-test was non-significant. The assumption of the homogeneity of variances has been violated. To substantiate our findings, we conducted the non-parametric Mann-Whitney-U test to verify the mean differences. The results indicate significant mean differences between the two groups and are therefore useful for further analysis (Table 1).

Tab. 1: Mean, Standard Deviation, Cronbach's Alpha

Construct	α	Total		Netherlands		Germany	
		M	SD	M	SD	M	SD
Explorative Innovation	.83	3.25	.89	3.27	.84	3.21	.97
Exploitative Innovation	.78	3.35	.84	3.36	.76	3.34	.94
Cross border Collaboration	.84	3.85	.92	3.82	.93	3.89	.92
Digital Transformation	.88	3.91	.82	3.72	.86	4.14	.71
Gültige Werte (Listenweise) 86							

According to our first guiding research question 'How do SMEs participating in funded cross border R&D Alliances innovate?' the data indicates that SMEs participating in funded R&D Alliances pursuing both explorative and exploitative innovation activities. There is a statistical difference between explorative innovation and exploitative innovation. The data suggest that SMEs score higher in exploitative innovation activities (M=3.35, SD=0,84) compared to explorative activities (M=3.25, SD=0.89). Thus, H1 is not supported.

The following table shows the statistical differences on item level (Table 2).

Tab. 2: Item level, Mean, Standard Deviation, Cronbach's Alpha

Items	Total		Netherlands		Germany	
	M	SD	M	SD	M	SD
Explorative Innovation						
New Product, Service, Business Model	3.64	1.23	3.70	1.06	3.56	1.41
New Structures and Processes	3.25	1.06	3.13	1.11	3.41	0.98
New Supply Chain	3.11	1.14	3.09	1.09	3.14	1.21
New Markets	3.21	1.20	3.29	1.08	3.11	1.35
New Distribution Channels	3.00	1.22	3.20	1.13	2.76	1.30
Exploitative Innovation						
Refine Existing Product, Service, Business Model	3.62	1.04	3.60	0.90	3.64	1.20
Improve Structure and Processes	3.57	1.07	3.51	1.04	3.63	1.13
Improve Supply Chain	3.20	1.17	3.13	1.02	3.29	1.33
Increase Economy of Scale Existing Markets	3.13	1.19	3.24	1.10	3.00	1.29
Expand Services for Existing Clients	3.19	1.21	3.35	1.08	3.00	1.35
Digital Transformation						
Strategy Implementation	4.08	0.92	3.98	1.01	4.21	0.80
Structures and Processes	3.94	0.94	3.68	0.93	4.26	0.85
Business Model	3.71	0.96	3.51	0.95	3.95	0.92
Cross border Collaboration						
Joint Business Activities	4.04	0.92	3.98	0.90	4.10	0.94
Network	3.91	1.03	3.83	1.06	4.00	1.00
R&D Alliance	3.85	1.19	3.83	1.18	3.87	1.22
Long-term Partnership	3.66	1.14	3.72	1.03	3.59	1.27

The data indicates statistical differences on the item-level between Germany and the Netherlands. While Dutch SMEs score higher in explorative and exploitative innovation, German SMEs score higher in 'Cross border Collaboration' and 'Digital Transformation'.

The following table (Table 3) shows the relations between explorative and exploitative innovation activities, cross border collaboration, digital transformation and increase of sales (performance). Due to the central limit theorem, the sampling distribution will be normal or nearly normal (N>30).

Tab. 3: Correlation Analysis (Pearson)

Correlations				
Constructs	Explorative Innovation	Exploitative Innovation	Cross border Collaboration	Digital Transformation
Exploitative Innovation	.72**			
Cross border Collaboration	.62**	.48**		
Digital Transformation	.22*	.14	.28**	
Increase Sales (Performance)	.59**	.67**	.32**	.11

* p < .05; ** p < .01.

The data indicates relative strong significant correlations between ‘explorative innovation’ and ‘cross border collaboration’ (r=.62, p<0.01). Thus, H2 is supported. ‘Exploitative innovation’ is positively related to ‘cross border collaboration’ (r=.48, p<0.01). Thus, H3 is supported. ‘Explorative innovation’ is positively related to ‘increase sales (performance)’ (r=.59, p<0.01). ‘Exploitative innovation’ is positively related to ‘increase sales (performance)’ (r=.67, p<0.01). Thus, H4 is supported. ‘Explorative innovation’ is relatively weak related to ‘digital transformation’ (r=.22, p<0.05). There are no statistical relations between ‘exploitative innovation’ and ‘digital transformation’. Thus, H5 is partly supported.

5. Limitation and future research

Our study faces several methodological and conceptual limitations, which provide valuable opportunities for further research. A potential extension of our study could be the examination of balanced organizational culture in relation to balanced explorative and exploitative dimensions to gain knowledge about the social structure in R&D Alliances. The main limitation is the cross-institutional design of the empirical data which does not allow for the verification of the causality of the results. We focus on senior management and highly skilled professionals involved in R&D Alliances. The results do not offer detailed insights into an organization specific interplay of explorative and exploitative innovation activities, but it reveals insights into the specific R&D Alliance context. Comparative studies on national values in relation to innovation would provide further insights on this topic. In order to avoid common method bias (Podsakoff *et al.*, 2003), we asked different subjects on dependent and independent variables and use more than one person per examination unit as a subject. A common-method bias can generally not be ruled out in this research. Despite unique research setting of the European cross-border region, we argue that our preliminary findings may be generalizable to geographic systems in other parts of Europe as well.

6. Discussion and practical implications

Our ongoing study contributes to the research on innovation and cultural dynamics in two respects: (1) we tested explorative and exploitative innovation practices using data sample which covers SMEs participating in funded cross border R&D Alliances in various industries. (2) Our study adds to the research on cultural dynamics by interpreting our results in light of cultural values by suggesting the use of the configuration model of organizational culture. Our study also provides practical implications for senior managers of SMEs, funding bodies, and academia participating in funded cross border R&D Alliances.

In support of the theoretical arguments, we come to the conclusion that SMEs participating in funded cross border R&D Alliances should coordinate exploration and exploitation activities at the same time and constantly balance the interplay between exploitation and exploration activities to achieve ambidexterity.

In order to address the organizational paradox associated with the ambidexterity, senior management can either coordinate explorative and exploitative activities by designing separate

organizational units (structural ambidexterity) or they can create an organizational context that supports exploration-oriented and exploitation-oriented activities within the same organizational unit (contextual ambidexterity). However, considering the results in contexts of small and medium sized enterprises participating in cross border R&D Alliances in a specific funding region, contextual ambidexterity seems to constitute the more generally applicable concept due to organizational size, financial constraints and regional advantages (e.g., special relationships with local companies, access to local companies and academia, information flow). The interaction between performance management and social support creates a high-performance organizational state which helps to coordinate the interplay of explorative and exploitative activities. While structural and contextual ambidexterity are often discussed as opposite positions, we argue to set a complementary cultural balancing in interaction to deal with paradoxes of exploration and exploitation activities at the same time to ensure also a culturally base of legitimacy in an organizational field.

Explorative and exploitative innovation goes along with the imagination of new ideas, but at one point in time, when it comes to implementation and commercialization, interdependence emerges, and a more collectivistic undertaking is required. Innovation activities, which are, by definition, complex and of high risk, require collaboration and networking skills on the intra-organizational level as well as in interaction with the broader stakeholder environment. Therefore, senior managers, funding bodies and other major actors in R&D Alliances should encourage cross border collaboration (e.g., joint business activities, networks, long-term partnerships) by balancing cultural dynamics and innovation ambidexterity in an organizational field.

We argue to conceptualize a culture beyond national boundaries when balancing explorative and exploitative innovation activities in SMEs participating in funded cross border R&D Alliances. While culture at the national level of analysis has indirect influences on innovation activities, organizational culture directly influences innovation activities on the level of practices. We argue that commonalities in cultural practices on innovation behavior might affect companies' innovation outcome in an organizational field.

We suggest using a holistic approach when investigating the various cultural effects on organizational antecedents of ambidexterity in context of cross border R&D Alliances in an organizational field by conducting the configuration model of organizational culture as a frame of reference.

A dynamic cultural equilibrium that provides meaning to social behavior is a decisive factor in responding to changes through explorative and exploitative activities. A culturally supported base of legitimacy is expressed by its balanced values, goals and strategies through structures and operations in relation to their task and legitimization environments. Senior management should think holistically. Neglecting the cultural perspective in a cross-border R&D context would limit the abilities to face the complexity and dynamics of the external environments in order to create competitive advantages and a culturally supported base of legitimacy. We suggest that a balanced organizational culture foster a balanced interplay of explorative and exploitative activity.

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Digitalization as an enabler of multi-lever internationalization of firms

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Abstract

Objectives. *This work aims to investigate how institutions support companies to develop digitization processes and how these processes affect the performance and evolution of corporate activities in an international context with a view towards sustainable development.*

Methodology. *To accomplish this aim, a bibliometric analysis on scholars contributions is conducted and an analysis of reports by member states is presented via illustrations.*

Findings. *Three main issues guide the implementation of digital technologies in the domain of business internationalization: innovation, entrepreneurship, and market and competitive advantage. All these elements act as bridging elements between digitalization and internationalization, as they offer opportunities to join the international arenas.*

Research limits. *This research is based on official reports by member states, therefore further step of analysis on firms implementation of digital technologies would complement the insights acquired.*

Practical implications. *The implementation of digital technologies act as a catalyzer of internationalization process and multiple pathways towards the achievement of a fruitful internationalization may be achieved by firms.*

Originality of the study. *To the best of our knowledge this is one of the first studies operationalizing the digital technologies in the domain of international business strategy and to observe this phenomenon from the perspective of national governments.*

Key words: *Digitalization; Internationalization; Innovation; Institutions; Bibliometric analysis; European Union*

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1. Introduction

Both scholars and practitioners consider digitalization and internationalization as pillars of the development paths firms can set in the current scenario; indeed, digitalization offers opportunity to access resources and skills, and to enable learning and knowledge abroad (Coviello *et al.*, 2017); likewise, Ghemawat (2017) recalled the outcomes of globalization - including its dark side - and recognized the role of digital technologies in furthering the activities to be developed abroad, since the digital word may counteract the limitation of the physical ones and continue 'the explosive growth of cross-border digital flows'. Anyway, the author stressed the need to consider also other factors that are needed to support firms' growth abroad, including regulations, the role of language and culture, shipping, and the intangible assets that can be hardly transferred via digital technologies. The same posture on the contribution of digital technologies to the international development of firms is adopted by the Association of Craft and SMEs in Europe - SME United - as one of its spokespersons participated to a workshop recently organized by the European Union (2020) and stated that support to digitalization is needed for SMEs in order to favour the development of their abroad business policies. Accordingly, the European Commission set the SME Strategy for a sustainable and digital Europe to seed the further development of the Single Market and stressed the need to involve local and regional authorities. Very recently, also Chinese government (2021) claimed the relevance of digitalization as its related instruments offer an opportunity to increase global competitiveness of Chinese firms, thus efforts are called for to fill the extant digital divide and improve the commercial performance of the entire Chinese Economy.

Due to the interest that digital revolution represents for business in general (Forbes, 2021), as well as the need to further understand how Industry 4.0 may impact organizations and its related business models (Remané *et al.*, 2017), as well as the infusion of digital technologies in their international strategies (Dachs, 2018; Azoeva *et al.*, 2020; Bettiol *et al.*, 2020), this research deals with the interplay between digitalization and internationalization. More in detail, the aim of this research is to understand which areas of an organization are mostly affected by digital technologies and how the implementation of these technologies may enable the achievement of suitable conditions to compete in international arenas. In order to reach this aim, the authors will perform a literature review to lean on the recent advances scholars offered and to investigate the elements emerged from scholars contributions into the policies European governments launched at national level to support firms' digitalization. Therefore, the next sections are devoted to a literature review on the contributions combining digitalization and internationalization, to describe the methodological approach we adopt, and to grasp meanings from what governments proposed to local firms. Finally, implications, limitations, as well as consideration for further research are presented.

2. Literature review

2.1 Rationale for review

Due to the need to understand the variety of factors shaping the debate between digitalization and internationalization, the authors of this research decided to opt for a bibliometric analysis, as it offers a chance to have a wide perspective on a certain topic (van Raan, 2005) and to have an objective and unbiased way in the identifying of the most relevant issues (Scherngell *et al.*, 2013). Additionally, bibliometric analysis proved being useful in recently developed debates (e.g., Colurcio *et al.*, 2017) and its use supports the analysis of research in crossing multiple disciplinary fields as well as fragmented research streams (Aria and Cuccurullo, 2017). Consequently, this section reviews the literature on digitalization and internationalization in the domain of business and management; due to the quite common use of digitization as an alternative to digitalization, the authors checked this alternative not to miss relevant contributions. Anyway, no significant changes

emerged. Moreover, the authors chose to analyse the contributions in international journals and to discard proceedings in order to avoid considering twice some research efforts and to focus on solid contributions, too (de Carvalho *et al.*, 2020) and to run this research in Web of Science - Web of Knowledge (hereinafter WoS-WoK), as it covers most of the key scientific sources (Birkle *et al.*, 2020). Due to these review criteria, the dataset the authors consider in this research initially consisted of 366 contributions; when filtering them based on the discipline fields 'Business' and 'Management' only 101 remained; further on, the discarding of proceedings paper led to the final dataset being composed by 79 contributions. These contributions are sourced from 54 different journals - showing a fragmented debate on the topic - range from 2005 to 2021, with few authors contributing with more than 2 papers and USA, Canada, and England being the more active countries in this field of research. Finally, the bibliometric analysis has been performed through Bibliometrix and Biiblioshiny (Aria and Cuccurullo, 2017), in order to benefit from its compatibility with WoS-WoK, its ease of use, and the multiplicity of analyses one can perform with these tools. A co-words on authors' keywords was chosen as suitable analysis as mirrored in recent studies on Industry 4.0 (Cobo *et al.*, 2018) and due to the highly informative role of authors' keywords (Weismayer and Pezenka, 2017); association was chosen as an index for normalization, since no particular differences usually emerge when opting for other indices (Leydesdorff and Zaal, 1988).

2.2 Review of contributions

The co-words analysis is represented through the use of Biblioshiny as a network of co-occurrence, leading the authors to identify three main categories shaping the debate on digitalization and internationalization. These categories deal with innovation, entrepreneurship, and markets and competitiveness; in next lines these three categories are described in order to show the interplay between digitalization and internationalization.

Fig. 1: Network visualization on the dataset from Web of Science



Source: Authors' elaboration through Bibliometrix

Anyway, these categories should not be thought as totally separated one another, neither the contributions are considering these topics separately. For instance, Lee and Falahat (2019) considered the contribution of digitalization to marketing activities to set competitive advantage and innovate products and the way they are marketed in international arenas, thus combining marketing and innovation and framing them as connecting elements between digitalization and internationalization.

The first category groups contribution describing the effects of industry 4.0 on both innovation and internationalization; one of the first contribution in this category is Lee *et al.* (2008), as they had a pioneering view on the digital technology and the technological convergence, long before Industry 4.0 would have emerged; the authors consider the international collaboration networks as a way to concretize the advantages of R&D efforts to leverage on both external knowledge and capabilities. As soon as Industry 4.0 became a significant trend, new contributions emerged, as Igartua *et al.* (2018) that investigated the challenging conditions brought by Industry 4.0 in the innovation process of SMEs; their focus led to consider the need to frame the new digital technologies in the right areas of an organization, thus furthering the need for suitable models to be adapted based on the maturity level of each organization and its areas. The innovation goals set by these firms and the learning-based outcomes may pave the way towards an international development also for SMEs; anyway, contextual conditions and market dynamics should be carefully taken into account. A contribution more oriented to the effects of the implementation of new digital tools was offered - at both a theoretical and an empirical level - by Li *et al.* (2019) as they identified the effects of digital transformation on innovation networks in a multinational context; indeed, the multinational companies they analysed showed a positive impact of mergers and acquisition on both domestic and international innovation. Moreover, these effects are expected to be more relevant in emerging markets if firms set the right conditions to create a balanced network to support innovation and its multiple sides. A similar view on the benefits of further crossing a firm boundaries can be found in Mubarak and Petraite (2020), as they first described the key features of the Industry 4.0, then observed the role it plays on the open innovation strategy of firms in a cross-country investigation; their analysis led to consider innovation as the bridging element between digitalization and a positive performance in international markets, with effects depending on the moderating and mediating role of technological orientation of firms, thus stating firms need to acquire digital trust to accelerate their pace of open innovation and the achievement of goals in an international domain. The need for this acceleration was also stressed by Indrawati *et al.* (2020) as they found some factors hindering the development of technological innovation at an international level since firms - especially SMEs - miss the due support from government and financial institutions to fill their gap; anyway, the authors stated that an internal attitude to innovate should be furthered by these firms, also through partnerships. To sum up, the first category considers innovation as a mediator for the implementation of digital technologies in an international domain for multiple goals, as the acquiring of knowledge, the improvement of capabilities, and the international development of operations, but this change requires skills for and an orientation towards new visions on innovation and the willingness to collaborate with other entities.

The second group refers to contributions investigating entrepreneurship as a consequence of the identifying of novel opportunities from digital technologies in an international domain. Autio (2017) set a framework for international new ventures as he observed the contribution of digital infrastructures and a propensity for learning to experiment operations abroad. Indeed, he stated that a solid position in foreign markets may be acquired if firms strategically use organizational capabilities and learning orientation to acquire the dynamic capabilities enabled by digital tools and set a proper strategic process of internationalization. A different approach is proposed by Shaheer *et al.* (2020) as they investigated the internationalization process in a digital context, thus they consider the opportunities for international entrepreneurship as deriving from the effects of digital technologies on the context. This latter is transformed by new technologies, since also customers start being engaged and behave differently due to technologies, thus both firms and customers are part of a global market in which the digital side is a key element that allows overcoming the barriers to internationalization. Likewise, Hervé *et al.* (2020) referred to the changes affecting global markets and the opportunity they create also for micro-firms and SMEs; additionally, these scholars also stated that the more organizational functions are digital, the higher the chance to assume successful decisions in setting the strategy for international markets. Therefore, the digital technologies affect both entrepreneurial orientation and a firm's capability, due to the effects on strategizing. Finally, Martinelli *et al.* (2020) focused on the disruptive role of digital transformation

in a different business realm, namely in well established businesses with a long-time international presence. In this context, firms are challenged by the need to adapt oiled mechanisms, and the knowledge and the experience firms acquired throughout time, as well as the knowledge at an industry-level - may guide firms in such a complex process of change and in keeping the relevance acquired in international arenas. To sum up, this second category shows the role of digital technologies in furthering new opportunities in the international markets for both new ventures and well-established organizations. Scholars agree in stressing the need to leverage on the opportunities of digital technologies both internally and externally, namely to run digital-based operations and to benefit from the digitalization of international markets.

The third group describes the contributions of authors based on markets and competitiveness; thus, they observe the impacts of digital transformation on firms' positioning in markets and their strive for competitive advantage. In 2016 Grönroos recalled one of his publications from the 90s to review the internationalization strategies of services firms in light of the changes brought by Internet and digitalization. Besides recognizing some factors that continue to affect the process of internationalization of services and the international marketing choices, he identified the new ways of internationalizing since novel technologies offer opportunities to offer services globally. Therefore, he acknowledged the role of digital technologies in creating an even more global market for services firms. Few years later Joensuu-Salo and colleagues (2018) identified a research gap on SMEs internationalization and analysed the interplay among digitalization, market orientation, and marketing capabilities in the process of internationalization. Marketing capabilities appear to be improved via the proper implementation of digital technologies and act as a mediator towards success in the international markets. Indeed, these scholars stressed that in international firms there is no direct impact of digital technologies on success in international markets, since only through the infusion of novel technologies in marketing activities and market orientation there can be beneficial effects; on the opposite, they state that digitalization may perform direct effects on the internationalization of firms that are about to start their process of internationalization, since they are still shaping their market orientation.

A different perspective is adopted by Liu *et al.* (2019) as they observed the contribution of digital technologies to the development of new forms of competitive advantage, leading to the reshaping of business models; indeed, they consider digital technologies as the levers to react to environmental changes, expand the market domain, and allow to properly position a firm into markets, especially technologically-driven ones. Therefore, the implementation of digital technologies is an inside-out process starting from the decisions to build new conditions for competitive advantage, updating all the elements of a business model, and leading to a new positioning in the markets, especially the fast-moving ones. Finally, a conclusion similar to Joensuu-Salo and colleagues (2018) is proposed by Cassetta *et al.* (2020) as digital skills should be meant as a driver to change the information-based processes along supply chains. Therefore, their contribution is aligned with the previous ones, but they address some more the need to leverage on e-business technologies to have a positive impact on the internationalization, thus setting a competitive advantage depending on the abilities of firm to invest and innovate their skills. Additionally, they provide evidence of the need - mainly for SMEs - to struggle between different technological alternatives related to the specific industry or the context a firm is part of. In summary, the digital technologies are meant to be levers to improve the competitive advantage of firms and their positioning into markets, with beneficial effects being more evident in turbulent markets.

3. Research process

The literature contributions underlined that digitalization can support firms in carrying on the international development, through effects on innovation, entrepreneurship, and markets and competitiveness. In detail, our study aims to observe how supranational and national institutions -

with special reference to the European Union - are following this direction and how they are stimulating and supporting interventions addressing these effects. To accomplish this goal, a qualitative research approach has been adopted, in line with the methodological guidelines in business research (e.g., Johnston *et al.*, 1999) in comparing theory with practice; the analysis has been conducted on official reports provided by the governments of European Union countries to observe the advancement in the digital transformation of firms. European Union adopted the so-called 'Digital Economy and Society Index' (DESI), "*a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness*" (EU, 2020), to define a ranking of the Member States on the basis of their dealing with the digital transformation of local industries. All the reports collected via official sources were published in 2020 and most of them are approximately 40 pages. This ensures homogeneity in the analysis. The choice of documents issued by central institutions also ensures objectivity - since reports are not issued from organizations - and timeliness - as they have been issued with reference to the same central policy. The analysis of such documents is in line with other business studies (Mnif and Gafsi, 2020), also on internationalization (e.g., Konstantynova, 2019).

As documents have a similar structure and adopted a similar perspective, but conveying different messages, a comparative design approach has been considered suitable. It was decided to use documents provided by the European Union jointly with the governments of the member states given the authoritativeness and the reliability of the sources. Furthermore, since the reports were all coordinated by the EU, we reduced the risk to have partial information and observations as the meanings attributed to the concepts, as well as the aims pursued, were comparable and presented in a similar way.

In practice, in line with the results of the bibliometric analysis, we focused our observation of the official reports on the three main aspects emerged from the literature review, namely the connection between digitalization and internationalization through (1) innovation, (2) entrepreneurship and (3) the competitive advantage as a goal for companies, in the domain of the planning and implementing of a digital transformation process. The results of this step of the analysis are presented through illustrations, as suggested by Hair Jr. *et al.* (2019) to provide evidence of the phenomenon under investigation.

4. Findings

For all the countries analyzed internationalization is a very hot topic, as in most cases it emerges as a not-to-be-missed strategy for firms to survive in the globalized market. Many scholars pay attention to the role of SMEs, as, for them, international development can be an opportunity (thanks to their flexibility) as well as a threat (due to the difficulties they could face to acquire resources and managing risks). In most cases, innovation of processes is considered both a tool and a goal in doing business, with special reference to those processes linked to the human resource management and the achievement of resources that can represent a way to be different and more competitive on the global market through an innovative approach and innovative offerings:

"(The Spanish Instituto Nacional de Ciberseguridad) has been active in supporting SMEs' international growth and developing new Spanish cybersecurity start-ups by implementing several target programmes and orchestrating different networking, workshops and collaborative activities";

"(In Lithuania, the purpose of the Inocluster project) is to promote cooperation between private legal entities and / or other entities in the R&D activities. Program supports clusters' operation (research strategies, market research, training, marketing, cooperation projects, international projects) and also investments in R&D infrastructure in cluster".

In detail, most of the governments consider the internationalization process to be an opportunity to cooperate with other countries through a network approach, and to improve the firms' performance and favor national economic and social sustainable development. Furthermore, it is also a way to acquire new resources to make more efficient the production process and the services provision:

“(In Germany, the Industry 4.0 Strategy and Industry 4.0 Platform) support SMEs with specific service offerings, such as the online map of use cases, the compass for Industrie 4.0 orientation, the online library and with their engagement in the Transfer-Network Industrie 4.0. drives national and international exchanges through numerous bilateral and multilateral cooperation - particularly in the areas of IT security and standardization”;

Also, innovation emerges as strictly linked to the international development supported by the digitalization process. In fact, new technologies and other innovative tools are considered to be very useful to improve employees' skills and protect the firms' developing cybersecurity initiatives. Cybersecurity emerges as a very important issue for managers and workers; for example - as per the illustrations above -, the Spanish Government consider cybersecurity as a very important aspect in dealing with international development and the participation in networks and programs involving several actors. Lithuania's Government stresses the importance of promoting cooperation between different categories of entities and investing in R&D initiatives. Similarly, the German Government highlights the support offered to SMEs in national and international exchanges promoting instances of bilateral and multilateral cooperation.

“(In Finland) The level of innovation in digital industries is perceived as elevated”;

“The focus (of the DIGINNO project in Lithuania) specifically is on promoting the uptake of ICT in the business sector, developing innovative and interoperable digital public services and facilitating Digital Single Market related policy discussions on the Baltic Sea Region level”.

Most of government pay attention to the territorial competitiveness in the international markets, in fact, connections among global markets, digital business model, and market positioning emerged. In regard, the improvement in the performance, simplification, and flexibility of procedures, enabling technologies and competitive human capital, are considered to be relevant when dealing with digitalization processes. For example, Sweden launched “The Automation programme”, a project involving many companies and offering support to improve their competitiveness through automation and digitalization. In the same vein, the Austrian government describe digital technologies as tools to increase firms' efficiency, simplify procedures, and gain - or maintain - competitiveness.

“(In Sweden) The main objective (of The Automation programme / Robotlift) is to reach large numbers of industrial companies and to help them accelerate their work within automation, thereby improving their competitiveness and long-term growth”;

“According to industry associations, the key opportunities in Austria related to take up in digital technologies are: increasing efficiency of production; maintaining competitiveness; simplifying and improving administrative procedures; facilitating direct marketing”.

In general, ties among digitalization, global markets, entrepreneurship, innovation, and competitiveness have been observed. This supports the hypothesis according to which the digital transformation favors the competitiveness and the positioning of companies on the international market, favoring interactions and communication processes, as well as the improvement of human resources and the improvement of the attitude in starting new business.

5. Discussion and implications

When scanning documents provided by national and international institutions it appears that topics as digitalization and internationalization - and their combination - are often linked to strategies planned or implemented by European countries. In general, the digitalization process is considered both a lever for internationalization and, consequently, a way to achieve and maintain competitive advantage in the international scenario (Cassetta *et al.*, 2020).

Although competitiveness and market position are highly discussed by scholars and institutions as well as practitioners, when dealing with the international development most of reports highlighted a tie between internationalization and cooperation among the firms operating in the international context; indeed, one of the main aims of the companies starting an internationalization process is to collaborate or cooperate, also from an ethical perspective, creating and delivering value through innovation (Li *et al.*, 2019); indeed, governments stress the role of multi-actor innovation to further the internationalization process and increase the competitiveness of firms.

According to scholars, digitization can represent an opportunity for businesses (Autio, 2017), and, at the same time, a challenge to be faced with suitable resources that can allow and facilitate a company in achieving the competitive advantage (Liu *et al.*, 2019).

To achieve this goal, the development of new technologies and the implementation of technological and digital tools appear to be fundamental, as digital transformation can represent a facilitator to achieve useful resources to improve the business model and expand business processes; therefore, this result mirrors the posture of scholars in framing the opportunities of digitalization for both already operating firms (Martinelli *et al.*, 2020) and new ones (Autio, 2017). Additionally, the analysis showed the bridging role digital tools may have in favouring the internationalization of firms, thus stimulating the further development of already operating organizations and the emerging of born global companies, due to the chances new ventures have to immediately join the international arenas.

Accordingly, many scholars emphasize the relationship between digital transformation and internationalization (Lee *et al.*, 2008), considering that digital tools and new communication technologies can accelerate the process and allow a company to operate remotely, thus to act on its market positioning and the competitive levers. In many cases a focus on skills and the value of workers' knowledge can be detected as scholars, institutions and practitioners consider resources and levers for business development, and the advancement of an effective digital transformation as a driver of the internationalization process (Coviello *et al.*, 2017; Dachs, 2018; Azoeva *et al.*, 2020).

Two main approaches emerged when scanning literature contributions on digitalization and internationalization, and reports of countries implementing a digitalization process, namely the relationship between internationalization and cooperation between the different actors, and the ties between competitiveness and new technologies. More in detail, a particular link can be detected between internationalization and cooperation, while the digital transformation process is closely connected to the dynamics of innovation (Li *et al.*, 2019) as well as to the interplay among competitiveness, competitive advantage, doing business and innovation (Lee and Falahat, 2019).

Finally, it is worth underlining that two other elements emerge that can be considered transversal to the ones highlighted previously, namely, the role in the international domain of small and medium-sized enterprises, and sustainable development. Sustainability is currently a very hot topic in the international debate on various disciplines and one of the main goals of most businesses, whether profit or non-profit, and above all of governments and institutions. The digitalization process, as well as the internationalization, are perceived as means to achieve the long-term survival of a company and a successful performance; in regard, much has been written about the process of digitization and internationalization in small and medium-sized enterprises, since internationalization is seen as a challenge for small and medium-sized enterprises, but also an opportunity Autio (2017). On the one hand, the most critical issue concerns the difficulty that most small businesses face in acquiring the resources to start an internationalization process; on the other

hand, the size and simpler organizational structures of this category of enterprises allow for greater flexibility and adaptability.

6. Conclusions

The purpose of this paper was to investigate how companies can benefit from the implementing of a digital transformation process to support the internationalization throughout their business activities.

Our focus was on how governments can favor support to organizations and encourage the digitization in companies. In fact, supranational and national institutions are increasingly focusing on digital transformation to make companies and territories more competitive by producing fruitful opportunities through the development of innovation initiatives and intellectual resources derived from employees' skills and abilities.

A general orientation towards digital transformation emerged to improve the competitiveness of businesses, and therefore the attractiveness of the territory, both locally and internationally, thanks to the leverage represented by new technologies and the innovation of the business processes that those technologies may support. It also emerged that the internationalization strategy favor collaboration and cooperation initiatives that can improve companies' performance, and, at the same time, favor the achievement of the competitive advantage.

The results can be considered transversal to all types of companies operating in the international scenario, although, in many cases, scholars and report refer to small and medium-sized enterprises. In line with this, it would be interesting to deepen the study of this category of firms, also to observe whether companies in some sectors behave differently from others. Factors affecting readiness and acceptance should be examined, namely those factors that help companies to be ready to digitally transform their processes and operate on an international - or even global - level, and those factors that determine the propensity of companies to digitize on the basis of the perceived risks and opportunities.

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The impact of entrepreneurial team experience on international expansion

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Abstract

Objectives of the paper: *International entrepreneurship studies have predominantly focused on the individual's role in international expansion, neglecting the overall team experience and knowledge. This study relates a variety of experience dimensions that characterize the team to the speed of reaching significant foreign sales.*

Methodology: *Upper Echelon theory is transferred to the context of the new and small firm and used to theorize the impact of entrepreneurial team experience on strategic decisions and, in turn, the venture's speed to reaching significant export intensity. Special attention is paid to the many facets of experiential knowledge. An OLS regression is employed on a set of 98 Italian and German new ventures.*

Findings: *Results of the OLS regression confirm the importance of the teams' industry experience, while, surprisingly, international experience exerts a significant but negative effect on the speed to reach significant foreign sales. Experience in import-export related functions and gained in MNEs, as well as foreign language competence do not show significant impact.*

Practical implications: *Practitioners and entrepreneurs who pursue fast international expansion get insight into the 'ideal' composition of the team.*

Limitations of the paper: *The limited sample size does not allow to single out all experience variables.*

Originality: *To the best of our knowledge, this paper is the first to analyse empirically the impact of the many dimensions of prior team experience on the speed of internationalization.*

Key words: *Internationalization, Upper-Echelon-Theory, entrepreneurial team, experiential knowledge, international experience, international new venture, born global*

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1. Introduction

Entrepreneurial teams have received relatively little research attention in International Entrepreneurship (IE) research. Given the fact that the majority of new ventures are team-founded this is surprising (e.g. Bordet, 2019; European Startup Monitor, 2019; Denicolai *et al.*, 2014). It is even more surprising in view of the fact that entrepreneurs, i.e. the founders of new ventures, are considered the key resources of the young and small business (e.g. Wright *et al.*, 2007).

The resources that entrepreneurs bring to their new venture have been described with their social capital, and, especially in the international new venture context, with their (prior) international experience and global mindset (e.g. Hagen and Zucchella, 2014). In the entrepreneurial internationalization stream of IE, experiential knowledge acquired prior to foundation has been described as one of the key drivers and explanations of their early, fast, and intense internationalization (e.g. Zucchella *et al.*, 2007; Coviello, 2017; Hennart *et al.*, 2021). Experience dimensions that have been most commonly included in born global or INV studies include international experience acquired through studies or work abroad. Less frequently prior industry experience or functional knowledge gained in import-export related functions or in an MNE have been considered. Similarly, the international orientation or the global mindset of entrepreneurs has been described to trigger born global internationalization trajectories. Less frequently studied in IE, but considered important in the general entrepreneurship literature, industry experience has been found to facilitate not only start up activity itself (e.g. Reagans *et al.*, 2005) but also internationalization speed - for example through the introduction into or the exploitation of existing (international) networks which, in turn, speed up short-term and long-term international growth (e.g. Hagen & Zucchella, 2014) or because it compensates for a lack of international experience (Sapienza *et al.* 2006)¹.

With previous international experience, for example, it has been argued that entrepreneurs have already acquired experiential knowledge important to discount risk and to help leapfrog stages related to internationalization which makes them enter foreign markets more quickly and realize more significant sales. If cohorts of entrepreneurial internationalizers are compared with their more traditional or later internationalizing counterparts, findings as to the role of international (entrepreneurial) orientation or the various international experience dimensions are mixed (Hennart *et al.*, 2021).

Thus, what is missing in extant research is not only the focus on entrepreneurial teams, also the multi-faceted nature of experience needs additional investigation.

To shed more light on this topic, our study focuses on the experience of the entire entrepreneurial team. It also considers the multiple dimensions of experience that have been included and found relevant in extant research in order to better understand the new venture's speed to reaching significant foreign sales. The paper draws on the Upper Echelon Theory (UET) as the theoretical background for the study. UET, as we argue, is appropriately transferable from the Top Management Team background to the new venture setting. OLS regression is employed on a sample of 98 German and Italian new ventures.

The remainder of the paper is organized as follows. We firstly introduce the UET, and discuss its transferability to the new venture context. We then proceed with a literature review and hypothesis development. The empirical analysis details data collection, measures, method and findings.

A discussion and conclusion section terminates the work.

¹ For an overview of studies that compare all facets of experience in entrepreneurial internationalizers with traditional or late internationalizers see Hennart *et al.* 2021.

2. Theoretical background

2.1. The Upper Echelon Theory (UET)

Our approach follows the Upper Echelon theory which is based on the premise of limited rationality (Cyert and March, 1963). This premise is based on the assumption that, especially when it comes to strategically important and complex decisions - of which internationalization is an example - top managers do not proceed objectively, but rather include subjective experiences, values, and external influences in their decision-making (Hambrick and Mason, 1984). As a result, the evaluation of a situation is subjective and not based on objective criteria (Hambrick, 2007). Each decision-maker thus brings her individual resources to make “strategic” (Hambrick and Mason, 1984) decision and solve complex situations. The strategic decisions are defined as “complex and of major significance to the organization” (Hambrick and Mason, 1984: 195). Their complexity makes the theory, based on the limited rationality premise, particularly suitable. On the contrary, according to the theory, for example the more operational or routine decisions are more likely not to be biased by the individual resources of the managers. These individual resources include the cognitive characteristics of each decision-maker and may consist of experience-based knowledge of future events, alternatives, and their consequences (March and Simon, 1958).

The UET has been developed for and proved to be useful mainly in the context of Top Management Teams, and, thus, longer established and larger firms. Therefore, the extent of transferability of the model towards new ventures must be determined. As mentioned above, the UET is based on the assumption of bounded rationality (Cyert and March, 1963). The stated conditions of limited rationality are most likely to occur in presence of high job demand (Hambrick *et al.*, 2005) and managerial discretion (Hambrick and Finkelstein, 1987) and therefore the predictability of the performance under these conditions is better (Jin *et al.*, 2017). Jin *et al.* (2017) argue that within the entrepreneurial context the reflection of the characteristics of managers within their strategic decisions and thus within the performance of the company, will be much clearer. Since new ventures tend to appear in more complex environments (Chandler, Honig and Wiklund, 2005) and complexity arises from the novel situation, in which every new venture finds itself (Amason *et al.*, 2006; Hagen and Zucchella, 2019; Hagen *et al.*, 2019), entrepreneurs cannot rely on the past operating history of the company (Schjoedt and Kraus, 2009). Therefore, new ventures are often thought to be more ‘complex’ than established companies (Jin *et al.*, 2017). International new ventures also face higher environmental complexity which leads to a higher job demand, and, in turn, are more a subject to the principle of bounded rationality (Cyert and March, 1963).

Job demand is influenced by task challenge which is described as, “the conditions that make it difficult for an executive to attain a given level of performance” (Hambrick *et al.*, 2005: 476). Hambrick, Finkelstein, and Moorey (2005) also argue, that this level of difficulty depends on both the external environment and the internal resources and capabilities of the organization. Since the new venture environment and especially the international new venture environment is being described as complex and dynamic (Amason *et al.*, 2006; Schjoedt and Kraus, 2009; Hagen *et al.*, 2019) the task challenge is high and thus leads in turn to a higher job demand. From the internal perspective, new ventures have usually lesser resources and capabilities than established firms, as described with the liability of smallness and newness (Stinchcombe, 1965). The international new venture additionally faces a third liability - the liability of foreignness (Hymer, 1976). The limited resources of the new venture must be used systematically (Shan *et al.*, 2014), which can lead to a higher task challenge and, in turn, to a higher job demand (Hambrick *et al.*, 2005, p. 476).

Managerial discretion is defined by the actions the manager is allowed to take and by the constraint in her choice of actions (Hambrick, 2007), i.e. her ‘latitude of action’ (Hambrick and Finkelstein, 1987: 371). To understand how discretion displays, three determinants must be considered. Again, they can be divided into the three categories of the task environment, the internal organization, and the characteristics of the manager (Hambrick and Finkelstein, 1987). For example, the greater the differentiation possibility in a market and/or industry, the greater the

discretion of the manager (Hambrick and Finkelstein, 1987). Since international new ventures appear in more complex environments (e.g. Hagen *et al.*, 2019), have entrepreneurs who seek for innovation (e.g. Knight and Cavusgil, 2004) and, in most of the cases use a differentiation strategy to enter the market (e.g. Moen, 2002; Paul and Rosado-Serrano, 2019), the discretion of the entrepreneurs is rather high. Additionally, discretion also depends on market growth and competition. The higher the market growth, the higher the discretion of the managers in the company (Hambrick and Finkelstein, 1987). Along the same line of thought a low level of competition on the market leads to higher discretion (Hambrick and Finkelstein, 1987). Based on the assumption that international new ventures tend to enter the market with a differentiated offer targeted towards global niches one can say that they should enjoy freedom from competition and/or exercise market power in their niche (e.g. Zucchella *et al.*, 2016). In terms of internal organization, Hambrick and Finkelstein (1987) argue that the more established an organization in terms of, for example, size, age, culture is, the less the managers discretion is. Founders of international new ventures do not feel such pressure as there is usually no board of directors. External stakeholders, partners, or business angels can reduce the range of opportunities too, however, this is more the matter of limited resources. The presence of limited resources results in a reduction of the range of possible strategies of the entrepreneur and thus lead to a reduction of discretion (Hambrick and Finkelstein, 1987). Overall, it can be stated that an entrepreneur has more discretion than a top management team member, and therefore, by definition, the upper echelon theory can be transferred to our context - it may even provide a better prognosis for entrepreneurial teams than for the top management team.

Carpenter *et al.*, (2004) develop a new UE approach which integrates additional upper echelon characteristics, like the international experience or the team size, and analyze their precursors more in-depth. Furthermore, the extension of the model describes contextual factors like the market in which the organization is active. This approach further supports our lines of investigation, that at foundation of the venture it is generally advantageous to look at the entire management team, i.e. the entrepreneurial team, as a whole and not just at individual team members since tasks and functions are shared within the team. Considering the entire team would also proxy the total amount of cognitive resources better than counting only the individual. Overall, knowledge of the team as a whole increases the chances of a more accurate prediction of venture performance, and in particular, the time to and the intensity of international expansion.

2.2. Literature review and development of hypotheses

We have argued above that the UET is appropriately transferable to an entrepreneurial team context. Following the UET we emphasize and link the combined effect of entrepreneurial cognitive characteristics to international performance. Along these lines, we extend the dominant IE view that the entrepreneurs' international experience constitutes a crucial resource for accelerated international expansion to include a closer look at the team and a more-dimensional view of experience. Team characteristics influence the strategy of the venture and, in turn, the venture's performance. By extension, in our context, venture performance is defined as the speed to reaching 25 percent of foreign sales over total sales (e.g. Knight and Cavusgil, 1996; Servais *et al.*, 2007).

Experience within an industry, company, or country has an impact on the performance of the company, through the strategic decisions of managers (Hambrick and Mason 1984). The strategic decisions are defined for example as market entry strategies, resource commitment decisions and the selection of the market (Anderson *et al.*, 2014; Jones and Coviello, 2005; Ruzzier *et al.*, 2007).

As discussed above, there are influences regarding the relationship between the entrepreneurial team and the decision which originate from internal or external conditions (Hambrick and Mason, 1984). We can, therefore, expect that the strategic decisions of the entrepreneurs, based on their - differential - characteristics, experiences, and knowledge are then reflected in the performance of the new venture.

However, the specific characteristics of the *entrepreneurial team* that influence the internationalization process have not yet been discussed yet. Also the type, the direction, and the strengths of these influences remains to be clarified.

First of all, the size of the entrepreneurial team takes all entrepreneurial managers, rather than only one individual, into account. A bigger team leads to better performance since it has a higher variety in perspectives of the information. Also, a bigger entrepreneurial team can handle more information at once and complete simultaneously tasks, which is not possible if the entrepreneurial team is small (Haleblian and Finkelstein, 1993). Moreover, bigger teams lead to a higher amount of human capital within the entrepreneurial team, to more resources and capabilities within the new venture, and bigger flexibility of both, the team and the new venture. Ji et al (2017) state that the characteristics of the entrepreneurial team, viewed as a collective, have a positive influence on the performance. This argument finds more support when the job demand is high or the company is acting in a more complex environment (ibid). Since, the international new venture and the entrepreneurial team face both, complexity and job demand at a rather high level (e.g. Chandler *et al.*, 2005; Amason et al. 2006; Hagen *et al.*, 2019), the hypothesis finds an even bigger validation within an entrepreneurial team.

The many facets of prior experience and their impact on the speed of international expansion

The knowledge of entrepreneurs and managers can be distinguished in objective and experiential knowledge. Experiential knowledge is gained through personal experience. For example, the crucial role of experiential - market - knowledge is reflected in the Uppsala process model (Johansson and Vahlne, 1977) which assumes a slow and stepwise process in international expansion. Once acquired, the experiential knowledge of the manager has a direct positive effect on her strategic decisions to move from close markets to more distant markets, to move upwards the establishment chain etc and, thus, to assist with strategic decisions related to international expansion. Prior knowledge enables the firm to leapfrog phases and speed entry into foreign markets.

Also, Shane (2000) emphasizes the importance of the experiential knowledge of entrepreneurs to recognize opportunities and base their decision towards exploiting them. Experiential knowledge is also important for learning from errors, being able to evaluate alternatives, and being able to make the right strategic decisions (Blomstermo *et al.*, 2004). Thereby, knowledge is provided through each individual and depends on the learning process of each entrepreneur (Autio *et al.*, 2000). Here, again an aggregated - team - approach is of advantage. Eriksson, Johansson, and Majkgard (1997) argue that firms initially need to develop a daily business, which then will be changed due to the emergence of international engagement. Specifically, knowledge here refers to information about customers, competitors but also distributors within a market and can even consider the political situation or the culture of the market (Eriksson *et al.*, 1977). According to Reagans et al. (2005), the daily business can be established much faster, if prior industry experience exists and therefore also this kind of knowledge can foster the internationalization process. Furthermore, if the knowledge is being analyzed through the resource-based view, the linearity between knowledge and new venture performance or internationalization can be shown. Wernerfelt (1984) proposes, that resources within a company differ from others: those resources can be either knowledge about customers and production (Wernerfelt, 1984) or human capital, with experience being a determinant in it (Ayadi *et al.*, 2008; Ucbasaran *et al.*, 2001). The experiential knowledge of the entrepreneurs determines the level of human and social capital and shows a significant impact on competitiveness and the performance of new ventures (Kogut and Zander, 1992; West and Noel, 2009).

As the discussion above shows, however, the origin and the nature of the experiential knowledge is multifaceted which calls for a nuanced measurement of experience. Studying the earliest phases of the business, it is prior experiential knowledge which needs to be taken into account (e.g. Coviello, 2005). Prior knowledge can be found in working experience, in industry experience and/or in (international) markets. International experience can be gained while studying and/or

working abroad and/or in the markets in which the new venture is now active. It can also be acquired when working in import/export related functions or in a MNE. Due to the complexity and risk of the international new venture foundation (e.g. Hagen *et al.*, 2019) entrepreneurs that rely on similar work experience can cope with that risk and take advantage of opportunities, which other entrepreneurs may not take notice of (e.g. Johansson and Vahlne, 1977; Blomstermo *et al.*, 2004). Additionally, researchers correlated entrepreneurs with high levels of prior industry experience with international new ventures, (e.g. Oviatt and McDougall, 1994; Oviatt and McDougall, 2005; Servais *et al.*, 2007; Luostarinen and Gabrielsson 2006). According to McDougall, Oviatt, and Shrader (2003), the industry experience for the entrepreneurial team will be higher for entrepreneurs within an international new venture in comparison with a domestic new venture. Thus, the industry experience of entrepreneurs can be connected to a faster internationalization process. Westhead, Wright, and Ucbasaran (2001, p. 345) state that the industry experience of the entrepreneurial team is positively related to the internationalization process of the new venture.

Based on these arguments the following hypothesis is formulated:

H1: Aggregated prior work experience, in the same industry, of the entrepreneurial team has a positive influence on the internationalization speed of the new venture.

Hambrick and Mason (1984) stated that one determinant of managerial characteristics is the functional track. The functional track can be subcategorized into three types. The interesting type here is called the “output function” and describes activities like marketing, sales, and R&D. Hambrick and Mason (1984: 199) state that “There will be a positive association between the degree of output-function experience of top managers and the extent to which the firm emphasizes outputs in its strategy”. According to their hypothesis, one can argue that an exporting function or experience within a company, that operates multi-nationally, can be emphasized in the strategic decisions of entrepreneurs. Moreover, Blomstermo et al (2004) state that experiential knowledge can help managers in their decision of strategy choice for the market entry and the selection of the foreign market. As knowledge relates to similar experiences in the past, it can be assumed that a function within the exporting department in a company or within a multinational company can influence the knowledge towards the internationalization of the entrepreneurs. In a study of new ventures in Canada, Reuber and Fischer (1997) found evidence for the influence of entrepreneurs’ prior experience in sales and the internationalization of the new venture. In both ways entrepreneurs gain experience in coping with foreign markets and, thus, this experience can help them with their strategic decision-making process. Prior experience within a multinational firm or commercial activities was found to be correlated significantly with the internationalization process of new ventures (Zucchella *et al.*, 2007; Reuber and Fischer, 1997).

Based on these findings, the following hypothesis is proposed:

H2: Aggregated prior experience of the entrepreneurial team within a) a multinational company or b) an exporting function has a positive influence on the internationalization speed of the new venture.

The better opportunity exploration and exploitation of entrepreneurs, through prior knowledge, can also be linked to their international orientation. Karagozoglou and Lindell (1998) examined motives and barriers to internationalization within a technology-based industry in the US. The results showed, that nearly 2/3 of the sample stated as a motive for internationalization the global market opportunities, whilst almost half of the sample stated the lack of experience for opportunity exploration as a barrier (Karagozoglou and Lindell, 1988). Shaw and Darroch (2004) study of entrepreneurial new ventures in New Zealand showed, that the barrier to internationalization, which is perceived the most crucial (together with finance), is the lack of knowledge of opportunities.

Also, Domurath and Patzelt (2019) among others argue, that if the entrepreneurial team members have more experience in the domestic market than in the international market, the internationalization process will take longer. This can occur because entrepreneurs with less international experience need more time to identify and seize opportunities in the foreign market (Shan, 2009). Domurath and Patzelt (2019) argue that an opportunity similar to one in the domestic market is not necessarily recognized in the foreign market if the entrepreneur does not have any international experience. Therefore, the lack of international experience will slow down the internationalization process of the new venture. Moreover, several researchers argue that prior international experience of the entrepreneur has a positive effect on the internationalization process of the new venture (e.g. Gruenhagen *et al.*, 2019; Reuber and Fischer, 1997; McDougall *et al.*, 2003; Baum *et al.*, 2015; Manolova *et al.*, 2002). International experience can be gathered by working, living, or studying abroad according (e.g. Clark *et al.*, 2018; McDougall *et al.*, 2003). Prior international experience helps managers cope with the uncertainty of the foreign markets and helps them recognize and exploit opportunities better and thus accelerates the internationalization process (e.g. Autio *et al.*, 2000; Baum *et al.*, 2015; Reuber and Fischer, 1997; McDougall *et al.*, 2003; Manolova *et al.*, 2002). According to Hambrick and Mason (1984, 1999), the experience of a manager is displayed within their strategies, which means that the international experience leads to an international approach and thus to a faster internationalization of the new venture.

Furthermore, Reuber and Fischer (1977), determine two streams of effects on the internationalization process, through international knowledge. First, international experience influences the internationalization process positively, through the usage of strategic networks. Second, internationally experienced managers internationalize from the beginning. This shows a two-sided positive effect on the internationalization (Reuber and Fischer, 1977). Also, Zucchella *et al.* (2007) argued that the international experience of entrepreneurs affects the internationalization process of the new venture. McDougall *et al.*, (2003) also argue that the entrepreneurial team of international new ventures will have higher international experience compared to a domestic entrepreneurial team.

Since entrepreneurs cannot rely on experience within the newly founded venture, they have to rely on similar task experiences from their past. The effect of prior international experience can be compared to the effect of prior working experience in a similar field or a multinational company.

Put together, the above discussion leads to:

H3: Aggregated international experience within the entrepreneurial team has a positive influence on the internationalization speed of the new venture.

Moreover, another dimension of international orientation is the knowledge of foreign languages.

According to Pankaj (2001, p. 138), the trade between two countries is increased by 300% if a common language is spoken. Regarding exports or internationalization of the new venture, this approach, together with the dimension of 'language distance' (Ghemawat, 2001), can be used to show the importance of language within the entrepreneurial team. Cultural elements also refer to language and speaking a certain language may speak to cultural affinity and, thus, understanding. Although extant research is mixed with regard to the impact of languages on internationalization speed (e.g. Zucchella *et al.* 2007 find a positive impact while Cannone and Ughetto 2014 do not confirm significant results), along with our reasoning above we formulate the following hypothesis

H4: Aggregated knowledge of foreign languages within the entrepreneurial team has a positive influence on the internationalization speed of the new venture.

3. Empirical analysis

Data collection

Data were collected through an online survey in Germany and in Italy in the period from April to June 2019 extracting company emails randomly from AIDA and Crunchbase datasets using as a cut off the year 2000 to avoid retrospective bias. The data that are used in the study consist of 98 usable questionnaires which correspond to a response rate of around 13 % and to the first wave of the survey. 75 observations are from Italian new ventures and 23 are from German new ventures. ”. A large majority (95 %) of respondents were founders themselves, the rest being for example export managers or other knowledgeable persons (e.g. CFO) in the company with an average company experience of 10,5 years.

The average company age is 15 years. Two thirds of the companies sell consumer goods (of which one third durable consumer goods), the others offer services to consumers and to businesses. Overall, B2C companies constitute 66 % of our sample.

The term company founder was defined as “all persons who had entrepreneurial responsibility in the establishment and management of the company, regardless of ownership. If there was more than one founder, the questions were answered for every founder distinctly. The questionnaire included questions about the number of founders and previous experience as detailed in the measure-section below and the number of languages spoken by each entrepreneur. All variables were measured in terms of the length of experience, i.e. years.

Model specification

We are investigating the relationship between entrepreneurial team characteristics and the speed to reaching an export intensity of 25 percent. Each variable should be considered individually, however, taking into account the other characteristics of the entrepreneurs in order to avoid distortion of the results. We therefore use an OLS method. The analysis of the model is performed with the freely available statistical software for econometrics, GRETL.

The variables are not normally distributed, nevertheless, this does not indicate that the OLS model cannot be used (Lumley *et al.*, 2002). Lumley *et al.* (2002) argue that for the linear regression normality is not required to fit. Next, the linearity of the regression needs to be tested. It can be argued, that a structural change at the 76th observation could occur because data was taken from different countries. Therefore, the linear regression could have a structural change within the model, which can be tested with the test of equality as proposed by Chow (1960). The output of the test statistics is the following: $F(5, 88) = 0,67827$ with a p-value of 0,6410. Therefore, the null hypothesis is confirmed, which means that there is no structural break at the observation point of 76 and the regression can be used for the whole dataset. Another check for the model is for omitted variables and collinearity. Therefore, the test for specification errors within a least-square linear model is used (Ramsey, 1969). The test-statistic $F = 0,829729$, with a p-value of 0,439 confirms the null hypothesis which indicates that the model is free from the omitted variable bias.

Lumley *et al.* (2002) argue that heteroscedasticity can have an impact on the predictability of the OLS model and therefore must be checked for. The Lagrange-multiplier test from White (1980) is being used showing that the model is heteroscedastic ($TR^2 = 5,483368$, with a p-value = $P(\text{Chi-square}(14) > 5,483368) = 0,977884$). The heteroscedasticity implies problems with the predictability of the variables and needs to be taken into account. To account for the heteroscedasticity in the errors of the variables of the model, a different approach than a simple OLS model is being used. First (I), the OLS estimation of the model is performed. Then (II), an auxiliary regression is executed to generate an estimate of the error variance. Lastly (III), the weighted least squares are analyzed, by using the reciprocal of the estimated variance as weight. In the auxiliary regression (II), the logarithm of the squared residuals from the first OLS is regressed. Either the regression takes place on the original regressors and their squares (by default), or just on the original

regressors (if the “include squares” box is cleared). The logarithm transformation is made for ensuring the non-negativity of all estimated variances. The weighted series for the final WLS is formed as $1/\exp(u^*)$, under the assumption that the fitted values are u^* (Gretl Statistical Software). This approach is being made with the heteroscedasticity-corrected estimates regression, in Gretl.

Measures

Dependent variable

Internationalization speed is defined by the number of months needed to reach an export intensity of 25 percent. It is thus a more finegrained measure than the one used commonly of reaching this threshold after 3- or 6-years of foundation (Knight and Cavusgil, 1996; Servais *et al.*, 2007). On average, within the dataset, new ventures achieved 25% of their foreign sales after 33 months, so less than three years.

Independent variables

Prior work (industry) experience is measured with the work experience in the same or similar industry of the company aggregated for all founders (Jin *et al.*, 2017; Verbeke *et al.*, 2014; Gruenhagen *et al.*, 2018). The prior working experience is measured in years before the new venture creation. The measure focuses on the depth of the experience, not the breadth. On average the entrepreneurial team in our dataset had approximately 12 years of experience in the same industry, before starting the new venture.

Also prior experience in an MNE or within a export/import related function (Zucchella *et al.*, 2007) is measured in years and aggregated. Since the dataset is small, too many regressors can cause an invalid outcome of the model. Therefore, the two variables were summarized in one. Again, the variable is based on the depth of the experience of the entrepreneur and not the breadth, since only the number of years are accounted for and not the different positions within their prior experiences (Gruenhagen *et al.*, 2018). On average, the entrepreneurial team in our data set has aggregated experiences within a multinational company or a sales position in a company of approximately 7 years.

International experience is referring to the whole entrepreneurial team and aggregated, with the distinction between education and work experience (Gruenhagen *et al.*, 2018; Jin *et al.*, 2017; Zucchella *et al.*, 2007). Again, the depth of the international experience is being considered, not the breadth. The average international experience in our dataset in the entrepreneurial team is approximately 6 years.

Foreign languages is measured aggregated in terms of number of languages spoken by the entrepreneurs. The average entrepreneurial team speaks 3 foreign languages.

The model is checked for multicollinearity with the Belsley, Kuh, and Welsch (1980) collinearity test. The model that was initially intended to be used contained the dummy variable ‘Country’ which caused a collinearity problem and thus needs to be eliminated from the model. After the elimination of the dummy variable, the model shows no collinearity and thus is reliable.

In addition, the model has been tested for covariance amongst the variables and endogeneity of the error term and the variables. The covariance matrix does not evidence any clear interdependence of variables. Next, the endogeneity was tested. Since endogeneity is determined by a correlation of the model variables and the error, it can lead to an inconsistent model and the inadequate prediction of the outcome (Petrin and Train, 2010). For testing the endogeneity, the Hausman specification test is being used. The test uses the dummy variable country since it can influence the international experience but also the other characteristics. The Chi-square (1) = 2,57459 with p-value = 0,108592 show that we do not have the problem of endogeneity. Additionally, the dummy variable of the

‘country’ can influence the other team effects, therefore we are considering both. The results of the Hausman-test are summarized in the following table 1 below:

Tab. 1: Hausman test of endogeneity (Gretl outputs)

Variable	Dummy country	Team size	Null hypothesis
International experience	p-value = 0,108592	p-value = 0,840626	Failed being rejected → no endogeneity
Prior work experience	p-value = 0,0582724	p-value = 0,562861	Failed being rejected → no endogeneity
Foreign Languages	p-value = 0,122113	p-value = 0,695923	Failed being rejected → no endogeneity
Prior MNE/Ex-IM experience	p-value = 0,132244	p-value = 0,725485	Failed being rejected → no endogeneity

Source: own elaboration

To summarize, the model is free from endogeneity; corrected towards its heteroscedasticity and collinearity of one variable; the regression is linear and has no structural change. The regression is not biased towards omitted variables but is not normally distributed. The regression is statistically significant, and the variables show good predictability as is shown in the following section.

4. Empirical findings and discussion

The model is significant (p-value 0,000117) confirming a strongly significant relationship between the independent variables (Foreign Languages, Prior Work Experience, International Experience, Prior ‘Company’ Experience) and the dependent variable, the speed to reaching 25 percent of export intensity. Nearly 21% of the internationalization speed variance can be explained through the in-dependent variables in the model (r-square 0.21856; adjusted r-square is 0.184950).

Tab. 2: Results of the regression (Gretl output)

	Coeffizient	Std error	t	p-value
Const	30,9398	8,12369	3,809	0,0003***
ForeignLanguages	-0,822961	1,05446	-0,7805	0,4371
PriorIndExperience	-0,288909	0,0851993	-3,391	0,0010***
InternationalExp	0,149274	0,0493099	3,027	0,0032***
Prior MNE/imp-exp	-0,1549	0,195973	-0,7904	0,4313
Res sum of squares	412,3065	Std error reg	2,105565	
R-squared	0,218560	Adj R-squared	0,184950	
F (4,93)	6,502761	P-value (F)	0,000117	
Log-Likelihood	-209,4592	Akaike crit	428,9183	
Schwarz crit	441,8431	Hannan-Quinn crit	434,1461	

Source: own elaboration

As illustrated in table 2, H1 is confirmed. The industry experience of the team impacts the internationalization speed of the new venture. According to the model, the internationalization of a new venture will be approximately 0.289 months quicker for each year added to the entrepreneurial team’s aggregated prior working experience in the same industry, under the assumption that the other variables remain constant.

Prior experience within a multinational company or an exporting function instead does not have a significant impact on the speed to reach 25 % export intensity.

Hypotheses H3 and H4, are referring to the international experience. Hypothesis 3 states that the international experience has a positive effect on the speed of reaching international sales. However, the coefficient of the international experience variable in the regression is positive and significant, meaning that the international experience extends the duration of internationalization (p-value 0.0010). A one-year increase in international experience will increase the time needed to reach 25 % of export intensity by approximately 0,149 months. The hypothesis 5 that foreign languages have a positive influence on the internationalization process is rejected.

Confidence intervals confirm that the statistically significant variables good estimators for the influence on internationalization (Eckstein, 2014).

The speed to reaching 25 % of export intensity was found to be significantly influenced by the prior working experience and the international experience of the entrepreneurs. While prior working experience in the same industry had a positive effect on the duration to reach this threshold, international experience, much to our surprise and against most extant work in IE, showed a negative and significant effect on the speed to reach 'BG status'.

Prior industry experience in a similar field can be argued to enhance the entrepreneur's ability to evaluate alternatives and seize opportunities (Blomstermo *et al.*, 2004) and simultaneously build up their daily business quickly (Eriksson *et al.*, 1977; Johanson and Wiedersheim-Paul, 1975). According to the UET, the better assessment of strategic alternatives will impact on their international decisions and, thus lead to better performance, i.e. speed to 25 % of foreign sales. With industry experience also valuable networks and customer knowledge can be expected.

Second, we find no support for H2, which assumed a positive correlation between the prior experience of an entrepreneur within a MNE or an exporting function and the new venture's international performance. There is, however, some evidence of a positive relationship (Reuber and Fischer, 1997; Zuchella *et al.*, 2007). A closer look at the data reveals that only a few ventures have such experiences and therefore, a possible explanation lies in the small dataset. Another explanation may be the fact that we are dealing with new ventures and that the organizational context is too different to transfer work experience from the a large-sized company. Experiential knowledge refers to similar experiences, and the knowledge acquired in MNEs may not be directly transferable.

Another dimension of experience was related to the international working and studying experience of the entrepreneurs. With H3, a potential positive influence of prior international experience of the entrepreneurs on the internationalization process of new ventures was proposed. This relationship proved to be significant but with a positive sign, thus going in the opposite direction. Again, a possible explanation may be found in the nature of the data or the variable itself. Due to the limited data, we have combined study and work experience, which, in extant research has shown mixed and contradictory results. Nevertheless, the opposite effect could also be explained because of the nature of our dependent variable. In order to compare with the bulk of extant work, we chose the speed to reaching 25 % of export intensity as our dependent variable and we did not consider market selection or commitment decisions. According to Melen and Nordman, for example, many international new ventures opt for committed entry modes from the very beginning and also market selection decisions do not follow the 'easy-markets'-first trajectories. Under this line of thought, international new ventures may trade off the risk that arises with more committed decisions and the speed of approaching multiple markets with a less risky entry mode (Hagen *et al.*, 2019). If the international experience is high, the internationalization approach may come with a higher commitment in the foreign market or with more difficult markets to reach and thus take a (slightly) longer time. However, the clear effect of the negative relation between the international experience and speed is rather surprising and needs to be investigated further.

Foreign languages showed no significant impact in our model, consistent with, e.g. Ughetto and Cannone (2014). As of today, the use of English as a universal business language may discount the need for more and diverse language skills.

Finally, we have argued that considering the entrepreneurial team experience, instead of the individual experience, will further our understand of reaching significant foreign sales very quickly. Accounting only for one factor, the teams' experience, more than 20 % of the variability in our dependent variable can be explained. Since the entrepreneurial characteristics are not directly reflected in the performance or internationalization of the company, but run through strategic decisions, it is a very complex process which would benefit from adding moderating factors, i.e the industry or the regional level of export intensity to account for the 'environment'. The influences of the environment towards strategic management decisions can also be attributed to the psychic or other distance dimensions, which may also complement to the model.

5. Conclusion, limitations, and future research

As is the case with all studies, also our work comes with limitations that present avenues for future research. First of all, the model focuses on the in-depth knowledge and experience of the entrepreneurial team without relating it to the international markets the venture is active in.

Further research should also include the breadth of experience within the entrepreneurial team (Gruenhagen *et al.*, 2018; Clark *et al.*, 2018). This is in line with a consideration of heterogeneity in the entrepreneurial team which has shown to influence team processes. This aspect could be made by looking at each characteristic for itself and providing one model for each variable, so that the heterogeneity in each variable can be explained.

In summarizing our findings, it can be said that entrepreneurial team characteristics, i.e. their prior experience and specific knowledge, influence the speed to reaching significant foreign sales. Based on the premises of the UET, the many facets of experiential knowledge found relevant for individuals have been theorized and empirically investigated for teams and transferred to the context of international new ventures. OLS regression was used to examine the linear relationship between the characteristics of the entrepreneurial team and the speed of reaching 25 percent of export intensity. While we found prior industry experience to exert a significant positive effect on such speed, prior international experience showed, much to our surprise, a significantly negative effect. Prior experience in export/import-related functions and experience in a MNE proved to be insignificant, as did the number of languages spoken.

Prior industry experience is rarely accounted for in IE work, which predominantly discusses international work or study experience. In the light of our findings, industry experience may 'overrule' international experience or be in partial overlap, given the operationalizations of the concept. Alternatively, highly internationally experienced entrepreneurs may be more open to taking more commitment or to taking bigger steps in terms of market selection which may mean slowing down the overall speed of reaching export intensity. Gabrielsson *et al* (2008) and Luostarinen and Gabrielsson (2006) emphasized these considerations for new ventures rather than focusing on reaching a numeric foreign sales threshold only.

In any case, our findings call for future research research which accounts for the overall team experience, instead of considering only the individual. Also, the multifaceted nature of experiential knowledge may be investigated further. Overall, the entrepreneurial team should get the same research attention as is the case for the top management team in the larger firm. After all, the effects of entrepreneurial team characteristics on the international performance and overall performance translate into growth and job creation in national economies. Given the importance of SMEs across almost all economies, such work would give valuable advice to policy.

For entrepreneurs and managers our results may constitute a guide on how to form and develop teams that are ready for early and continued international performance.

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A mediation analysis of the role of organizational innovation on export performance[♦]

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Abstract

Objectives. *This study focuses on the interconnectedness of different innovation types and their effect on firms' export performance.*

Methodology. *We employ a serial mediation model implementing structural equation modelling using data from a representative sample of 5969 Italian companies (MET survey 2015)*

Findings. *The results indicate that organizational innovation improves export performance indirectly through the process and product innovation. Hence, organizational innovation on export performance is entirely mediated by the causal link between the two mediators process and product innovation. Furthermore, the impact of process innovation on export performance is entirely mediated by product innovation, i.e., we observe an indirect effect of process innovation on export performance*

Research limits. *The availability of longitudinal data should help in coping with causality issues.*

Practical implications. *Results suggest that companies should innovate not only their processes and products but also their organizational structure to be well suited to go abroad successfully.*

The originality of the study. *This study finds its strength in the broad sectors' coverage of the data. Moreover, it helps to deepen the analysis of the relationship between innovation and its effect on export performance providing new empirical evidence and allowing to speculate about the procedures through which organizational innovation, process innovation, and product innovation enhance export performance*

Keywords: *Organizational innovation, Product and process innovation, Export performance, Internationalization*

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1. Introduction

The increasing global competitiveness has changed the worldwide economy and emphasized the importance of an appropriate exporting strategy to succeed in international markets (Brouthers *et al.*, 2009; Katsikeas *et al.*, 2000). Exporting represents one of the most common mechanisms implemented to enter new global markets. It allows firms to improve operating capacity utilization, enhance production efficiency and, consequently, profits, and be successful in a highly internationalized marketplace (Matanda and Freeman, 2009; Sousa *et al.*, 2008).

Export performance is driven by internal elements related to the firm's organizational setting and the export marketing strategy and external forces regarding the international markets' nature (Brouthers *et al.*, 2009; Katsikeas *et al.*, 2000; Sousa *et al.*, 2008). Thus, an improved export performance can be expected if the organizational and managerial reactions are appropriately implemented to respond adequately to the exogenous and uncontrollable factors emerging outside of the firm (Leonidou *et al.*, 2002).

The successful realization of an internationalization process is beneficial for both the company and national prosperity (Sousa *et al.*, 2008). The understanding of internal drivers of export performance, in particular innovation, is still ambiguous and leaves room for further research (Pla-Barber and Alegre, 2007).

In the field of internationalization and export strategy, the adaptation to the local environment and a continuous learning process are fundamental elements of international success and superior performance (Cavusgil *et al.*, 1993; Johanson and Vahlne, 1977). Organizational innovation, product innovation, and process innovation are seen as the main elements in reaching these goals (Azar and Ciabuschi, 2017).

Even if existing research already investigated the innovation-performance association, extant literature considers technological innovation with a specific focus on product innovation (Damanpour and Aravind, 2011; Crossan and Apaydin, 2010). Nevertheless, it is argued that the implementation of a single innovation type or the adoption of various innovations belonging to the same typology may not fully realize the positive impacts of innovation on performance (Damanpour and Aravind, 2011).

Previous studies suggest that organizational innovation represents a prerequisite and critical enabler of technological innovations (Armbruster *et al.*, 2008; Damanpour and Evan, 1984). Furthermore, modifications of a company's technical system should always be accompanied by administrative changes to enhance organizational performance (Damanpour *et al.*, 2009). However, there is only limited understanding of the complex relationship between different innovation types (Camisón and Villar-López, 2014; Damanpour and Aravind, 2011; Gunday *et al.*, 2011).

The literature provides some evidence of a link between knowledge creation processes and exporting activities (Love and Ganotakis, 2013; Roper and Love, 2002; Gkypali *et al.*, 2018). In particular, firms' export orientation and internal knowledge creation capacity are endogenously related (Gkypali *et al.*, 2012; Harris and Li, 2009). Indeed, firms' technological capabilities development is related to their absorptive capacity. A higher degree of absorptive capacity, in turn, has a positive effect on the firms' ability to cope with the complex strategy for living up to the challenges of the regional, national and global business interface (Love *et al.*, 2010).

On the other side, the role of exporting performance is an important determinant throughout firms' innovation process (Aw *et al.*, 2007; Ganotakis and Love, 2011; Gkypali *et al.*, 2012; Harris and Li, 2009; Kafouros *et al.*, 2008). The literature highlights the existence of a two-way causality relationship between exporting and innovation activities (Gkypali *et al.*, 2012; Harris and Li, 2009). The presence of endogeneity suggests that exporting activities not only serve as a proxy for the international competition and the firm's competitiveness (Tsekouras and Skuras, 2005) but also as a means of accessing external knowledge, i.e. a channel of technology transfer (Haathi *et al.*, 2005; Gkypali *et al.*, 2018)

The present study attempts to design and empirically test a model that links different innovation types and export performance in line with the framework proposed by Gkypali *et al.* (2018). The

association between organizational innovation, process innovation, and product innovation are examined along with their direct and indirect effects on export performance. We employ a serial mediation model implementing structural equation modelling using data from 5969 Italian companies (MET survey 2015) to test our model empirically.

The Italian context represents an ideal setting for the analysis, given its peculiarities. Indeed, Italy is characterized by geographical disparities between regions. Moreover, firms active in the sectors defined as made in Italy (the so-called for 4 “A” sectors) play a crucial role in determining aggregate export performance. They coexist with firms belonging to high technology sectors. Put it differently, Italian firms define their export and innovation strategies under a variety of conditions. This variability allows us to deepen and enrich the findings existing in the literature to check the robustness of different hypotheses concerning the heterogeneous conditions existing.

This study contributes to existing international business and innovation research by demonstrating the heterogeneous impacts of organizational innovation, process innovation, and product innovation on export performance and its complex relationship between the investigated innovation types. A fundamental understanding of these interconnections is critical because empirical evidence in previous research regarding the relationship between organizational innovation, process innovation, product innovation, and firm performance is scarce (Mol and Birkinshaw, 2009). Moreover, we also provide a test of the strength of the relationships for firms operating under a wide range of economic conditions.

Furthermore, this study emphasizes how organizational innovation indirectly affects export performance through a serial relationship between process and product innovation. This finding suggests that organizational innovation in response to environmental fluctuations changes the organizational setting in a way that facilitates the implementation of process innovation (Damanpour *et al.*, 2009), which in turn supports the introduction of product innovations resulting in new, highly qualitative products that better reflect the expectations of international markets (Barney, 1991; Flaig and Stadler, 1998) and ultimately improve export performance (Roper & Love, 2002).

Finally, to the best of the authors’ knowledge, this is the first study that simultaneously analyses the heterogeneous impacts of organizational innovation, process innovation, and product innovation on export performance in a serial mediation model.

The remainder of this study is structured in the following way. Section 2 provides a review of the relevant innovation and internationalization literature and develops a series of hypotheses on which is based the theoretical model describing the relationship between organizational innovation, process innovation, product innovation, and export performance. In Section 3, the methodology used to test the proposed hypotheses is illustrated. Section 4 presents the data. Section 5 presents the results. Finally, Section 6 encompasses discussions and conclusions regarding academic and managerial implications and highlights limitations and further research directions.

2. Hypotheses

Innovation is a multidimensional phenomenon. It describes a process running through different stages from the creation to the elaboration and, ultimately, the adoption of ideas and behavioural patterns that are new to the implementing organization (Damanpour, 1996). This innovation process encompasses transforming such ideas into new processes, new products or services, and new ways of structuring the organization or new managerial methods (Damanpour and Aravind, 2011; Damanpour and Evan, 1984). These various types of output deriving from this process can be categorized in different ways. OECD (2005) in the Oslo Manual defines four types of innovation: organizational innovation, process innovation, product innovation, and marketing innovation. In the present paper, we focus on the synergies and interrelations of only three types of innovation, organizational, product, and process innovations. In contrast, marketing innovation goes beyond the scope of this research. Product innovation refers to introducing a good or a new or substantially

improved service concerning its characteristics or utilization purpose. Process innovation regards adopting new or substantially improved production, distribution, and administrative support methods for goods and services (OECD, 2005). The definition of organizational innovation is more debated in the literature (Armbruster *et al.*, 2008). The first studies in this field were concerned with administrative innovation (Damanpour, 1991; Damanpour and Evan, 1984; Daft, 1978), which was defined as innovation related to modifying the organizational structure and the management of human resources. A later stream of research refers to management innovation (Mol and Birkinshaw, 2009; Hamel, 2006, 2007, 2009), managerial innovation (Damanpour and Aravind, 2011), or organizational innovation (Armbruster *et al.*, 2006; OECD, 2005). However, even though these concepts use different notions, their definitions overlap significantly (Damanpour and Aravind, 2011). In this context, the definition of organizational innovation suggested by the OECD (2005) simultaneously considers essential aspects of both traditional and more recent conceptualizations (Camisón & Villar-López, 2014), specifying organizational innovation as introducing new organizational approaches concerning the firm's business practices, the organization of the workplace, or external relationships.

2.1 Role of organizational innovation

A firm's capability to strategically design the organizational processes based on technological and administrative innovations is an essential source of competitiveness and becomes increasingly important in continuously changing market environments characterized by dynamic technologies, customer needs, market setups, and judicial conditions (Damanpour *et al.*, 2009; Teece *et al.*, 1997).

Nevertheless, in contrast to product innovation, process innovation has been neglected from a theoretical and empirical perspective (Adams *et al.*, 2006; Crossan and Apaydin, 2010; Macher and Mowery, 2009; Reichstein and Salter, 2006). Camisón and Villar-López (2014), applying a resource-based view, suggest adopting new organizational practices and working methods characterized by their rarity, value, inimitability, and non-substitutability enhance the firm's ability to implement certain technical functions.

Meanwhile, organizational innovations concerning business practices, the organization of the work environment, and the management of relations with external parties foster improved organizational efficiency and the exploitation of innovative products and technological processes (Camisón and Villar-López, 2014).

Various empirical studies link the introduction of organizational innovation to a firm's capability to implement process innovations. For example, Gunday *et al.* (2011), in their research of Turkish manufacturing firms, found empirical evidence for the positive effect of internal coordination and cooperation on the implementation of process innovation.

Therefore, based on this theoretical framework, the following hypothesis is established:

H1: *The implementation of organizational innovation is positively associated with the adoption of process innovation.*

Slater *et al.* (2014) suggest that product innovation represents an essential mechanism for firms to maintain and enhance their competitiveness in a quickly changing environment with short product life cycles. They find that organizational structure, management systems, intra-functional integration, and partnerships influence innovativeness levels of product innovation.

Following this line of reasoning, Damanpour and Aravind (2011) suggest that organizational innovation causes a change in a company's structure, strategy, and systems, positively impacting product innovation (OECD, 2005).

Moreover, a firm's innovation capabilities or organizational innovations constitute essential factors for deploying resources and subsequent conversion into innovative products and services (Pla-Barber and Alegre, 2007; Azar and Ciabuschi, 2017). Based on this insight, Garrido and Camarero (2010) argue that organizational innovation facilitates innovative strategies on the technological and product level.

Additionally, Cozzarin (2017), in his study on manufacturing firms in Canada, found a positive and significant impact of organizational innovation on the process and product innovation, with a higher average treatment effect for product innovation. Hence, the following hypothesis is proposed:

H2: *The implementation of organizational innovation is positively associated with the adoption of product innovation.*

2.2 *The relationship between process and product innovation*

Barras (1986) considers a reverse product cycle model for service industries. In which incremental process innovations augment efficiency in the first stage, radical process innovations increase the effectiveness in the second stage, and ultimately product innovation introduces new services in the third step (Barras, 1986).

Other, more recent studies also emphasize the process-product pattern of innovative activities (He and Wong, 2004; Un and Asakawa, 2015). Flaig and Stadler (1998) and Fritsch and Meschede (2001) found that process innovation is related to product innovation. This association can be explained by the fact that process innovation enhances a firm's ability to increase its product quality and develop entirely new products significantly.

Therefore, the following relationship between the two innovation types is hypothesized:

H3: *The implementation of process innovation is positively associated with the adoption of product innovation.*

2.3 *Export performance and innovation*

Hamel (2006) suggests that organizational innovation can also be the basis of a sustainable competitive advantage, which can be explained by considering the firm's resource-based view. A firm controls a set of resources that consist of accumulated tangible and intangible assets (Amit and Schoemaker, 1993). A firm's ability to deploy and combine the existing resources using organizational methods and processes is a fundamental element required to meet specific objectives (Amit and Schoemaker, 1993). In this context, implementing different innovation types equips an organization with the necessary capabilities and competencies to reach a superior performance (Damanpour *et al.*, 2009).

However, product and process innovations alone are insufficient to successfully manage the difficulties emerging in the competitive global climate (Teece, 2007). Furthermore, the adoption of organizational innovation leads to strategical, structural, and administrative changes that positively affect organizational climate, communication, coordination, cooperation, human resource policies, and teamwork (Damanpour and Aravind, 2011; Gunday *et al.*, 2011), which in turn improve the performance of the firm (Azar and Ciabuschi, 2017). Therefore, organizational innovation should increase export performance by stimulating specific organizational parameters that manage the difficulties deriving from the international environment (Prange and Pinho, 2017).

Several empirical studies confirm this suggested relationship between organizational innovation and export performance (Prange and Pinho, 2017; Azar and Ciabuschi, 2017). Based on this theoretical framework, the following hypothesis is derived:

H4: *The implementation of organizational innovation is positively associated with firm export performance.*

In internationalization and export strategy, the adaptation to the local environment and a continuous learning process are fundamental elements of international success and superior performance (Cavusgil *et al.*, 1993; Johanson and Vahlne, 1977). This alignment to local expectations can be achieved by introducing different product variations, which is fostered by product innovation and the testing of their success (Azar and Ciabuschi, 2017).

Product differentiation is an important driver of competitive advantage in international markets (López-Rodríguez and García-Rodríguez, 2005) and allows them to achieve superior economic performance. The introduction of product innovation increases market share if the newly launched products correspond to customers' expectations (Hua and Wemmerlöv, 2006) and if firms offer new products before their competitors (Min *et al.*, 2006). Product innovations are also related to a higher degree of export intensity (D'Angelo, 2012).

Hence, the following relationship is hypothesized:

H5: *The implementation of product innovation is positively associated with firm export performance.*

Existing innovation literature investigates the relationship between process innovation and export performance with a lower degree of profundity. Process innovation is generally considered an intermediate outcome that facilitates superior performance outputs, rather than representing a distinct and separate objective itself (Crossan and Apaydin, 2010; He and Wong, 2004).

However, the adoption of process innovations can positively impact firm performance through cost reductions, quality enhancements, productivity gains, and the fulfilment of expectations deriving from internal and external stakeholders (Piening and Salge, 2015). In fact, not only product differentiation can be the source of competitive advantage, but also cost leadership enabled by process innovations increases a firm's competitiveness in international markets (López-Rodríguez and García-Rodríguez, 2005).

The element of cost competitiveness is particularly important in an international environment because the exporting company must overcome sunk and variable costs such as transport costs. In this contextual setting, only the most productive and innovative global players can bear these costs and realize superior profits in the export market (Roberts and Tybout, 1997). Hence, the following hypothesis is developed:

H6: *The implementation of process innovation is positively associated with firm export performance.*

There are several ways in which organizational innovation facilitates the adoption of process innovation. Camisón and Villar-López (2014) suggest that organizational innovation in the form of new business procedures, new ways of managing the relationships with external partners, and new workplace configurations enable a firm to enhance organizational efficiency and to foster innovative production and technological processes.

Furthermore, the introduction of a successful process innovation requires an appropriate organizational framework and administrative system (Ettlie and Reza, 1992), which can be developed through organizational innovation. Consequently, organizational innovations adopted to respond appropriately to external pressures create an organizational setting that facilitates the implementation of process innovations following the difficulties emerging from the dynamic firm environment, which can increase performance (Damanpour *et al.*, 2009).

However, Camisón and Villar-López (2014) suggest that process innovation only impacts performance if it supports the generation of product innovations. This link between process and product innovation can be explained by the fact that innovative processes enhance a firm's competitive advantage concerning organizational resources, facilitating future product innovations (Barney, 1991).

Therefore, process innovation allows a firm to offer higher-quality products or develop completely new products (Flaig and Stadler, 1998), ultimately translating into improved export performance.

There exist some empirical studies that confirm the idea that product innovation has a positive effect on export intensity (Roper and Love, 2002), whereas process innovation only plays a significant role if it is complemented by product innovation (Kongmanila and Takahashi, 2009).

Therefore, the model proposed suggests that organizational innovation in response to environmental uncertainties modify the organizational setting to facilitate the implementation of

process innovation, which in turn supports the introduction of product innovations that better reflect the expectations of international markets and ultimately improve export performance.

Hence, the following hypothesis is proposed:

H7: A serial relationship mediates the effect of organizational innovation on export performance between process innovation and product innovation.

3. Method

In this study, data analysis was based on the structural equation modelling (SEM) approach, which simultaneously tests the paths between the different variables used in the model and to carry out confirmatory factor analysis (CFA). In particular, we employ CB-SEM for the investigation of the proposed model. There are some benefits related to this method. First, this approach allows testing causal links between different variables derived from a theoretical framework and generates a covariance matrix of these variables, which ultimately enables the estimation of the path coefficients (Jöreskog *et al.*, 2016; Loehlin and Beaujean, 2017). Furthermore, the CB-SEM approach's properties facilitate confirmatory factor analysis by focusing on explanations rather than predictions, and it also generates various goodness of fit statistics for the evaluation of model fit (Byrne, 2016; Kline, 2016). Finally, the covariance-based method is characterized by a certain degree of robustness, which assures stable estimates, and the recent development of new techniques allows the management of nonnormal data (Latan *et al.*, 2019).

The SEM approach's implemented estimation technique is the Maximum Likelihood (ML) method, which relies on some basic assumptions regarding sample size, normally distributed data, model identification, and absence of collinear predictors. Concerning sample size, the rule of thumb proposed by Byrne (2016) and Kline (2016), which suggest a minimum sample size of 150 observations, is easily met. Furthermore, a model is considered "identified" if the degrees of freedom are greater or equal to one (Latan *et al.*, 2019). With respect to the normality assumption, it is necessary to indicate that the model consists of one latent variable describing export performance and three observed categorical variables explaining the diverse innovation types. Given that categorical variables are nonnormal by definition, the Maximum Likelihood method was corrected for nonnormality (Satorra and Bentler, 1994). Categorical variables are discrete rather than continuous. They are more likely to produce nonzero kurtosis estimates based on the middle categories' frequency, and the asymmetry between categories can cause nonzero skewness (Rhemtulla *et al.*, 2012). Additionally, Rhemtulla *et al.* (2012), in a comparison between the robust maximum likelihood (ML) method corrected for nonnormality and robust categorical least squares (cat-LS) technique, showed that robust ML leads to underestimated factor loadings and unbiased estimates of factor correlations. Therefore, the structural model is reliable, and the selection of the robust ML approach is acceptable, given the predominant importance of structural parameters for this study.

Generally, three different steps can be distinguished in the applied data analysis procedure. The first step consists of assessing and evaluating the measurement model through CFA to verify the validity of the variables used in the model and scrutinize the reliability of the constructed model to guarantee consistent measurements. In the second stage of data analysis, the structural model is assessed and evaluated by analyzing the coefficient of determination and several goodnesses of fit statistics. Finally, in the last phase, the suggested hypotheses are tested based on a 95% significance level. Nevertheless, before the description of the results obtained from the data analysis procedure, it is necessary to define the construction and the content of the used variables.

As already indicated in the previous section, the research model consists of a latent variable based on two indicators describing export performance and three observable variables related to different innovation types. More specifically, we define the following variables:

Organizational innovation: Innovation research often builds on secondary data (e. g. registered patents) or other proxy variables such as R&D investment to materialize innovation (Archibugi and

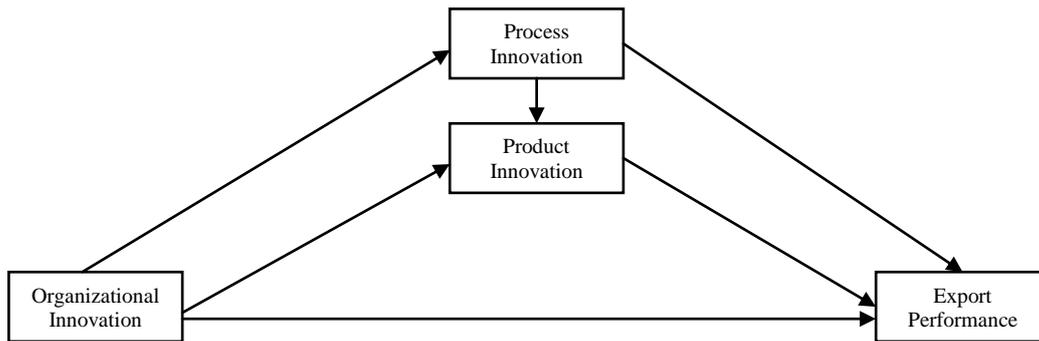
Planta, 1996; Nam *et al.*, 2014). Nevertheless, some recent approaches highlight the benefits of more direct measures of innovation output, not only because of several drawbacks related to the use of patents and R&D intensity but also because of sectoral dissimilarities that can lead to biased results if such proxies are used to operationalize innovation (Galizzi & Venturini, 2008; Hervas-Oliver *et al.*, 2011). The measure of organizational innovation considers the three fundamental elements of this innovation type suggested by the OECD (2005): business practices, workplace organization, and relations with external parties. In the questionnaire's innovation section, the MET survey asks whether firms have introduced organizational, managerial, or commercial innovations in the three years between 2013 and 2015. However, these organizational, managerial, and commercial innovations also include marketing innovation, representing a distinct innovation type (OECD, 2005). Consequently, to capture the effect of organizational innovation, the firms that only have introduced marketing innovations as organizational, managerial, and commercial innovations have been eliminated. Therefore, organizational innovation is a binary variable that takes the value one if the firm has introduced new business practices, new approaches for the workplace organization, or new ways of managing relationships with external parties in the three years between 2013 and 2015 zero otherwise.

Process Innovation: Similarly, the variable of process innovation is measured by the question that asked firms, following the definition of process innovation suggested by the OECD (2005), whether they have introduced principal or secondary process innovations in the three years between 2013 and 2015. The measure of process innovation incorporates both levels of innovativeness. It represents a binary variable equal to 1 if a company has introduced principal or secondary process innovations in the three years between 2013 and 2015, and 0 otherwise.

Product innovation: Finally, also the measure of the last investigated innovation type, product innovation, is based on its conceptualization provided by the Oslo Manual (OECD, 2005). This variable was measured by the MET survey question that asked whether firms have introduced principal or secondary product innovations in the three years between 2013 and 2015. Therefore, the variable product innovation also encompasses both degrees of radicalness and is defined as a binary variable taking the value of 1 if the firm has introduced principal or secondary product innovations in the three years between 2013 and 2015, and 0 otherwise.

Export performance: Concerning internationalization and, more specifically, export literature, there are no definite theoretical indications on measuring export performance (Brouthers *et al.*, 2009). In this context, Zucchella *et al.* (2007) indicate that three dimensions of export are generally considered in the literature: the geographic scope of exporting captured by the number of countries that are targeted as export markets, precocity and speed of foreign sales, and export intensity measured as the percentage of export sales over total sales. However, Katsikeas *et al.* (2000) argue that there exists no individual measure of export performance that outperforms all other proxies and, therefore, can be considered superior. Nevertheless, several authors suggest that the percentage of export sales to total sales represents an important indicator of the performance of firms that operate internationally (Cavusgil, 1980; Ramaswamy *et al.*, 1996). Furthermore, this measure of export intensity also has been implemented in various Italian studies on export activities (Majocchi *et al.*, 2005; D'Angelo 2012). This justifies the consideration of export intensity, measured as the percentage of export sales over total sales, as an indicator variable for export performance. However, given that export performance represents a multidimensional construct, an appropriate investigation of this concept requires various indicators (Sousa, 2004). Therefore, the firms' export activity's geographic scope, measured as the number of countries to which the firm sells its products, is introduced as a second indicator variable for export performance. In other words, export performance represents a latent construct defined by the observed variables of export intensity and geographic scope of export activities.

Fig. 1. The conceptual model



Source: our elaboration.

Control variables: Furthermore, the control variables considered in the proposed model are defined in the following way: size represents a categorical variable that classifies firms based on the number of employees in 4 different categories, including 1 - 9, 10 - 49, 50 - 249, and more than 250 employees, age is expressed as the number of years in business, and international relations are captured by a dummy variable that takes the value one if the firm has relevant and continuous relations with other firms, corporations or institutions, and zero otherwise.

Fig. 1 displays the complete conceptual model, including control variables and the latent variable indicators capturing export performance.

This study uses lagged variables, which reduces the possibility of a joint determination of independent and dependent variables (Spanos *et al.*, 2004). As already indicated, the measures related to the different innovation types refer to the three-year time period between 2013 and 2015, which also represents the period covered by the geographic scope variable. In contrast, export intensity refers to the ratio of export sales to total sales in the last year considered by the MET survey of 2015. Given that the causal effects between the different innovation types are investigated, the definition of the respective variables based on three years potentially allows overcoming causality problems. Furthermore, the use of three years is in line with a proposition of the OECD (2005), which suggests considering three years given that innovation represents a path-dependent process that may require some time to reveal its effects on firm behaviour.

4. Data

For this study, the data has been extracted from the Monitoraggio Economia Territorio (MET) survey of 2015 and 2013 (Brancati *et al.*, 2015). This survey has been integrated with ulterior information such as balance sheet data or employment numbers through the combination with Bureau van Dijk data. The population of interest for the MET survey consists of companies registered in Italy and operating in industry and production services sectors for all dimensional classes. The sample contains 23071 observations, which allowed the implementation of ulterior consolidations and regional oversampling.

We selected 5969 firms among those present in the two surveys and did not report missing data for the relevant variables. The firms' average number of export markets was 12, within the range of 1 - 188. On average, in the firms considered in the sample, approximately 36% of total sales are generated in foreign countries, ranging from 0.1 - 100 %. The macro-regional distribution of the observations shows that approximately 31% of the observed firms are registered in the North-West of the country, 33% in the North-East, 22% in the Center, and 14% in the South and the Islands. Concerning the economic sectors, the most represented industries are the mechanic sector with 15.6%, the metal industry with 13.9%, and the rubber, plastic, and chemical sector with 11.3%. Finally, 47.2% of the investigated firms have between 10 and 49 employees, 25.2% of firms have from 1 to 9 employees (Tab. 1).

5. Results

The proposed model consists only of one latent variable capturing export performance, which is based on the two indicator variables export intensity and geographic scope of export activities. The standardized factor loadings are used to assess the individual reliability of the items.

In this model, the reliability of the construct and the internal consistency is assessed by analyzing composite reliability (CR) that is equal to 0.6, representing the proposed minimum value for this indicator (Bagozzi and Yi, 1988). The average variance extracted (AVE) is calculated to assess convergent validity further. A commonly considered threshold in this context is $AVE \geq 0.5$. However, Fornell and Larcker (1981) indicate that if AVE is smaller than 0.5, but the composite reliability is higher than 0.6, the model's convergent validity is still appropriate. Hence, an AVE of 0.44 in combination with a CR of 0.60 manifests convergent validity. Furthermore, given that factor loadings influence this AVE and CR, the underestimation of the latter also negatively influences the former two indicators. The following disposition (Tab. 2) summarizes the results of the measurement model assessment.

Tab. 1: Descriptive statistics

Characteristics	Frequency	Percentage
<i>Macroregions</i>		
North-west	1,857	31.11
North-east	1,951	32.69
Centre	1,303	21.83
South and islands	858	14.37
<i>Dimension</i>		
1 - 9 employees	1,506	25.23
10 - 49 employees	2,820	47.24
50 - 249 employees	1,362	22.82
> 250 employees	281	4.71
<i>Economic sector</i>		
Food sector	536	8.98
Clothing sector	620	10.39
Wood and furniture	411	6.89
Paper, printing, and publishing sector	275	4.61
Rubber, plastic and chemical sector	677	11.34
Metal	831	13.92
Means of transportation production	292	4.89
Mechanics	932	15.61
Electric machines and electrical equipment	525	8.80
Other manufacturing industries	251	4.21
Transport, post, and communication	231	3.87
Other services	388	6.50
Indicator	Mean	Range
Geographic scope	12.11	1 - 188
Export intensity	36.32	0.1 - 100

Note: Geographic scope is indicated in absolute values, whereas export intensity is displayed in percentages

Source: our elaboration on MET data.

Tab. 2: Measurement Model: loadings, composite reliability, and average variance extracted

Items	Description	Standardized Loadings
Export Performance (AVE = 0.44, CR = 0.60)		
Export Intensity	Percentage of export sales over total sales	0.53
Geographic Scope	Number of countries to which the firm sells its products	0.76

Source: our elaboration on MET data.

The covariance-based SEM approaches generate various goodness of fit indices that can be used to assess the structural model (Tab. 3 provides an overview of the structural model). These indices are influenced by sample size and model complexity. Therefore, numerous researchers propose to

report a combination of fit statistics to obtain a more robust interpretation (Kline, 2016; Loehlin and Beaujean, 2017).

Tab. 4 shows that in the model proposed by this paper, the resulting χ^2 is significant suggests a poor fit. Nevertheless, this statistic is sensitive to sample size (Gerbing and Anderson, 1985). Even if a considerable number of observations are important to improve the parameter estimates' precision, it simultaneously increases χ^2 with the ultimate consequence that it will be almost always significant for specific sample sizes (Iacobucci, 2010). The other commonly used descriptive fit statistics are used to show the overall goodness of fit and to provide stable interpretations: GFI, CFI, TLI, and RMSEA. For GFI, CFI, and TLI, the recommended threshold of 0.9 (Jöreskog *et al.*, 2016; Loehlin and Beaujean, 2017) is met with respective values of 0.97, 0.97, and 0.89. Finally, the obtained RMSEA of 0.05 is smaller than 0.08 and therefore fulfils the minimum requirements (Schumacker and Lomax, 2016). Additionally, the coefficient of determination (CD), which for the overall model is equal to 0.45 showing a good fit.

In this third step of data analysis, the covariance-based SEM technique has been implemented to simultaneously test the proposed hypotheses by determining the path coefficients of the model and their significance level. As shown in Tab. 5, the first path between organizational innovation and process innovation displays a positive and significant coefficient (0.36, $p < 0.01$). Hence, the first hypothesis is supported. Concerning H2, the path coefficient between organizational innovation and product innovation is positive and significant (0.18, $p < 0.1$), supporting the corresponding hypothesis.

Furthermore, the positive and significant path coefficient linking process innovation and product innovation (0.33, $p < 0.01$) supports H3. H4 states that the implementation of organizational innovation is positively associated with firm export performance. However, even if the path coefficient between organizational innovation and export performance is, in fact, positive (0.11), it is not statistically significant. This may be explained by the fact that the interplay completely mediates organizational innovation on export performance between process innovation and product innovation, which is suggested by H7 and therefore tested in the following part. Considering H5, the corresponding path coefficient is positive and significant (0.18, $p < 0.05$). Hence, the fifth hypothesis is supported. Regarding the relationship between process innovation and export performance captured by H6, the corresponding path coefficient is positive (0.001) but very small and insignificant ($p > 0.05$): process innovation affects organizational innovation through product innovation's completely mediating role. Again, this potential explanation is investigated when testing H7.

Fig. 2 graphically summarizes the results obtained from the SEM analysis.

Tab. 3: Structural Model: Items and description

Items	Description
Organizational Innovation	Binary: 1 if the firm has introduced new business practices, new approaches for the organization of the workplace, or new ways of managing relationships with external parties, 0 otherwise
Process Innovation	Binary: 1 if a company has introduced principal or secondary process innovations, 0 otherwise
Product Innovation	Binary: 1 if the firm has introduced principal or secondary product innovations, 0 otherwise
Export Performance	Latent: Export intensity and geographic scope as indicators
Control variables	
Size	Categorical variable based on the number of employees: 1 = 1-9 employees, 2 = 10-49 employees, 3 = 50-249 employees, 4 = >250 employees
Age	Number of years in business
International Collaborations	Binary: 1 if the firm has relevant and continuous relations with other firms, corporations, or institutions, 0 otherwise

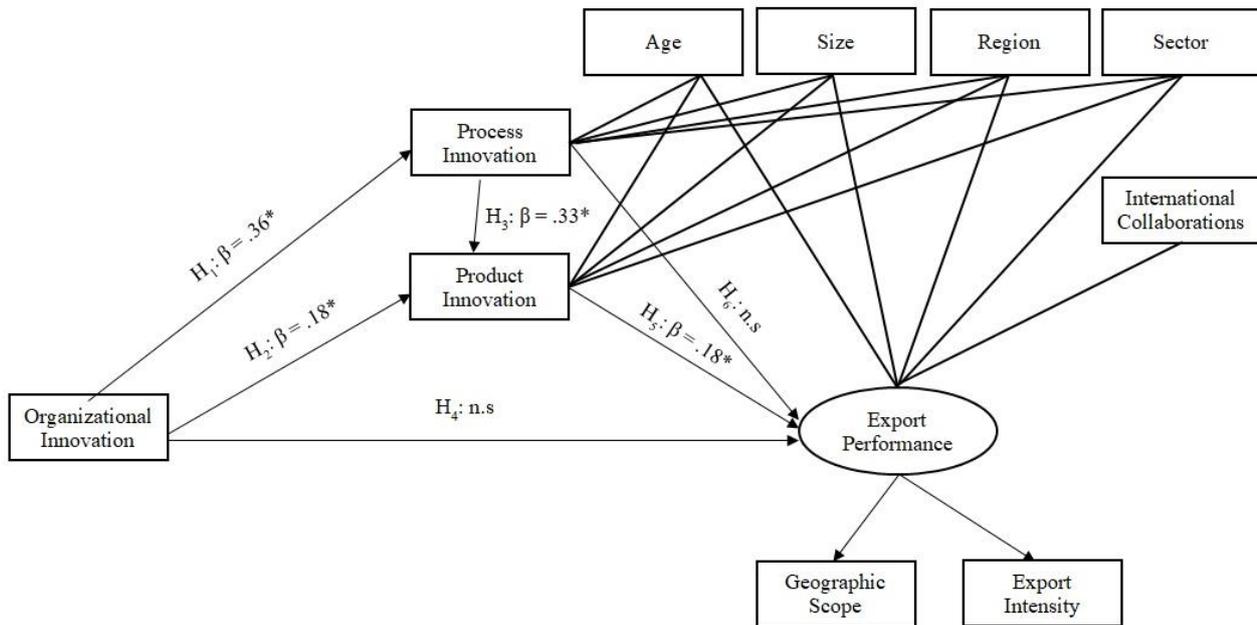
Source: our elaboration on MET data.

Tab. 4. Goodness-of-fit statistics

Statistics	Outcome
Likelihood Ratio test: $\chi^2(13)$	172.25
Root mean squared error of approximation (RMSEA)	0.048
<i>Baseline Comparison</i>	
Comparative fit index (CFI)	0.967
Tucker-Lewis index (TLI)	0.894
Goodness of Fit (GFI)	0.965
<i>Size of residuals</i>	
Standardized root mean squared residual (SRMR)	0.016
Coefficient of determination (CD)	0.449

Source: our elaboration on MET data.

Fig. 2. The conceptual model with SEM results



Source: our elaboration on MET data.

For completeness, we comment also some evidence about the effects of the control variables. Firm size positively and significantly influences both process innovation (0.14, $p < 0.01$) and product innovation (0.08, $p < 0.01$). Furthermore, also, export performance is positively and significantly influenced by firm size (0.40, $p < 0.01$). This result is consistent with the expectations based on the proposed theoretical framework. Concerning firm age, the path coefficient between age and process innovation is positive but small (0.008) and not significant. In contrast, the path coefficient between age and product innovation is slightly negative (-0.02) and not significant. This is consistent with other studies that found an insignificant relationship between age and innovation (Camisón and Villar-López, 2014). On the other hand, the effect of firm age on export performance is positive and significant (0.05, $p < 0.01$), in line with the extant literature. Finally, the path coefficient between international collaborations and export performance is positive and significant (0.21, $p < 0.01$), confirming the suggested relationship.

Being located in Center or North of Italy -compared to those located in South of Italy- is positively related with better export performances (with coefficients significant and equal to 0.12 for North East, 0.15 for North West and 0.09 for Center). No effect is found on process innovation; indeed, all the coefficients are not significant. Product innovation performance is positively associated with being located in North East. Firms active in made in Italy sectors have worst process performance (-0.05, $p < 0.01$), but better product performance (0.04, $p < 0.01$). moreover, they have better export performance (0.08, $p < 0.01$).

Finally, the seventh hypothesis suggests a serial mediation model, including organizational innovation as an independent variable, process and product innovation as mediators, and export performance as a dependent variable is tested. Serial mediation means that the model consists of two or more mediators that are in a hierarchical causal relationship (Demming *et al.*, 2017). In such a model, the indirect effect is divided into different specific indirect effects. The first is the long-way mediation, which includes both mediators and therefore captures the following path: organizational innovation → process innovation → product innovation → export performance. Given that this long-way mediation is significant, the existence of serial mediation can be claimed (Demming *et al.*, 2017).

To further assess the observed mediation type, the decision tree for establishing mediation and non-mediation typologies proposed by Zhao *et al.* (2010) has been utilized. This approach requires the analysis of indirect, direct, and total effects of the proposed variables. As already indicated, the long-way indirect impact of organizational innovation on the export performance that passes through the causal chain linking the mediators, process innovation, and product innovation is significant.

Tab. 5. Direct, indirect, and total effects of each path

Hypothesis	Hypothesized path	Coefficient	P> z	Conclusion
	<i>Direct effects</i>			
H1	Organizational Innovation → Process Innovation	0.362	0.000	H1 supported
H2	Organizational Innovation → Product Innovation	0.184	0.000	H2 supported
H3	Process Innovation → Product Innovation	0.334	0.000	H3 supported
H4	Organizational Innovation → Export Performance	0.011	0.481	H4 not supported
H5	Product Innovation → Export Performance	0.184	0.000	H5 supported
H6	Process Innovation → Export Performance	0.001	0.945	H6 not supported
	<i>Indirect effects</i>			
H7	Organizational Innovation → Product Innovation	0.129	0.000	H7 supported
	Organizational Innovation → Export Performance	2.002	0.000	
	Process Innovation → Export Performance	2.132	0.000	
	<i>Total effects</i>			
	Organizational Innovation → Product Innovation	0.325	0.000	
	Organizational Innovation → Export Performance	2.344	0.000	
	Process Innovation → Export Performance	2.199	0.000	
Control variables				
	Size → Process Innovation	0.145	0.000	Expected
	Size → Product Innovation	0.081	0.000	Expected
	Size → Export Performance	0.400	0.000	Expected
	Age → Process Innovation	0.008	0.537	Not expected
	Age → Product Innovation	-0.015	0.182	Not expected
	Age → Export Performance	0.053	0.003	Expected
	International Collaborations → Export Performance	0.201	0.000	Expected
	Nord East → Process Innovation	0.009	0.619	Expected
	Nord East → Product Innovation	0.020	0.253	Expected
	Nord East → Export Performance	0.119	0.000	Expected
	Nord West → Process Innovation	0.004	0.830	Expected
	Nord West → Product Innovation	0.045	0.008	Expected
	Nord West → Export Performance	0.148	0.000	Expected
	Center → Process Innovation	0.016	0.329	Expected
	Center → Product Innovation	0.017	0.288	Expected
	Center → Export Performance	0.089	0.000	Expected
	Made in Italy sector → Process Innovation	-0.051	0.000	Expected
	Made in Italy sector → Product Innovation	0.040	0.001	Expected
	Made in Italy sector → Export Performance	0.082	0.000	Expected
	Services → Process Innovation	-0.083	0.000	Not expected
	Services → Product Innovation	-0.017	0.157	Expected
	Services → Export Performance	-0.047	0.001	Expected

Source: our elaboration on MET data.

On the other hand, by examining the direct effect of organizational innovation on export performance, a positive but not significant coefficient can be observed (0.11). Finally, the total effect regarding the relationship between organizational innovation and export performance is positive and significant (2.34, $p < 0.01$). Building on these findings, the decision tree developed by Zhao *et al.* (2010) classifies the observed mediation type as indirect-only mediation. Baron and Kenny (1986), in the presence of a significant indirect effect and an insignificant direct effect, speak of full mediation. This means that the mediation completely explains the variation of export performance by organizational innovation. Another interesting aspect that emerges from the empirical results is that the shortcut mediation, which involves only process innovation as a mediator, is insignificant. Given that the direct effect of process innovation on export performance is insignificant, the indirect effect going through product innovation is significant. The total effect of process innovation on export performance shows a positive and significant coefficient (2.20, $p < 0.01$). It is possible to state that the impact of process innovation on export performance is completely mediated by product innovation. In conclusion, all of these findings support H7.

6. Conclusions

6.1 Discussion and implications

In general, this study's findings demonstrate that the adoption of different innovation types for the handling of foreign markets is positively associated with export performance. The implementation of organizational innovations generates a business environment that fosters the introduction of new processes, which facilitates the launch and the development of new products. These new organizational methods, processes, and products enable exporting firms to respond adequately to technological and environmental fluctuations emerging in highly competitive international markets (Kafouros *et al.*, 2008; Zahra and Covin, 1995). Therefore, this study confirms that innovation is a fundamental driver of competitive advantage in global markets, representing an essential determinant of export performance (Pla-Barber and Alegre, 2007).

Furthermore, this paper finds evidence for the proposition that in this exporting framework, particularly organizational innovation is a fundamental enabler of technological innovation in the form of process innovation and product innovation. This means that the introduction of new business practices, new methods for the organization of the workplace, and new ways of managing the relations with external parties deriving from organizational innovation improve the innovativeness level of the firm and create an appropriate environment for the implementation of process and product innovations (Damanpour and Evan, 1984). This is consistent with the proposition of Damanpour *et al.* (1989), which indicates that the appropriate development of the organization's administrative element is fundamental for the successful introduction of technological innovations. Moreover, the results confirm that the relationship between organizational innovation and export performance is completely mediated by the two mediators, process innovation and product innovation, which are linked by a hierarchical causal chain. This finding means that the structural improvements deriving from organizational innovation improve export performance only indirectly, and not directly, through the creation of an appropriate business environment for the introduction of new processes, which in turn positively affect the adoption of product innovation. In other words, this result supports the argument that organizational innovation in response to external pressure creates an organizational setting that fosters the implementation of process innovations following the difficulties arising in the rapidly changing environment (Damanpour *et al.*, 2009); these process innovations rather than directly influencing export performance enhance a firm's competitive advantage concerning essential organizational resources, which facilitates the future introduction of new highly qualitative products (Barney, 1991; Flaig and Stadler, 1998) that ultimately result in improved export performance (Roper and Love, 2002). This explains the non-significant relationship between organizational innovation and export performance

and simultaneously justifies the insignificant association between process innovation and export performance. Hence, the findings also support the argument that process innovation only has an impact on firm performance if it supports the development of product innovation (Camisón and Villar-López, 2014).

Previous research already investigated the complex association between various innovation types and different dimensions of firm performance in a simple mediation model (Camisón and Villar-López, 2014), explored the mediating role of technological innovation in the relationship between organizational innovation and export performance (Azar and Ciabuschi, 2017), and analyzed the complementarity and substitutability of diverse innovation types (Doran, 2012). However, this paper's key findings contribute to the existing research by emphasizing the importance of implementing process and product innovations and by specifically demonstrating the interplay of different innovation types and export performance in a serial mediation model. Furthermore, this study contributes to international marketing research by emphasizing the impact of varying innovation types on export performance (Pla-Barber and Alegre, 2007). When firms market new products in foreign destinations, they cannot limit themselves to product innovation. Process innovation and organizational innovation are of similar importance for achieving a superior export performance (Damanpour and Aravind, 2011; Gunday *et al.*, 2011).

Finally, the results obtained from this study have various implications for international managers. The difficulties arising from the expansion in dynamic international markets can be compensated by a firm's enhanced ability to differentiate itself through the generation of competitive advantage based on an appropriate combination of different innovation types. Therefore, managers must focus not only on product innovation because it has the most direct effect on export performance but also to be innovative concerning the organizational setting, structure, and business practices to allow the creation of an adequate environment for the adoption of process innovation, which enables a firm to accumulate fundamental organizational resources for successful future product innovations. Innovation represents an essential mechanism that allows exporting firms to adapt to the dynamic global environment they must face. Therefore, if the implemented innovation strategies match the international market's characteristics and demand, improved export performance can be expected. However, managers need to understand that organizational innovation and process innovation do not significantly affect export performance. Therefore, these innovation types must necessarily be followed by product innovations to guarantee superior performance in global markets.

6.2 Limitations and directions for future research

This study provided some contributions to innovation and internationalization, but at the same time, there exist some limitations. First, to measure the firms' innovative behaviour, only binary variables have been introduced into the model. Even if this allows us to obtain a direct output measure for innovation activities, it does not capture innovation's multidimensional nature. Therefore, future studies could apply more comprehensive measures for the different innovation types and consider a multidimensional definition of the distinct innovation typologies. The measure of export performance -even if it is more accurate compared to that used in the literature (Azar and Ciabuschi, 2017)- could be further enriched by introducing additional indicator variables, regarding, for example, the precocity and speed of foreign sales or the number of products sold in foreign markets. The variables' timing shows some limitations because most of the constructs are defined covering three years, without providing any indication about their exact timing. In fact, in the context of innovation and internationalization literature, which is characterized by potential causality problems, more profound knowledge about the specific occurrence of certain events defining the used variables could be valuable. Future research should investigate the relationships hypothesized in the proposed model using longitudinal data to resolve the given limitations and provide a more detailed assessment of causality among organizational innovation, process innovation, product innovation, and export performance. In this context, two interesting aspects to

evaluate are the empirical possibilities that product innovation's introduction leads to process innovation. The adoption of technological innovation in the form of new products and new processes causes organizational innovations. Finally, the proposed model, once data are available can be applied to different countries, allowing a comparison of the findings.

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The role of cognitive frames towards circular economy practices in SMEs

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Abstract

Objectives. *The development of an integrative cognitive framework in managers in which environmental and economic views are strictly enwind is crucial for supporting the transition towards a more circular economy. The paper explores the drivers for developing such integrative view in managers of SMEs operating in the hospitality sectors.*

Methodology. *The research is grounded on original data collected by a survey 252 Italian SMEs operating in the hospitality sector. Adopting a structural equation model, we tested drivers that can contribute to create respectively an environmental and economic logic in managers, whether the co-presence of these logics is able to generate an integrative view and, as a consequence, influence of such view on the adoption of pro-environmental practices.*

Findings. *The results confirm environmental concern being a driver of environmental logic, the importance of environmental logic and the economic one as determinants of the integrative view and the importance of such view in adopting of pro-environmental practices.*

Research limits. *The study is focused on a specific geographical context. The number of drivers of environmental internalization could be expanded.*

Practical implications. *The study contributes to the steam of research on sustainability among SMEs by stressing how intangible factors are crucial for reaching environmental embeddedness.*

Originality of the study. *Understanding how organization are able to manage potential competing logics in an integrative cognitive framework is still unexplored, mainly in the Hospitality sectors. In such sectors finding an equilibrium between economic and environmental need is crucial for really embracing environmental sustainability.*

Key words: *cognitive frames; circular economy; SME; pro-environmental practices; hospitality sector.*

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1. Introduction

A growing global demand of products and services has increased the need of natural resources and contributed to the deterioration of the natural ecosystem (UNEP, 2019).

Numerous institutions have increased efforts for supporting the economy transition towards more circular and sustainable pattern and make compatible increasing profit and environmental protection (Porter and Kramer, 2011; Gusmerotti *et al.* 2019). As a consequence, citizens and consumers are becoming more demanding in terms of environmental commitment of companies (Testa *et al.*, 2020). Also in the hospitality sector, consumers have demonstrated more attention towards the environmental footprint of hospitability and food service (Passafaro, 2020).

However, the increasing pressure from external stakeholders have not generated an isomorphic response from organizations (Boiral *et al.* 2017). In some cases, managers are not able to adopt a cognitive framework where an environmental and economic views are integrated causing a decoupling between real environmental performance and external green image (Greenwood *et al.* 2011; Testa *et al.*, 2018). In such circumstances, economic benefits are just in the short term, linked to a precarious improvement of corporate reputation (Marquis *et al.*, 2016), whereas, environmental actions are just superficial and are mainly related to communication action such as signing official declaration or publishing sustainability reports (Macellari *et al.*, 2021). Only a cognitive framework where sustainable principles are enwinding into strategy and operations can generate a substantial economic advantage. This assumption is particularly valid in case of SMEs which are characterized by an endemic lack of financial and physical resources (Testa *et al.*, 2016). For instance, as highlighted by a recent study carried out by Iraldo *et al.*, (2017) focused on HORECA sector, just a deep managerial commitment and the adoption of practices recognizable by customers can generate a positive effect of economic performance. However, even if there is a wide consensus among scholars that sustainability embeddedness is a *conditio sine qua non* for producing a positive effect on economic performance the debate on which factors are able to lead the institutionalization of sustainability principle is still on-going (Aguinis and Glavas, 2013). Starting from the consideration that the institutional environment is complex and it is a source of competing logics, some scholars have focused their attention on the managerial approaches on potential conflicting logics such as environment and economic logic (Van der Byl and Slawinski, 2015; Dahlmann and Grosvold, 2017). Understanding how organization are able to manage potential competing logics in an integrative cognitive framework, to our knowledge, is still unexplored, mainly in the HORECA and Hospitality sectors. In such sectors, mainly characterized by SMEs and where the effect of brand and corporate reputation is not comparable with some manufacturing sectors operating in B2B market, finding an equilibrium between economic and environmental need is crucial for really embracing environmental sustainability. In order to contribute to this search of understanding, following the categorization provided by Van der Byl and Slawinski (2015) we explored which factors develop an integrative view in managers of SMEs operating in HORECA sector. In details, by using data collected by a questionnaire-based survey which involved 252 Italian SMEs, we tested which factors contribute to create an environmental and economic logic in a manager decision making process and whether the co-presence of these logics produce an integrative view which, as a consequence, influence the probability of adopting pro-environmental practices. The results confirm most of our hypotheses stressing that is crucial to find an equilibrium between environment and economic logic for adopting substantial environmental practices. The study contributes to the literature on corporate sustainability with a focus on hospitality sector in manifold ways, both theoretically and empirically. First, the study contributes to the steam of research on sustainability among SMEs by stressing how intangible factors are crucial for reaching environmental embeddedness. Second, empirical findings shed a light on which beliefs influence the creation of an integrative view supporting the emerging literature on the managerial approach towards sustainability. Third, the study provides an original contribution on the emerging literature on which are the drivers of environmental proactivity of hospitality organizations.

The rest of the paper is organized as follows. In the next section, we introduce the literature on the relation of environmental and economic performance and present the study's hypotheses. The research design including how we built the questionnaire and collected the data is described in the next section. Then, we reported the main results clarifying which hypotheses were supported. The final section discusses theoretical and managerial implications, together with limitations and avenues for future research.

2. Literature review

There are several examples in the managerial literature of researches exploring the benefits of companies deciding to protect the environment while conducting their operations (Porter and van der Linde, 1995; Hart and Ahuja, 1996; Christmann, 2000). Generally, green practices are those activities approached by a firm aiming at reducing the environmental footprint (Mauch *et al.*, 2006; Ortiz-de-Mandojana and Bansal, 2016). Those activities are fundamental as depict clearly the way businesses might contribute to the reduction of natural resource extraction (De Haas and Poelhekke, 2019), climate change mitigation (Bansal and DesJardine, 2014), waste reduction (Cainelli *et al.*, 2019) or more in general to the transition towards a more circular economy (Gusmerotti *et al.*, 2019). Pollution prevention and green supply chain management are example of internal green practices while green product development is a typical example of external practice (Ambec and Lanoie, 2008). While internal green practices might foster the reduction of costs and environmental risks, the external ones might facilitate firms in meeting expectations of different typologies of stakeholders (i.e. suppliers, clients, institutions, regulators, etc.) positively influencing the reputation and legitimacy of the business (Hart *et al.*, 2003).

Plenty of environmental management researchers (e.g. Van der Byl and Slawinski, 2015; Bonacchi and Rinaldi, 2007) explored the importance of a cognitive framework in which there is an alinement between the environmental logic and the economic ones; in a way where an "advance in one aspect of sustainability should trigger as well an advancement in the economic dimension" (Van der Byl and Slawinski, 2015). Indeed, several studies (Ambec and Lanoie, 2008; Miroshnychenko *et al.*, 2017) suggest a positive impact of the adoption of green practices on the financial results of a firm. For instance, a clear relationship between firm financial performance and environmental sustainability in the healthcare industry has been proved by Christoffersen *et al.* (2013) analysing data collected from the Newsweek Green Rankings. Orlitzky *et al.* (2003), provided a meta-analysis on the linkages between the social and environmental performances of a firm and the financial performance grounding on 52 quantitative studies previously published. The authors found that both social and environmental responsibility are likely to pay off in the medium term, even if the operationalizations of the corporate social and environmental performance and corporate financial performance also mitigate the positive relationship. Other scholars underlined also that firms adopting eco-efficiency practices could reduce costs and increase the legitimacy of the firm in the eyes of different typologies of stakeholders (King and Lenox, 2001; Darnall *et al.*, 2008).

Similarly, there are researches exploring the interrelation of the integrative view (environmental and economic) of firms operating in the hospitality sector that show a positive relationship between green practices and financial results. For instance, Bagur-Femenias *et al.* (2013) in their work found out that the adoption of green practices in travel agencies allowed them to differentiated themselves from competitors while, at the same time to reduce operative costs. Analogously, studies grounding on firms operating in the hospitality sector suggest a positive relation between the adoption of green strategies and short-term financial performance (Leonidou *et al.*, 2013; Wang, 2014; Xu & Gursoy, 2015). Those researches suggest that the adoption of a proactive environment strategy, translating into different actions, resulted in economic benefits represented by the possibility to affiliate with large hotel chains (Kassinis and Soteriou, 2003), higher establishment category (Álvarez *et al.*, 2001), etc.

However, the literature exploring linkage between environmental and financial performance have not shown definitive conclusions. During the last few years, some researchers underlined that the mere adoption of environmental actions and practices is not enough for gaining economic benefits as well; environmental actions and practices should be indeed deeply embedded into the firm to produce an economic result (Bromley and Powell, 2012; Kassinis and Panayiotou, 2018). For instance, some studies (Boiral *et al.*, 2017; Testa *et al.*, 2018) grounding on the neo-institutional theory suggested that firms could ceremonially embrace environmental actions and practices aiming at assure conformity with the institutional requests in order to receive the external legitimacy although enduring operating as usual. Those authors indeed suggest that such ceremonial way of adoption create a divergent alignment between the internal efforts needed to implement the practice and the image projected externally. Similar discrepancies are underlined by researches exploring firms operating in the hospitality sector (Claver *et al.*, 2007; Tarí *et al.*, 2010). For instance, Bagur-Femenias *et al.* (2016) analyze the differences in adopting ISO 14001 environmental certification and Eco-Management and Audit Scheme (EMAS) by Spanish hotels. The authors conducted a survey of 210 small Catalanian hotels to investigate whether the adaption of the certification was ceremonially done or was supported by a strong commitment to green practices. The authors underlined a significant difference between the two behaviors, with the former, strongly commit to green practices, obtaining better financial results than other hotels, while the latter showing some sort of misalignment in their external image casted to different stakeholders. In such framework, our research aims at better understanding the alignment of economic logic and the environmental one as drivers of the adoption of proactive environmental practices of firms operating in the hospitality sector.

2.1 Hypothesis development

For a firm the consideration of the environment might arise from different sources, such as: regulations, stakeholders, supply chain partners, etc. Those actors represent different typologies of subjects which a firm is seeking to consider by displaying environmental concern. However, as suggested by Dechant and Altman (1994), individual's desires and expectancies about the environment are just partially guided by external forces. Indeed, the same desires and expectancies may also be motivated by an individual concern for the natural environment and the role a subject believe it should play in the societal setting. Shultz (2000) defines environmental concerns that kind of felling people develop associated with the degree to which they view themselves as interconnected with nature. Davis *et al.* (2009) suggest that a high degree of environmental values (or concern for the environment) acts as a form of personal identity for an individual. For such reason, individuals exhibiting strong environment values or concern for the environment would have a high degree of commitment to the environment, which in the business setting, might drive to the adoption of an environmental logic. In the managerial literature, the role of environmental concern as predictor of environmental logic in firms is not generally explored (Fraj-Andrés *et al.*, 2009), and especially for those firms operating in the hospitality sector. For such reason, in order to fully understand such aspect, we formulate the following hypothesis:

H1. there is a positive relationship between the environmental concern and the environmental logic of a firm operating in this sector.

Entrepreneurs may choose to adopt an environmental proactive strategy regardless of external pressures or their goal of profit maximization. Among these, the environmental logic intended as the intention and willingness of business owner or managers to be engaged in environmental management for reducing the environmental impact is highlighted in many studies. In larger business, several researches, showed that firms with managers holding strong environmental logic help implementing a set of business strategies aiming at the reconciliation of environmental goals

with economic goals (Dibrell *et al.*, 2011; Barr, 2007). The importance of such logic is also underlined by Bowen and colleagues (2001) that identified it as one possible explanation for diverging environmental strategies of the firms which operate in similar sectors. In the hospitality sector, for instance, Molina-Azorín *et al.* (2009) analyzing a sample of hotels located in Spain revealed that a managerial logic committed towards the environment translates into a greater integration of environmental consideration in traditional business logics. Similar results in the hotel industry were obtained by Brown (1996), Claver-Cortés *et al.* (2007), Ayuso (2006). However, the role of environmental logic as a driver for the adoption of an integrated view in firms seems almost neglected for other typologies of firms operating in the same sector (i.e. restaurants, bathhouses, etc.). To fully understand the impact of the environmental logic in the adoption of an integrated view in different typologies of firm operating in the hospitality sector we thus formulate the following hypothesis:

H2. there is a positive relationship between the environmental logic and the integrative view for firms operating in this sector.

Environmental pollution might harm firms in several ways. In some sectors, for instance, there are studies that have underlined the economic impacts associated with marine litter such as reduced fishing, public health effects, and reduced revenues for tourist activities (Hoagland and Scatista 2006; Newman *et al.*, 2015). Similar impacts were found also with business activities relying on nature-based amenities endangered by pollution issues (Huybers and Bennett, 2003; Blanco *et al.*, 2009). In such context, firms might directly respond in order to address the environmental damage causing a concrete harm for them. For instance, restaurants have been proved to adopt initiatives such as reduced plastic consumption and waste prevention initiatives also due to the economic damages caused to their business by the pollution surrounding their area (Chan and Lam, 2001; Kim and Hall, 2020). However, even if there are some evidences and anecdotal studies of such actions taken by firms in order to respond to the economic losses related to the pollution, there is the need to further expand such piece of knowledge. For such reason, in order to understand the impact of the role of the economic damage perception caused by pollution in the hospitality sector we thus formulate the following hypothesis:

H3. there is a positive relationship between the economic damage perception and the economic logic supporting firms in the adoption of integrative view for firms operating in the hospitality sector.

The seminal work of Hart (1995) outline how firms adopting strategies integrating the environmental view with the economic one might gain a competitive advantage, for instance by better utilize resources, incur in lower costs or avoid regularity actions. Since then, several other researchers investigated such relationship. Brammer and colleagues (2012), for instance, demonstrated that the reduction of production costs represent a fundamental driver for including environmental aspects into the strategic business process. Within the hospitality sector, there are several evidences from the literature that suggests a strong linkage between the economic logic of reducing cost related to water, energy, and waste management as drivers for the adoption of a complete economic-environmental integrative view (Deya and Tirado, 2011, Bagur-Femenias *et al.*, 2013; Garay and Font, 2012). Other researches, still related to the hospitality sector, suggest also that image improvement (Bohdanowicz, 2005) and the attraction of new customers (Alonso-Almeida, 2013) are key economic drivers for starting to include sustainability issues in the mere economic logic. Even if literature seems agreeing on the fact that the economic logic might represent a strong driver for the adoption of an integrated view in hospitality firms; Perramon *et al.* (2014) suggest that the intensity of such relationship might be influenced by the dimension of the firm. Indeed, smaller structures (such as restaurants) might perceive negligible economic incentives in considering environmental issues into their strategies. To fully understand the impact of the

economic logic in the adoption of an integrative view in the hospitality sector we thus formulate the following hypothesis:

H4. there is a positive relationship between the economic logic and the integrative view for firms operating in this sector

According to Lefebvre *et al.* (2003) a higher level of proactive management of environmental issues may be able to establish a positive association between the environmentally oriented managerial and operational actions to improve environmental performance. In such perspective, an integrative view represents the fundamental prerequisite for adopting pro-environmental actions and achieve an overall better environmental performance (González-Benito and González-Benito, 2005). Also in this case, there are some evidences of such relation in business operating in the hospitality sector. For instance, Paiano *et al.* (2020) exploring sustainable practices in the cruise sector remark the importance of complete integrative view of economic and environmental issues in adopting actions such as reducing packaging materials to minimize waste and identify ways a better management of packaging waste in cruises. The adoption of an integrative view directly translated to the implementation of voluntary tools in the hotel industry (Ayuso, 2006) represented for instance by codes of conduct, eco-labels, environmental management systems (EMSs) and environmental performance indicators. More empirical evidences regarding the impact of the integrative view on the adoption of pro-environmental actions in the hospitality sectors is essential; for such reason, in order to fully understand how the adoption of an integrative view translate to pro-environmental practices, we thus formulate the following hypothesis:

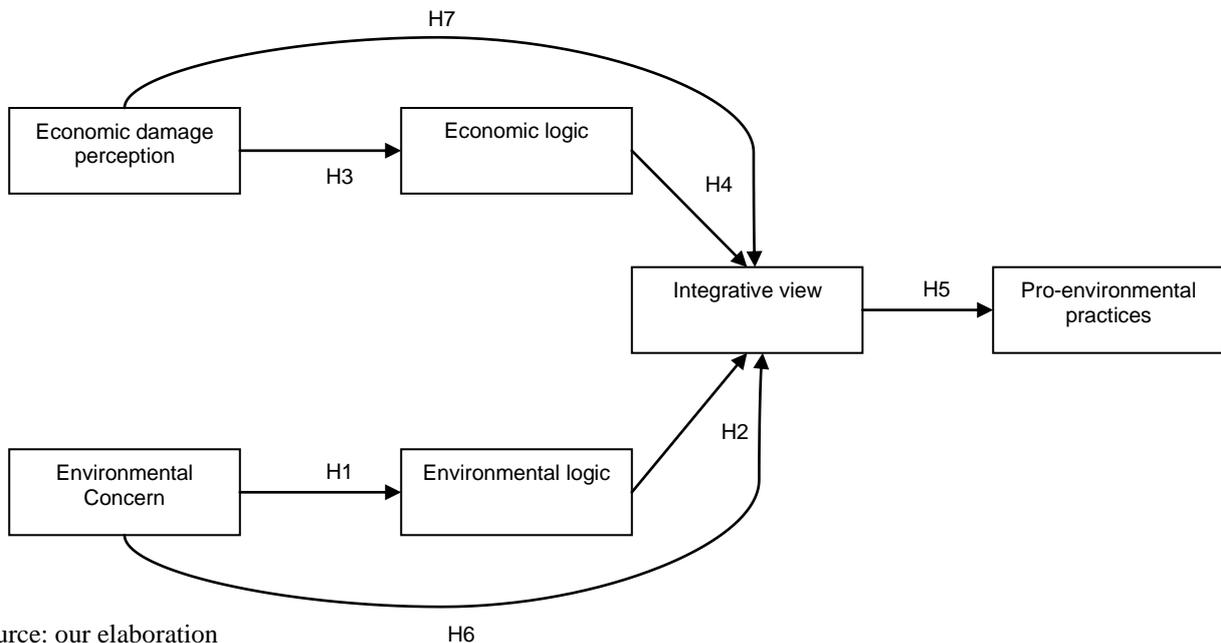
H5. there is a positive relationship between the integrative view and the pro-environmental practices for firms operating in this sector.

Finally, to fully understand the determinants of the integrative view is SMEs operating in the hospitality sector we aim at testing as well the following two mediation hypotheses:

H6. the environmental logic has a mediation role between the environmental concern and integrative view.

H7. the economic logic has a mediation role between the economic damage perception and the integrative view.

Fig. 1: Diagram of the hypotheses to test.



Source: our elaboration

3. Method

3.1 Data collection

The research is grounded on the results of a questionnaire completed by firms operating in the hospitality sector (i.e. hotels, restaurants and bathhouses) located in the coastal area of the Tuscany region.

The questionnaire was grounded on the existing literature and designed and adapted in order to provide fruitful information to test the previously presented hypotheses. After the questionnaire was designed it was tested by five firms operating in such sector. Feedbacks originated from such process were then considered for revising and finalizing the questionnaire. Once the questionnaire was ready, it was then administered by physically visiting target firms. In more details, the questionnaire has been administered in person with face-to-face interview conducted in the respondent's firm. Visits to firms operating in the hospitality sector located in the coastal area of the Tuscany region were organized in the period ranging from February 2017 and May 2017.

There are many advantages in adopting this modality; for instance, administering the questionnaire in person allowed us to reduce the uncertainty of responses, as a clarification could have been directly provided, collect a full set of completed questionnaire guaranteeing a very low drop off rate. Moreover, the interviewer is better able to control the pace of the interview and may be able to help the respondent to minimize distractions.

The researcher involved in the administration of the questionnaire was appropriately trained in order to briefly introduce the questionnaire and the aim of the study and to assure the confidentiality and anonymity of the information collected. Those aspects of confidentiality and anonymity could be detrimental in properly address social desirability bias (i.e. the tendency of a respondent to answer in the most favorable way) (Tourangeau and Yan, 2007). The respondents were selected by adopting a random sampling approach using list of companies that are available from local Chamber of Commerce. A total of 300 firms were identified adopting such sampling approach which are adequate for generalizing the population of Italian firms described by ISTAT (ISTAT, 2020) data related to the year 2017 which are presented in Table 1.

Tab. 1: Population of Italian firms

Business activity	n° of firms	% of firms
Hotel	51.448	15%
Restaurant	276.609	83%
Bathhouse	6.902	2%
Total	334.959	100%

Source: our elaboration

The administration of the questionnaire allowed to collect a total of 252 completed surveys; some descriptive statistics of the respondents are presented in Table 2.

Tab. 2: Descriptive statistics of the respondents

Business activity	n° of respondents	% of respondents
Hotel	130	52%
Restaurant	85	34%
Bathhouse	37	15%
Total	252	100%
Firm Size	n°	%
less than 10	191	76%
from 11 to 50	56	22%
more than 50	5	2%
Total	252	100%

Source: our elaboration

Given the fact that the number of respondents were slightly lower than the target, we used the Dillman (2011) formula to assess whether the sample size was representative of the Italian population. According to such formula, the optimal number of respondents would have been 269 respondents, for generalizing to a population at a 90% confidence level with a $\pm 5\%$ margin of error. Usually a slightly lower sample size is generally accepted in social studies (Wang *et al.*, 2016). Thus, our number of respondents might be considered suitable for our analysis.

When using self-reported data and all variables are assessed are originated from the same source, common method variance could represent a bias. In order to avoid such issue, we conducted Harman's single-factor post-hoc test (Podsakoff and Organ, 1986). As such test did not identified factors accounting for the majority of covariance among the variables we can confirm that common method variance is not a concern with the data acquired.

3.2 Measurements

Similar researches in the field were used to deploy the measures adopted in our research; those measures are presented more in details in the following paragraph.

Moving from the and researches conducted in the hospitality sector by Leonidou *et al.*, 2013; Tarí *et al.*, 2010; Chan and Lam, 2001 we identified some pro-environmental practices that might fit to business operating in this field. Those are related for instance to increasing the use of recycled materials (i.e. recycled paper, recycled plastics) and actions aimed at reducing the quantity of waste produced or their dangerousness. The measurement scale used was a 5-point Likert scale ranging from one ("strongly disagree") to five ("strongly agree"). Cronbach's α was then applied to assess the internal consistency of the construct, the result equal to 0.72 confirms an adequate consistency.

The integrative view was derived from the research conducted by Henriques and Sadorsky's (1999). More in details, three items were used to assess the environmental responsibility; in details we asked to the respondents the agreement with the following statements: i) my company has an environmental responsibility as well as the goal of making a profit; ii) Business ethics and environmental responsibility are fundamental to the survival of a company; iii) Environmental responsibility and profitability can be compatible. Also in this case, a Likert scale ranging from one ("strongly disagree") to five ("strongly agree") was adopted. Items were merged into a single factor with an internal consistency which was assessed with the Cronbach's alpha of 0.88.

We used three items to measure also the economic logic. In this case we identified those grounding on the work of Masurel (2007) and Parker *et al.* (2009) that allowed us to define the following items: i) offering products and services with less environmental impact can be an advantage over the competition; ii) reduce costs influenced my company's decision to implement waste reduction initiatives (e.g. avoid costs thanks to energy savings or thanks to reductions on the tax / waste tariff); reduce risks influenced my company's decision to implement waste reduction initiatives (e.g. thanks to preventive actions or improving emergency management). Also in this case, the measurement scale used remained unaltered. Items were combined into a single factor with an internal consistency (Cronbach's α) of 0.92.

The economic damage perception was also measured with 3 items using a Likert scale ranging from one ("strongly disagree") to five ("strongly agree") to understand the agreement of the respondents. More in detail, previous literature in the field (Lozoya *et al.*, 2014; Cole, 2014; Blanco *et al.*, 2009) was used to draw the following items: i) the presence of waste damages the image of the area; ii) tourists do not return to places where the beaches are dirty; iii) tourists do not return to places where the sea is dirty. The measurement scale used remained unaltered and items were combined into a single factor with an internal consistency of 0.94.

The environmental logic was derived from researches conducted by Dibrell *et al.*, 2011 and Barr, 2007. This allowed us to identify the following statements: i) I undertake more than necessary to guarantee respect for the environment; ii) My employees and I work hard to prevent waste formation. Also in this case, we asked respondents their agreement using a 5 points Likert scale and items were combined into a single factor with an internal consistency (Cronbach's α) of 0.81.

Finally, the environmental concern construct was grounded on researches from Schultz (2000), Schultz (2001). More in details, three items were used to assess the respondents the agreement about the fact that environmental problems can cause severe consequences to: i) myself; ii) my health; iii) my future; iv) the animals; v) the plants; vi) the sea. In this case, the measurement scale used was a 7-point Likert scale ranging from one (“strongly disagree”) to seven (“strongly agree”). Items were combined into a single factor with an internal consistency (Cronbach's α) of 0.92.

4. Results

In order to test our hypotheses, the data acquired through the questionnaires, based on a large sample size and the rule of thumb of 5 respondents per variable (Bentler and Chou, 1987), were processed by adopting a structural equation model. As is well known, the structural equation modelling process consists of two fundamental steps: first, a validation of the measurement model, which is conducted by a confirmatory factor analysis, and second, a further step consisting of fitting the structural model by a path analysis with latent variables. In the present case, both steps SPSS AMOS 22 was used.

4.1 Validation of the measurement model

A confirmatory factor analysis has been carried out on the purpose of assessing the properties of the measures. Table 3 presents the fit indices of the measurement model. In more detail, the table shows: the chi-square difference (χ^2), the degrees of freedom (df), the chi-square statistic adjusted by its degrees of freedom (χ^2/df), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root-mean-square error of approximation (RMSEA) and the p of Close Fit (PCLOSE).

As explained by Barrett (2007), a good model fit would provide a non-significant chi-square result. Nonetheless, according to Iacobucci (2010), the chi-square statistic is a test sensitive to sample size (i.e. the chi-square statistic most of the time rejects the model when large samples are used). For such reason, a model has a reasonable fit when the chi-square statistic adjusted by its degrees of freedom (χ^2/df) does not exceed 3.0 (Kline, 2005) as in our case. The comparative fit index (that usually should be ≥ 0.90 to demonstrate a good fit), the Tucker-Lewis index (that usually should be ≥ 0.95 to demonstrate a good fit) and the RMSEA (that usually should be < 0.08 to demonstrate a good fit) can be regarded as a good model fit.

Tab. 3 Assessment of the measurement model

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	PCLOSE
Measurement model	302.71**	133	2.27	0.96	0.95	0.072	0.07

** p<0.01

Source: our elaboration

Furthermore, we examined whether the common method variance (CMV) could magnify the data and leading to potential misjudgment. Relying on the study by Podsakoff *et al.* (2003) we adopted the single common method-factor approach; this test requires adding a common factor (latent variable) to the measurement model. All items were loaded on their theoretical constructs as well as on a created latent method factor. Then, the significance of the structural parameters is examined both with and without the latent factor. Ultimately, if, like in our case, the measurement model with a common factor returns the worst fit than the measurement model, we can be sure that the bias is not able to influence the findings.

Moreover, the Composite Reliability (CR) and Max Reliability (MaxR(H)) of the constructs were also assessed. CR is used to measure the construct reliability by drawing on the standardized loadings and measurement errors for each item (Fornell and Larcker, 1981), and it is acceptable when the value is above 0.7. Max Reliability (MaxR(H)) estimates the reliability of the scale's

optimally weighted composite; MaxR(H) is acceptable when the value is > 0.80. Table 4 shows the reliability and validity results.

Table 4 shows also the Average Variance Extracted (AVE) and the Maximum Shared Variance (MSV). Those indices can be relied on to checking the convergent validity and the discriminant validity of the measurement model. As stated by Cunningham *et al.* (2001), the convergent validity is used to measure if the items of a construct that are theoretically related are effectively related. Instead, the discriminant validity measures if the items of a construct are not correlated with other items not conceived to assess such construct (Ha and Stoel, 2009). Normally, if the value of the AVE is greater than 0.5 this indicates a good level of convergent validity of the constructs (Hair *et al.*, 1987). Finally, as supported by several authors (Fornell and Larcker, 1981; Hair *et al.*, 2010) discriminant validity is established by MSV when the value of MSV is lower than the AVE for all the constructs. As presented in Table 4, all the AVE values are greater than MSV and for such reason, discriminant validity is demonstrated.

Tab. 4: Reliability and validity results

	CR	AVE	MSV	MaxR(H)	Economic logic	Economic damage perception	Integrative view	Pro-environmental practices	Environmental logic	Environmental concern
Economic logic	0.921	0.796	0.404	0.947	0.892					
Economic damage perception	0.947	0.856	0.060	0.955	0.120	0.925				
Integrative view	0.874	0.698	0.382	0.886	0.319	0.151	0.836			
Pro-environmental practices	0.828	0.711	0.404	0.926	0.636	0.042	0.273	0.843		
Environmental logic	0.835	0.717	0.382	0.835	0.324	0.228	0.618	0.268	0.847	
Environmental concern	0.951	0.765	0.099	0.980	0.272	0.244	0.314	0.161	0.212	0.875

Source: our elaboration

4.2. Fitting the structural model

Together with the fit indices of the structural model, also the results are presented in figure 2. The structural equation model tested demonstrate a satisfactory goodness-of-fit indices ($\chi^2/df=2.481$, CFI=0.951, TLI= 0.941, RMSEA=0.068) The variance predicted by the overall model was 0.421.

The coefficients of the model show a positive and significant relationship between environmental concern and environmental logic (Hypothesis 1) ($\beta = 0.24$, $p < 0.00$), but they fail to corroborate the existence of a significant relationship between economic damage perception and economic logic (Hypothesis 3).

The model asserts the importance of environmental logic by showing a positive and strong relationship with the integrative view (Hypothesis 2) ($\beta = 0.59$, $p < 0.00$). Furthermore, a moderately strong positive relationship between the economic logic and the integrative view (Hypothesis 4) ($\beta = 0.19$, $p < 0.01$) emerges.

Moreover, a positive and significant relationship has been found between the integrative view and the pro-environmental practices (Hypothesis 5) ($\beta = 0.29$, $p < 0.01$).

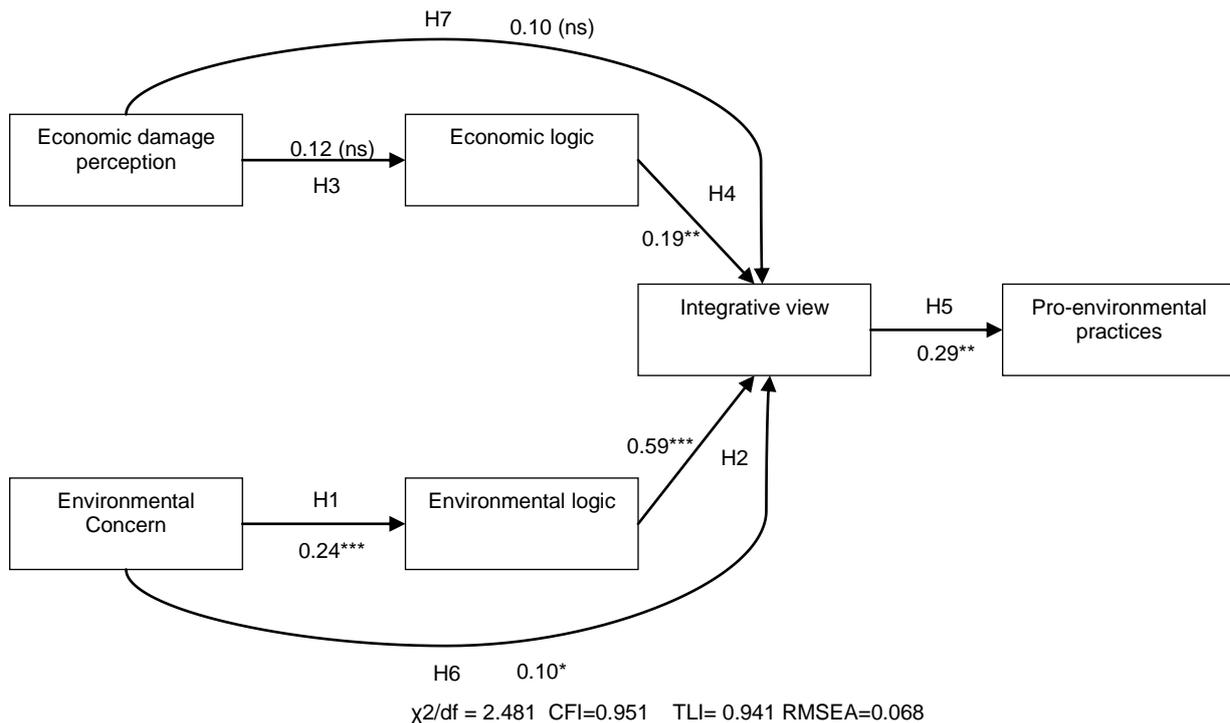
Hypothesis 6, testing the mediation effect of environmental logic between environmental concern and integrative view can be retained even marginally statistically significant. Finally, Hypothesis 7 testing the mediation effect of economic logic between economic damage perception and integrative view cannot be retained as not statistically significant. The mediation tests are presented in table 5.

Tab. 5: Mediation tests

Hypotheses tested	Indirect effect (Sig.)	Mediation
H6. Environmental concern - environmental logic - integrative view	0.104 (0.091)	Yes
H7. Economic damage perception - economic logic - integrative view	0.10 (0.532)	No

Source: our elaboration

Fig. 2: results of the structural model and fit indices



Source: our elaboration

5. Discussion and conclusions

By performing a structural equation modelling, the study investigates the influencing factors of environmental proactiveness in small and medium organizations operating in the hospitality sectors. Specifically, the study tested the role of an integrative cognitive framework on stimulating the adoption of environmental practices linked to circular economy and explored the extent to which the development of an economic logic as well as an environmental logic are crucial for moving managerial cognitive frame towards an integrative view.

The findings reveal that the adoption of circular practices is stimulated by a cognitive frame based on an integrative view. In other words, the managerial belief that economic and environmental goals are not incompatible is crucial for making managers aware that it is possible to pursue both objectives simultaneously. It is at least two decades that empirical studies have found that green practices can lead to a better economic performance (Ambec and Lanoie, 2008; Miroschnyenko *et al.*, 2017) but this relation is not always confirmed. For instance, focused on organizations operating in the hospitality sectors, Iraldo *et al.* (2017) has recently highlighted that just green practices easily recognizable by customers have an effect on overall competitive performance (i.e. use of customers' information practices and use of green food products). With our study, we stressed the importance that decision to adopt green practices cannot be just driven by short-term economic goals otherwise some green actions, relevant for supporting the circular transition, may be skipped. Moreover, for developing an integrative view it is important that a manager believes that environmental actions can be profitable and decisions on environmental actions are taken by considering the economic effect of those actions. However, managers need to develop an environmental commitment for developing an integrative view. This finding is in line with several empirical works which have emphasized the role of green-oriented beliefs in large and SMEs organizations (Papagiannakis and Lioukas; Testa *et al.* 2016). In addition, the study seeks to investigate which personal beliefs influence the creation of an economic and environmental logic. As emphasized by previous studies focused on managers' decision-making process towards

environmental action (Cordano and Frieze, 2000; Todaro *et al.*, 2020) individual environmental concern plays a significant role. In details, our study found that manager's environmental concern had a direct effect on personal environmental logic and a mediated effect on the formation of an integrative cognitive frame. Symmetrically, we explored which factors are behind the formation of an economic logic by focusing on the belief that a degraded local environment may decrease the number of customers and, consequently, have a negative economic effect on hospitality organizations. Contrary to what we initially expected this belief seems to have no effect on individual economic logic that probably have other influencing factors or, currently, local customers are, in the respondents' perceptions, attracted more by other local specificities.

The study contributes to the literature in several ways. First, this research responds to the invitations of Aykol and Leonidou (2014) for further studies for understanding why small organizations adopt green practices. In particular, our research seeks to explore the role of cognitive frames in pushing managers to carry out green actions by enlarging the empirical evidence provided by previous studies mainly focused on stakeholder's actions and manager's environmental commitment (Testa *et al.*, 2016). Second, the study contributes to the growing debate on the role of cognitive frames for understanding the internalization of environmental principles (Hahn *et al.*, 2014 Van der Byl and Slawinski, 2015; Hahn *et al.*, 2018). On the one hand, we provided an empirical evidence based on a quantitative approach and integrated the current research mainly focused on conceptual or qualitative studies. On the other hand, taking inspirations from previous empirical studies, we designed and tested new measurement scales for measuring integrative cognitive frame as well as environmental and economic logic, and offer to other scholars' useful tools for continuing on this steam of research. Third, the study provides an original contribution on the emerging literature on which are the drivers of environmental proactivity of hospitality organizations (Pérez and del Bosque, 2014; Jones *et al.*, 2016; Jang, 2020) and create a updated linkage between sectoral literature and the recent literature on the field of business and natural environment.

We believe that the results have managerial implications for both managers and policy makers. Managers of hospitality organizations shall overcome the contraposition between economic and environmental benefits and an integrative approach may align the two different logics. The growing attention of institutions and consumers on the need of a transition towards a circular economy (Gusmerotti *et al.*, 2019) have increased the possibility to adopt an integrative view. The use of recycled materials in the hotel and restaurant products may communicate the environmental commitment of an organization and encounter the needs of a consumer increasingly concerned to environmental issues (Vizzotto *et al.*, 2020). As well the adoption of waste prevention, mainly focused on food waste, can simultaneously generate multiple benefits such as: i) cost benefits due a better management of food storage; ii) increased customers' satisfaction, iii) reduction of environmental footprint and contribution to sustainable development goals.

Policy makers can also acquire some lessons from this study. In particular their role is crucial when an integrative view is threatened by an economic crisis. Taking into consideration that the COVID 19 pandemic has mainly affect the hospitality sectors due to citizens circulation and sociality restrictions, it is important to sustain the sector by supporting managers to realize actions that are compatible with environmental and social needs. Moreover, local institutions may design and implement initiatives to make recognizable the efforts carried out by hospitality organizations for protecting the environment. Green cards which allow a consumer to cumulate points that give access to discounts or other benefits as well as local labelling systems are just some examples of initiatives that can be implemented.

Further research is needed to better explore the drivers of environmental internalization among hospitality organizations. The limitations of the present study indicate directions that scholars could take for further investigating this topic. First, this study is focused on a specific geographical context and the sample just marginally reflected the composition of the sectoral universe at national level. Therefore, for checking the generalizability of the findings, scholars should replicate the empirical model in diverse geographical settings for searching common trends and country-specific

cultural factors. Second, future research should enlarge the number of drivers of environmental internalization to test and explore the reciprocal influence. For instance, studies should include contextual factors that can influence firms' motivation to adopt environmental practices (Bansal and Roth, 2000). The role of environmental issue salience can influence the development of environmental logic. In the same vein, pressures from specific categories of stakeholders such as customers and clients may emphasize the relevance of market logic and make more difficult the development of an integrative view (Hahn *et al.*, 2014). Moreover, the financial condition of a company may influence its ability to integrate economic and environmental view by generating intertemporal tensions (Slawinski and Bansal, 2015). This situation may be particularly critical for hospitality organizations that are mainly SMEs and seriously affected by restrictions due to COVID 19 pandemic. Moving on the downstream of our empirical model, between managerial approach and environmental sustainability and the adoption of profound environmental practices, there are organization's dispositions and capabilities that can influence that relation (Teece, 2007; Zollo and Winter, 2002). Therefore, scholars should devote attention to explore, for instance, the mediating role of internal capabilities and skills, employees' behavior and attitudes, leadership styles.

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Sustainability reporting analysis: the materiality impact on corporate financial performance

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Abstract

Objectives. *This study investigates, with the lens of the stakeholder, whether the quality of materiality, expressed in terms of depth and breadth, can lead to an increase in corporate financial performance (CFP). The study aims to verify whether the achievement of higher corporate social performance (CSP) contributes to improving the positive effect of materiality on the CFP.*

Methodology. *A content analysis of the firms sustainability report was developed. Additionally, a series of hierarchical regressions with a one-year lag time and moderation analysis were performed.*

Findings. *The analysis confirms that materiality quality has a positive impact on CFP. It was also verified that the effect of materiality on the CFP is amplified by the increase of the CSP. The results show that both the depth and breadth have a positive impact on CFP.*

Research limits. *A limitation would concern the country effect of the study, which is focus on American company.*

Practical implications. *Management should invest in an effective materiality process with which to communicate the company's commitment to more responsible actions in relation to each category of stakeholder, in order to receive superior economic and financial returns.*

Originality of the study. *This is the first study that attempts to understand the materiality process through the lens of stakeholder theory. Sophisticated analysis methodology is performed on sustainability reports that allow to explore the depth and breadth, that is the quality, of reports.*

Key words: *corporate responsibility; materiality; corporate financial performance; corporate social performance; stakeholder*

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1. Introduction

In recent years, attention to issues related to environmental sustainability, the exploitation of resources and the centrality of human rights and social inequalities has grown. Therefore, companies do not neglect their commitment to protecting the environment, employees, customers, and society more widely understood. The commitment of the company towards its stakeholders is called corporate responsibility (CR).

Cornelissen (2017) states that the future of a firm depends on how it is viewed by key stakeholders (e.g. shareholders and investors, customers, employees, community). Therefore, the success of a firm is determined by a set of different stakeholders who inevitably pursue different economic, environmental and social interests (Buchholz and Rosenthal, 2005). Directing business activities towards these interests becomes a priority for companies. Dawkins and Lewis (2003) argue that the impact of firms corporate responsibility actions will depend on its alignment with the expectations of its various stakeholders.

Given the importance of the role of stakeholders within the strategic framework, both researchers and practitioners have begun to shift their focus towards tools and methodologies aimed at creating permanent and stable relationships with stakeholders. The focus has therefore shifted to what is widely defined as stakeholder engagement. Not surprisingly, the latter is the starting point to better define the content of the *sustainability report* (Ali *et al.*), a tool that allows improving the relationship between firm and stakeholders, and that shows the implemented sustainability practices. One of the SR main aims is to help companies build trust with different stakeholders and enable them to make informed decisions. This supports companies to create long-term value for all stakeholders.

There are several guidelines and standards that guide the process of creating SR and the topics to be dealt with, defining many innovative contents; among these, *materiality* is the most significant and complex (Beske *et al.*, 2020) and still open to debate (Machado *et al.*, 2020). Materiality is a process through which a wide range of sustainability issues are defined and evaluated and, among them, the most relevant ones for the company and its stakeholders are selected. Materiality aspects consider all economic, social, and environmental impacts (Saenz, 2019). These aspects have the ability to influence the assessments of stakeholders regarding the company's ability to create value in the short, medium, and long term.

The relevance threshold should consider both the extent of the impact (the impact that is economic, social, and environmental) related to a specific aspect and the severity of the latter for the stakeholders (Mio, 2016). In this way, it is possible to identify critical issues and form a priority list in accordance with stakeholders needs and expectations. According to Bouten *et al.* (2011), the main objective of the principle of relevance is to provide stakeholders with information consistent with their expectations and useful for assessing the company's performance. To improve the quality and credibility of the SR, companies must understand the interests of the stakeholders and collaborate with them to obtain mutual benefits (Bouten *et al.*, 2011).

In recent years, the materiality process has attracted the attention of several academics and many scholars have tried to analyze this phenomenon, its applicability, and benefits. However, it has not yet been possible to definitively ascertain the impact that materiality can have on a firms performance. Although Torelli *et al.* (2020) found that the stakeholder engagement is positively correlated with the level of implementation of the materiality principle, no study has investigated, through the lens of stakeholders orientation, the impact of the materiality on firm performance.

This research work intends to verify whether the treatment of material aspects, expressed in terms of depth and breadth, in the SR allows companies to obtain better corporate financial performance (CFP). Furthermore, given the established relationship between CFP and corporate social performance (CSP), this study also has the ambitious aim of exploring whether achieving higher CSP contributes to improving the positive effect of materiality on financial performance. In this paper, both the two relationships are studied from a stakeholder perspective.

The study was carried out on a sample of companies belonging to the Fortune500 list in 2018. The research continued with the collection of SRs realized between 2014 and 2018. The reports were subsequently analyzed through content analysis, in order to operationalize the two items of materiality: depth and breadth. In particular, depth describes the quality of materiality in terms of number, and breadth the variety of the aspects dealt with by the company.

The analysis confirms that materiality quality has a positive impact on CFP (both when it is expressed in term of profitability for investors, as operating profitability, and as an improvement in market value). It was also verified that the effect of materiality on the CFP is amplified by the increase of the CSP, in order to confirm the interconnection between CSP and CFP. The results show that both the depth and breadth have a positive impact on CFP. Moreover, examining the role of the moderator of the CSP, the analyzes do not always support our hypothesis and show surprising results that will be duly investigated.

The work continues with the presentation of the literature analysis on CR and corporate performance, the development of hypotheses and the appropriate methodology adopted. Finally, the managerial implications, the limits of the research and the recommendations for future studies are highlighted.

2. Literature Review and hypothesis development

2.1 Corporate responsibility through reporting: the concept of materiality

Corporate Responsibility (CR) is the set of responsibilities activities of a company towards its stakeholders. Carroll (1979) was the first to introduce the theme of social responsibility in managerial theories, defining it as a set of corporate economic, social, ethical, and discretionary responsibilities. With regard to this free will, the European Commission explains that the CR is voluntary integration, by companies, of social and environmental concerns in their commercial operations, and in their relations with stakeholders (Commissione, 2001).

Although there is no legislation that imposes it, the issue for the business is relevant and it is undeniable that the current choices of companies highlight this propensity. The reasons for the growing attention towards CR are common to a variety of sectors and are to be found in changes that have occurred in both demand and supply (Rinaldi and Testa, 2013). On the demand side, there is greater attention from stakeholders towards these strategies; for example, consumers, thanks to the low cost of information and more responsible and aware education, have become more attentive to the origin of the products and select only those that have been made with respect for the environment and workers. On the supply side, the dedication and commitment to CR issue allows companies to be more competitive and increase their reputation. In any case, an intentional and methodical strategy that integrates the CR allows obtaining a win-win advantage for the stakeholder community and for the company (Laplume *et al.*, 2008; Lindgreen *et al.*, 2019).

Jones (1995) confirms the importance for companies to manage relationships with their stakeholders, arguing that companies that are committed to solving issues efficiently with their stakeholders will enjoy a competitive advantage over those companies that do not care. The author also stressed that effective management of relations with the main stakeholders contributes to improving economic performance. In addition, a good relationship with stakeholders can attract, retain, and motivate employees, thereby increasing productivity and improving profitability. According to Perrini *et al.* (2011) CR initiative aimed at satisfying the expectations of each individual category of stakeholder, bring different benefits to the company. For example, attention to employees (favorable working conditions, adequate climate and working environment, focus on safety and health, etc.) leads to an improvement in their motivation and satisfaction. Transparency, quality, and innovation in the production of goods and services increase consumer confidence.

The involvement of suppliers and the integration of CR criteria for the selection of new sellers leads to an improvement in the quality of finished products and an increase in the innovation of

production processes. All these benefits also have an impact on the economic and financial results, deriving from the reduction of costs (operating efficiency, lower cost of capital, conscious risk management) and/or from the increase in revenues (greater growth, improvement in competitiveness and of brand reputation). Barnett and Salomon (2012) stated that the adoption of socially responsible behavior is part of the mechanisms through which the company builds and maintains the trust of stakeholders, to develop what is defined as stakeholder engagement. The latter is a useful means to better define the content of the sustainability report (Ali *et al.*), which is part of the voluntary CR practices, and which mainly performs two functions: the assessment of the state of social performance of a company and the communication of sustainability initiatives, efforts and progress to its stakeholders. SR is one of the best communication channels used in corporate strategy to respond to stakeholder demands on sustainability (Du *et al.*, 2010; Schmeltz, 2012).

Companies that publish SR improve transparency, increasing market credibility and stakeholder confidence. In fact, SR companies make recognizable all the performances and investments made in social, environmental, and economic matters to the regulatory authorities, rating agencies, shareholders, investors, consumers, NGOs, and other stakeholders. From the point of view of stakeholders, the presence of qualitative and quantitative data within the reports allows them to make informed decisions based on the results obtained by the company in the field of sustainability. The quality of reporting is essential to help stakeholders perceive the advantages deriving from corporate policies on CR and it is therefore necessary to make clear and effective communications so that the company can benefit from better social and financial results (Du *et al.*, 2010). However, we have no knowledge of scientific works that investigate the quality of SRs with the lens of stakeholders, although this aspect is relevant.

Much of the research has in fact focused on the material aspects, i.e. the most important and relevant sustainability issues for both the company and the stakeholders and so named due to the materiality process with which these aspects are defined and evaluated. The materiality process serves to assess the relevance of economic, environmental, and social issues, and to ensure that sustainability strategies and reporting take into consideration those that present significant risks and opportunities for the company business and stakeholders (Font *et al.*, 2016). For example, the material aspects that can be identified and selected are: the reduction of GHG emissions and waste of water and energy, the facilitation of the introduction of worker diversity, the guarantee of adequate working conditions, transparency and the struggle against corruption and respect for human rights.

Although the positive view of the literature about the importance of materiality (De Villiers *et al.*, 2014; Higgins *et al.*, 2014), in the practice companies have many difficulties to manage with this innovative tool. In fact, identifying material aspects is much more challenging than financial accounting (Unerman and Zappettini, 2014) as there are several issues that companies need to consider to make sure that the material aspects selected have an impact on strategy, performance, governance, and in general on the future prospects of the company (Del Sordo *et al.*, 2018), and, on the other hand, there are many data that stakeholders must analyze. This involves, on the one hand, the use of time and resources (Mio and Fasan, 2014) and on the other, it risks that the materiality process is highly subjective. In some cases, the subjectivity of the selection of material aspects could favor opportunistic behaviors and thus leave companies the faculty to emphasize some aspects rather than others (Bellantuono *et al.*, 2018) For example, companies could decide to choose through the materiality process only the critical aspects connected to employees and suppliers, with the intention, perhaps, of hiding the exploitation of the scarce environmental resources considered material aspects for the environmental stakeholder. In the literature, there are several proposals for identifying material aspects aimed at overcoming the poor objectivity of the process. Bellantuono *et al.* (2016), for example, have developed a structured quantitative procedure, based on group multi-attribute assessment techniques, to support stakeholder engagement during the materiality process. Instead, Calabrese *et al.* (2019) introduced a “zone matrix”, which collects the results of the evaluation of the effectiveness of the communication of the CR to stakeholders. Other approaches, on the other hand, try to identify general material aspects that can be considered relevant for all

companies. The SASB Materiality Map, for example, is an interactive online tool developed, updated, and aligned with the sustainability issues that the institution considers most relevant. The map provides a method to preliminarily identify the most likely material issues concerning a given sector (Wu *et al.*, 2018). Finally, Wu *et al.* (2018) propose a benchmarking process. The authors suggest using the SRs of other firms as a method for a preliminary assessment of one's own material aspects. Similar companies in terms of size or sector may have risks and opportunities in common. However, none of the methodologies seems to have simplified the process of identifying the aspects of materiality and identified a list of factors that could be common to all companies, especially for environmental and social problems.

2.2 Materiality and corporate performance

Firms carry out CR actions in view of an economic return and the countless benefits that they entail. The literature has focused on studying the impact of CR on corporate performance, but researchers have reported mixed results (neutral, positive, and negative). However, preserving the investigation of CR through the lens of stakeholder theory, Freeman (2010) confirms the positive relationship between sustainability practices and company performance. According to this theory, companies are able to satisfy all stakeholders by guaranteeing them the maximum return (Freeman and Phillips, 2002). Shareholders are able to maximize profits (Berman *et al.*, 1999; Freeman and Phillips, 2002), employees prefer companies committed to sustainability (Backhaus *et al.*, 2002), and they are more willing to achieve financial goals (Moskowitz, 1972), customers proudly purchase socially responsible products and also agree to pay premium prices (Brammer and Millington, 2008). Institutional investors also prefer to invest financial resources in socially responsible companies (Barnett and Salomon, 2006). Researchers have shown that a positive reputation (Galbreath and Shum, 2012), skilled human capital (Russo and Harrison, 2005), general stakeholder satisfaction, allows sustainability-oriented companies to obtain a competitive advantage over competitors (Surroca *et al.*, 2010). Previous studies have stated that CR increases the corporate financial performance (CFP) of companies in both the short and long term (Peloza and Shang, 2011). Orlitzky *et al.* (2003) have shown that the profit of socially responsible companies is much higher than the profit of less responsible companies. Kim *et al.* (2014) reported that socially responsible organizations increase shareholder wealth by improving Tobin's Q.

This study shares the above arguments and proposes that the isolation mechanism of CR, expressed in terms of the quality of the materiality of SRs, allows companies to have a positive impact on CFPs.

CR practices, has become of primary importance for companies, have prompted researchers to find measures to evaluate the results deriving from the commitment to sustainable development. Corporate social performance (CSP), for example, measures the consequences and effects deriving from CR initiatives. In particular, the CSP refers to the results that companies obtain from relations with stakeholders and serves to explain how, once the company's social responsibility strategy is defined, the latter decides to take actions that can allow measurable financial results (Carroll and Brown, 2018). After decades of research, the relationship between CFP and CSP is still a matter of debate between those who believe that there is not an evident relationship (Surroca *et al.*, 2010) and those who argue instead that the increase in social performance has an impact on financial results. Among the academics who support the latter thesis, one party believes that the two variables are correlated but not positively (Brammer and Millington, 2008) and that, therefore, taking CR actions has a negative impact on financial performance; another party has shown, however, the existence of a positive relationship between CSP and CFP (Flammer, 2015; Lin *et al.*, 2009) which justifies the benefits of CR activities on the economic results of a company.

Barnett and Salomon (2012) created a bridge between the two strands of thought by explaining that, on the one hand, companies with a moderate CSP may have lower financial performance than those that, all things being equal, do not invest in CR; on the other hand, companies with a high CSP will have, *ceteris paribus*, a higher CFP than other companies. Therefore, investing little in CR

initiatives can lead to negative results in financial performance, because sporadic and poorly aligned activities with the business strategy do not allow companies to take advantage of the benefits deriving from CR and can even lead to a waste of resources. On the other hand, including social responsibility activities within strategic and organizational plans and investing higher resources with continuity over time, allows you to achieve better social performance and also higher economic and financial results due to the related benefits to a better CR. The theoretical models that have described the CSP-CFP relationship, although different, can be divided according to the interpretation that academics give to the financial benefits obtainable with CR practices. In fact, a first group sees the social performance of the company as a way to improve the operating margin, while a second identifies it as a driver of financial performance, as well as a means of operational efficiency. Some academics describe CSP as a distinctive resource for businesses, that is, a particular ability to manage business relationships and operations within the company, which allows them to generate greater benefits or reduce costs, improving financial performance (Ali *et al.*, 2020). Among the benefits, we can note a greater commitment of employees, who prefer companies that are careful to preserve the health and safety conditions of workers. Cost reduction can be achieved, however, by improving the efficiency of operating processes by reducing waste with a view to environmental protection. Other academics, on the other hand, consider CSP as a means of achieving better financial performance for the fame achieved. By implementing sustainable practices, in fact, a company acquires a greater reputation on the market, which allows it to achieve better performance. It is consumers who want those certain products, increase their demand, and advertise because they share the values and the work of the sustainable company (Margolis *et al.*, 2007).

In addition, a higher reputation makes it possible to obtain financing at lower rates from credit operators and requests for fewer guarantees from suppliers and investors. Whatever the orientation, the advantages of a high CSP are innumerable and explain the importance of proper management of the resources invested in sustainability. The integration of CR issues into the strategy, especially if it is long-term, will allow for the creation of the shared value discussed by (Kramer and Porter, 2011). For companies, it becomes essential to create a connection between CSR policies and corporate strategy, in order to be able to achieve their objectives both in terms of sustainability and in financial terms. Recognizing the strong interdependence between CSP and CFP, companies will be able to overcome the vision of CR as a simple cost or constraint and begin to consider it as a source of opportunity and competitive advantage (Porter and Kramer, 2006). Although numerous studies have been conducted to examine the direct impact of CR on the financial performance of the company, and the impact mediated through the CSP, these reports are still imprecise inconclusive. Therefore, it is desirable to proceed with further investigations.

2.2 Research design and hypothesis development

The materiality process is an essential phase in the creation of the sustainability report. However, the specific literature does not record direct evidence of a positive impact of material aspects on company performance. This study aims to examine how materiality affects the company's economic and financial results. It is therefore intended to verify whether the ability of a company to deal rigorously and thoroughly with material aspects within the sustainability report can lead to an increase in a company's financial performance. In particular, it was agreed to measure the quality of the materiality analysis in the reports and the discussion of the aspects with a view to stakeholder engagement through two measures: depth and breadth. The depth indicates the volume of material aspects treated by a company within the reporting. A high indicator of this measure represents a greater commitment by the company in dealing with the material aspects (Vurro & Perrini, 2011). In other words, the depth evaluates the ability of the company to speak in depth about the material aspects, but without distinguishing whether problems related only to one or more stakeholders are faced.

The breadth, on the other hand, represents the inclusion of the various stakeholders and their needs in sustainability reports (Vurro & Perrini, 2011). In fact, through this measure we try to understand if the materiality process takes into consideration the different categories of stakeholders, addressing the most critical sustainability issues of each of them. A high indicator highlights the company's ability to deal with the material aspects for each stakeholder, without however assessing the level of detail dedicated to each aspect.

In order to determine the relationships between the quality of materiality and the CFP, the model defined aims to verify the following hypothesis:

Hyp 1: The quality of the materiality analysis has a positive impact on CFP.

In more detail,

Hyp 1a: the depth (breadth) of the materiality strategy has a positive impact on the ROE of a company;

Hyp 1b: the depth (breadth) of the materiality strategy has a positive impact on the ROA of a company;

Hyp 1c: the depth (breadth) of the materiality strategy has a positive impact on the Tobin's q of a company.

The empirical study also aims to verify whether the CSP moderates the relationship between the quality of materiality and CFP. Having a high CSP helps companies that invest in the materiality process to achieve greater financial performance. Discussing the material aspects in the report may not be enough if the company is not committed to achieving concrete sustainability results. In order to determine the moderation effect of the CSP variable, the defined model aims to verify the following hypothesis:

Hyp 2: The CSP acts as a moderator on the impact of the quality of materiality on financial performance.

Thus, it is possible to deduce the following sub-hypotheses:

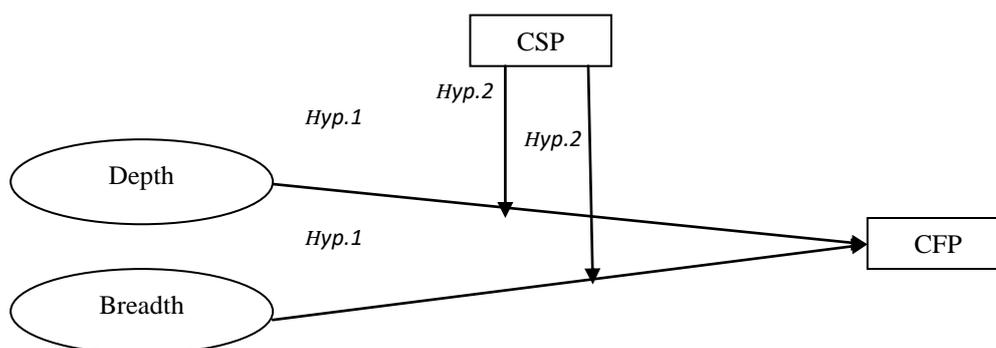
Hyp 2a: the CSP positively moderates the relationship between the depth (breadth) of the materiality strategy and the ROE;

Hyp 2b: the CSP positively moderates the relationship between the depth (breadth) of the materiality strategy and the ROA;

Hyp 2c: the CSP positively moderates the relationship between the depth (breadth) of the materiality strategy and the Tobin's q.

Figure 1 summarize the research design of the study.

Fig. 1: Research Design



Source: our elaboration

3. Methodology

3.1 Sample strategy

The research was carried out on companies belonging to the Fortune500 list, which includes the largest companies by turnover in the United States, in the period 2014-2018. The selected companies are those that have produced the sustainability report for at least one of the years analyzed in the research. Fortune500 companies were chosen for different reasons. First of all, the sample was selected due to the value of the turnover of which the companies belonging to the index boast, in fact few companies carry out the materiality process and usually they are the most profitable companies that have the capital to invest in sustainability (Drempetic *et al.*, 2019). The second reason concerns the language, in fact the construction of the main variables of the study is based on a search for words within the sustainability reports, which therefore must be in the same language. Finally, sustainability data are still few and refer mainly to American companies. The analysis could not cover a longer period of time as the materiality process was a subject that was not dealt with in the reports before 2014, as demonstrated by the preliminary analyzes conducted. Finally, based on the classification of the Sustainability Accounting Standard Board (SASB), the Fortune 500 are characterized by a fairly homogeneous division into sectors: the services sector represents 29% of the sample, the resource transformation sector 22%, the relative consumer goods sector expresses 20% of the sample, the technology communications sector 15% and, finally, that relating to financial accounts for 14%. The choice to have a very varied sample of companies is to identify the recurring material aspects in all sectors and evaluate their impact on company performance.

3.2 Content analysis

The list of material aspects was selected after a cross between the information obtained from the sustainability reports that follow the instructions of the GRI and the information provided by the SASB Map, which outlined a series of probable aspects divided by sector. The material aspects selected were organized by stakeholder, in order to assess the quality of the materiality process, through the attention and involvement that each company has had towards certain stakeholders groups. Once the list of material aspects was organized, the research was carried out with a content analysis, developed through the sophisticated MAXQDA software, and led to the identification of the two variables depth and breadth, which act as a proxy to evaluate the quality of the materiality process. The words searched in the reports have been divided according to the relevant stakeholders. For example, for the employee stakeholder, words such as employee engagement, working conditions, diversity, talent and workplace safety and health were sought; for the shareholder, words such as economic performance, R&D, transparency, business ethics and compliance were required; for customer, words such as customer privacy, access and affordability, product quality and safety, customer satisfaction were research; words like product innovation, responsible and sustainable supply chain, waste material management, and sustainable sourcing have been linked to the supplier; human rights, community relations and local communities have been supported by the stakeholder community. Finally, for environmental stakeholder, words such as GHG emissions, energy management, biodiversity, and climate change were sought.

3.3 Measures

The data for the construction of the variables were collected, in addition to the sustainability reports, from three different databases: Orbis, used to search for financial and economic data, Eikon by Thomson Reuters to search for social and environmental data and DataStream for market data. The dependent variables refer to the years $t + 1$ to evaluate how the impact of the other variables

varies over time, while the independent and control variables are always referred to the current year. In the following section all variables will be discussed in detail.

Dependent variable. Two profitability measures were used as dependent variables, the return on equity (ROE) and the return on asset (Yamamoto *et al.*) and a measure relating to the market, namely Tobin's q. In particular, the ROE was included to evaluate the financial performance of a company. The index has been widely used in previous studies that have examined the impact of CSR issues on financial performance (Margolis *et al.*, 2007; Orlitzky *et al.*, 2003). The ROA was instead used to evaluate the operating profitability. It has previously been used in several studies to assess the relationship between social and financial performance (Nelling and Webb, 2009; Waddock and Graves, 1997). Tobin's q is used as a market indicator and is defined as the ratio between the market value of the company and the replacement cost of company assets. Tobin's q has been used as a proxy for CFP in several CSR studies. Surroca *et al.* (2020) and Cavaco and Crifo (2014) have demonstrated the existence of a positive impact of CSP on Tobin's q.

Moderating variable. The moderation variable used is corporate social performance. Many previous CSP studies have relied on scores provided by rating agencies (Clarkson *et al.*, 2008; Hughes *et al.*, 2001) or using scores provided by AccountAbility (Vurro and Perrini, 2011) or Bloomberg. In this study, the ESG variable provided by Thomson Reuters was used, calculated as a score that reflects a balanced view of a company's performance in four areas: economic, environmental, social, and corporate governance. The Thomson Reuters ESG index uses 178 indicators relating to the company's environmental, social, and corporate governance aspects. It measures the social performance of a company within 10 macro-categories that make up the three pillars of the index: *environmental* measures the performance obtained in the resource use, emissions, and innovation categories; *social* measures social performance in terms of attention to workforce, human rights, community and product responsibility; *governance* measure social performance are management, shareholders, and CSR Strategy.

Independent variable. The independent variables used for the search measure the quality of the SR and are depth and breadth. Depth measures the depth, which corresponds to the volume of material aspects mentioned in the report by the company examined at time t (Vurro and Perrini, 2011). It is given by the sum of the material aspects relating to each stakeholder, multiplied by an index that corresponds to the ratio between the total number of aspects cited by the entire sample of companies for the stakeholder in question and the total number of material aspects cited by all companies in relation to all stakeholders. The weighting index is inserted to reduce the subjectivity in the choice of the aspects taken into consideration in the content analysis. The depth index measures the average volume of material aspects handled by company i at time t in relative terms, that is, in relation to what all the other companies in the sample do. While, breadth measures the breadth of the material aspects dealt with and corresponds to the variety of aspects included in the sustainability reports of the company examined at time t (Vurro and Perrini, 2011) This variable is calculated as the ratio between the total of the material aspects found in the report of the individual company and relating to each stakeholder and the total of the material aspects sought in the reports of all the companies relating to that specific stakeholder. For example, if a company has only dealt with two of the five aspects relating to employees and three of the five relating to investors, its breadth is equal to $2/5 + 3/5$, therefore it is equal to 1.

Control variable. The control variables were selected considering previous research on managerial and CR studies. In particular, the size was used, calculated as a total asset expressed on a natural logarithmic scale, since the sample consists of companies belonging to quite different sectors, the variance of profits and sales is very high (De Villiers and Marques, 2016; Frias-Aceituno *et al.*, 2014). To control the financial leverage, we checked for the debt equity ratio, which can have an important impact on the financial performance of a firm (Garcia-Castro *et al.*, 2010; Holder-Webb *et al.*, 2009; Pogutz and Russo, 2009). The EBITDA margin was inserted to check the profitability of the company. This measure checks the actual weight of costs on total revenues, excluding non-monetary items deriving from the financial structure (Pogutz and Russo, 2009). To control the variables that impact on CR, two measures were used. The first is the ESG

controversies score, which is a score aimed at checking a company's potential exposure to environmental, social and governance disputes and negative events that are reflected in global media. It is negatively linked to the financial and social performance of the company (Orlitzky and Shen, 2013). According to Frooman (1997) the market reacts negatively to the irresponsible behavior of a company and consequently reduces its value. The second measure is the GRI report guidelines, a categorical variable, which assumes the value 1 when companies follow the GRI guidelines for producing the report and assumes the value 0 otherwise. According to Hussey *et al.* (2001) the GRI guidelines represent a valid tool for following the progress achieved by companies in sustainability. Finally, we checked for the dummy sector, a categorical variable used to classify companies in the five sectors identified following the SASB map, and time, a categorical variable to control the specific effects of the year, as macroeconomic phenomena that influence could be present. financial performance.

3.4 Estimation procedure

The collected data was organized in a panel structure. The sample, according to an initial analysis, was made up of 377 companies, i.e., those that had produced the sustainability report for at least one year of analysis, which was then reduced to create the statistical model due to the lack of financial data. In order to test the statistical validity of the research hypotheses, the OLS regression model was adopted which considers the observations as a cross-sectional model. To avoid the correlation of error terms within each unit of analysis of the panel dataset, cluster-robust standard errors were used as a precaution, instead of the typical ones used in the case of heteroskedasticity. Before running OLS regressions, a correlation test must be performed to assess whether the variables included in the model are related to each other. The correlation matrix (Table 1) highlights the correlation coefficients of all the explanatory variables used in the model and demonstrates the absence of multicollinearity cases. To verify the results obtained, the variance inflation factors (VIF) was measured and the results of the VIF test confirm that the analyzes do not present multicollinearity problems. Based on the objective of the study, the analysis was performed using different regression estimation models following a hierarchical approach. The first model tests only the control variables. The second measures the effect of the quality of the materiality analysis on CFP (Hypothesis 1) and the third regression model verifies the same relationship moderated by the presence of CSP (Hypothesis 2). In each model, the dependent and independent variables were lagged by 1 year. After performing each regression, the collinearity between the variables of interest in the abovementioned models was examined using the variance inflation factor (VIF), and none of the variables included in the model reported a value above the common threshold of 10, suggesting that multicollinearity was not a problem (Neter *et al.*, 1990).

Tab. 1: Mean, standard deviation, and correlation.

	Variable	Mean	SD	1	2	3	4	5	6	7
1	ESG	54.6	29.4							
2	Depth	29.4	45.9	.2181*						
3	Breadth	1.7	1.5	.2485*	.5159*					
4	Size	17.0	1.3	.2425*	.1775*	.1638*				
5	ESG controversies	35.0	25.9	-.2468*	.1539*	.1601***	-.3844			
6	GRI report guideline	.41	.05	.4487*	.3658*	.4308*	.1788*	.1521*		
7	Debt Equity ratio	27.5	2.268.4	-.0142	-.0239*	.0033	-.0298*	-.0238*	-.0283*	
8	EDITDA margin	21.0	14.1	.1181*	.0793*	.0877*	.3436*	.0445	.1487*	-.0143
	*** p<.01, ** p<.05, * p<.1									

Source: our elaboration

4. Results

To verify the first hypothesis, namely that the *quality of materiality* affects the financial performance of the company, two sets of regressions were performed. The first set tests the first hypothesis, i.e., the positive impact of the depth of materiality on the ROE (1a), on the ROA (1b) and on Tobin's q (1c), at time $t + 1$. Table 2 reports exclusively the results of the regressions that verify hypotheses 1a, 1b and 1c.

In particular, the effect of depth on the ROE variable is significant only at time $t + 1$, with a p-value of the t-test less than .05 and a β equal to .106. Therefore, hypothesis 1a is verified. Table 2 shows that the variable depth has a significant effect on ROA at year $t + 1$, with β equal to .021 and a p-value for the t-test of less than .01. Hypothesis 1b is therefore fully verified. Finally, the depth of materiality has a positive impact on Tobin's q with a coefficient equal to .002, and a p-value of less than .05. Hypothesis 1c is also completely verified. Thus, the results of the first set of regressions, used to test the impact of the depth of materiality on CFP, confirm that the volume of material aspects handled by firm i has a positive effect on all three dependent variables observed.

Tab. 2: Results of the first set of hypotheses with variable Depth

	Model CV t+1	ROE t+1	Model CV t+1	ROA t+1	Model CV t+1	Tobin's q t+1
Depth		.106**		.021***		.002**
Size	-1.599	-1.680	-1.568**	-1.700***	-.234**	-.376***
ESG controversies	-.155	-.117	-.777	-.820	-.006***	-.009***
GRI report guidelines	-2.908	-3.025	-.000	-.000	-.076	-.175
Debt Equity Ratio	.005**	.007***	.007**	.007***	-.000*	-.000**
EBITDA margin	.101	.135	.127**	.137***	.018*	.028***
Dummy years	Included	Included	Included	Included	Included	Included
Dummy Industry	Included	Included	Included	Included	Included	Included
Costant	78.134	78.431	27.778*	35.129***	7.453**	8.342***
Observations	964	964	1029	1029	1023	1023
R-squared	.870	.960	.188	.190	.100	.117

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: our elaboration

The second set of regressions was used to verify the first set of hypotheses under the influence of the breadth, that measuring the impact of the amplitude of materiality on CFPs, at time $t + 1$. In particular, the effect of breadth on the ROE variable is significant, with a p-value of the t-test less than .01 and a β equal to 7,952. Table 3 shows a significant effect on ROA with p-value less than .01 and a β equal to 1. 149. Finally, the amplitude of materiality has a positive impact on Tobin's q with a coefficient value of .093, and a p-value less than .01. Thus, the second set of hypotheses are verified. The results of the second set of regressions, used to test the impact of the magnitude of materiality on CFP, argue that the variety of material aspects addressed by firm i has a positive effect on the financial performance of year $t + 1$, $t + 2$ and $t + 3$ both if the latter is estimated as profitability (ROE and ROA), and if it is estimated as market value (Tobin's q).

Tab. 3: Results of the first set of hypotheses with variable Breadth

	Model CV t+1	ROE t+1	Model CV t+1	ROA t+1	Model CV t+1	Tobin's q t+1
Breadth		7.952***		1.149***		.093***
Size	-2.456	-2.681	-.095*	-1.795***	-.234*	-.387***
ESG controversies	-.100	-.110	-.004	-.024	-.009*	-.009***
GRI report guidelines	-1.001	-1.440	1.654*	1.708**	.177**	.275**
Debt Equity Ratio	.005**	.007***	-.000	-.000	-.000**	-.000**
EBITDA margin	.166	.179	.136**	.142***	.017***	.028***
Dummy years	Included	Included	Included	Included	Included	Included
Dummy Industry	Included	Included	Included	Included	Included	Included
Costant	78.477	88.431	27.231*	35.815***	6.333*	8.425***
Observations	964	964	1029	1029	1023	1023
R-squared	.870	.108	.101	.106	.099	.126

*** p<.01, ** p<.05, * p<.1

Source: our elaboration

The second hypothesis, whereby the assumption that the social performance of a company acts as a moderator in the relationship between the quality of materiality and the financial performance of the company, has been verified with two other sets of sub-hypotheses, one examines the interaction of the ESG variable with the depth and the other examines it with the breadth. The following tables 3 analyze the effect of the moderation term between ESG and depth on financial performance at time $t + 1$. It is noted that, unlike what was assumed, the CSP does not have a positive moderating effect on the impact of the depth of materiality on ROE, ROA, and Tobin's q , since the p -value does not allow to accept the values obtained as statistically significant. While the ESG coefficient is in all cases highly significant and positive, thus demonstrating that as the CSP increases, the financial performance also increases. Thus, this set of hypotheses are not verified.

Tab. 4: Moderation effect of ESG on the relationship between DEPTH and CFP

	Model CV t+1	ROE t+1	Model CV t+1	ROA t+1	Model CV t+1	Tobin's q t+1
ESGxDepth		-.006		.000		.000
ESG	.987**	.958***	.098*	.108***	.012**	.024***
Depth	.444	.504	-.000	-.008	.000	.000
Size	-4.789	-5.559	-3.031***	-2.169***	-.367***	-.471***
ESG controversies	-.009	-.107	-.013	-.021	-.005***	-.009***
GRI report guidelines	-.009	-.107	-1.334*	-1.793**	-.333**	-.396**
Debt Equity Ratio	.005***	.007***	-.000	-.000	-.000	-.000*
EBITDA margin	.119	.221	.134**	.144***	.023***	.029***
Dummy Years	Included	Included	Included	Included	Included	Included
Dummy Industry	Included	Included	Included	Included	Included	Included
Constant	-3.199*	-3.283**	24.566***	36.126***	7.342***	8.436***
Observations	964	964	1026	1026	1023	1023
R-squared	.111	.112	.110	.111	.159	.161

*** p<.01, ** p<.05, * p<.1

Source: our elaboration

The last set of hypotheses analyzes the effect of the moderation term between ESG and breadth on firm performance at time $t + 1$. The results obtained (Table 5) show that the marginal effect of breadth on ROE depends on the level of CSP at time $t + 1$. The results are confirmed, with a significance level of $p < .01$. Also, the regressions analysis carried out using as dependent variable the ROA and Tobin's q , confirmed the hypothesis. In particular, the results are confirmed with a p -value of less than .01 for the ROA and less than .05 for the Tobin's q .

Tab. 5: Moderation effect of ESG on the relationship between BREADTH and CFP

	Model CV t+1	ROE t+1	Model CV t+1	ROA t+1	Model CV t+1	Tobin's q t+1
ESGxBreadth		.028***		.044***		.006**
ESG	.609**	.705***	.035	.048	.013	.015
Breadth	3.125*	4.178*	1.987*	2.194*	-.289	-.395
Size	-4.678	-5.729	-2.112***	-2.197***	-.335**	-.475***
ESG controversies	-.009	-.096	-.009	-.018	-.005**	-.008***
GRI report guidelines	-11.345	-15.856	1.124***	2.242***	.398*	.418**
Debt Equity Ratio	.005**	.007***	-.000	-.000	-.000	-.000
EBITDA margin	.111	.231	.122***	.147***	.011**	.029***
Dummy Years	Included	Included	Included	Included	Included	Included
Dummy Industry	Included	Included	Included	Included	Included	Included
Constant	94.321	95.410	26.546***	39.456***	7.657**	8.943***
Observations	964	964	1029	1029	1023	1023
R-squared	.107	.118	.109	.130	.165	.173
*** p<.01, ** p<.05, * p<.1						

Source: our elaboration

5. Conclusion

5.1 Discussion of the results

The objective of this study was twofold: to analyze both the impact of depth and breadth of the materiality of the SR on CFP, and subsequently observe the moderation effect of the CSP in the relationship between the quality of materiality and the firms performance. The model developed confirmed the first hypothesis, demonstrating that the quality of the materiality process affects financial performance. In fact, both the depth, which expresses the quantity of material aspects covered, and the breadth, which evaluates the breadth of the aspects covered in the report, have a positive impact on CFP. The two variables that were used as proxy for the quality of materiality showed a different effect on ROE, ROA, and Tobin's q, at time t + 1. It has been observed that the depth and breadth of material aspects on ROE have a positive impact at time t + 1. ROE indicates the percentage of profit generated by invested capital and demonstrates the company's ability to generate profit for investors. Therefore, addressing the material aspects related to multiple stakeholders (breadth) has a lasting impact on ROE over time, just as dealing in depth with some aspects (depth) has shown a positive impact only on the performance of the following year. This highlights that ROE progressively increases over time if the company manages to maintain an adequate balance between the different interests of the categories of stakeholders.

As regards the impact of the quality of the material on the ROA at time t + 1, it was found that dealing with the material aspects, both in terms of number and in terms of variety, has a positive effect in terms of the value of the assets owned. This is because the company, thanks to greater stakeholder engagement, increases sales and market share, improves brand positioning and employee productivity, and also reduces operating costs. Finally, the quality of materiality in the reports has a positive impact on Tobin's q and determines an improvement in the market value of the company, calculated as the ratio between the market value of the assets and their replacement cost. The increase in Tobin's q means that the company's assets, at the same replacement cost, are better appreciated by the market. This is because the quality of materiality allows to take advantage of the resulting benefits, such as improving the reputation, image, and value of the brand, thus guaranteeing the company a higher market value.

The second major objective of the research was to verify the role of CSP in the relationship between materiality and CFP. The social performance of a company acts as a moderator of the impact exerted on financial performance by the quality of materiality only if the latter is analyzed as the breadth of material aspects present in the report (breadth).

Improving a ESG index of a company, in fact, expands the positive effect that the variety of material aspects has on ROE, ROA and Tobin's q . When the ESG index, which measures the sustainability practices that the company carries out, grows, the positive impact of the treatment of material aspects in the report also grows due to the greater credibility and trust of stakeholders (Barnett and Salomon, 2012). In turn, this involves improving operational efficiency (Yamamoto *et al.*), increasing brand reputation and image (Tobin's q) and consequently also increasing revenues (ROE) per year $t + 1$. The improvement of the ESG index confirms that the actions taken by companies, to reduce the impact that their business activity has on the environment and the community, prove what is reported in the reports. The results show that the "more is better" rule is not sufficient since it is necessary that the report reflects the multiplicity of material aspects concerning the different categories of stakeholders (Rasche and Esser, 2006).

In summary, the study allows for three main applications. First, materiality has a positive and significant effect on CFP in general. And in particular, materiality improves performance even when it is analyzed as profitability for investors (ROE) in the short to medium term, only if the company manages to maintain a balance between all the interests of the stakeholders. Secondly, looking at the role of CSP, the impact of materiality on CFP is greater if ESG results improve. And only the discussion of a wider selection of material aspects (breadth) confirms the hypothesis of the moderation effect.

5.2 Final considerations and managerial implications

Materiality is considered a means of stakeholder engagement and improves the quality of reporting by communicating the issues that both the company and its stakeholders consider most significant from an economic, environmental, and social point of view (Font *et al.*, 2016). The involvement of stakeholders increases the reputation of the company, reduces opportunistic behavior, and allows companies to learn more about the challenges to be faced and the favorable opportunities to be exploited. These benefits allow you to increase the firm financial performance. The study carried out has shown, in fact, that materiality is an important process for creating greater economic and financial value. The analyzes showed that treating the material aspects in the report positively influences financial performance, both if they are analyzed as profitability for investors, and if they are analyzed as operating profitability, and if they are analyzed as value improvement market. Management should therefore invest in an effective materiality process with which to communicate the company's commitment to more responsible actions in relation to each category of stakeholder, in order to receive superior economic and financial returns.

Attention to material aspects allows companies to increase the stakeholder influence capacity (Barnett, 2007), i.e. to influence the perception of stakeholders CR activities and improve corporate reputation. Therefore, even companies that have a bad reputation by improving relations with their stakeholders could transform sustainable investments into profitable economic results.

The results support the intuition that analyzing multiple material aspects in the reports allows you to achieve lasting results over time. Dealing with a large number of aspects has a less impactful effect than dealing with a variety relating to more categories of stakeholders.

Firms should select, through the materiality process, the most important aspects and related to the different categories of stakeholders. It is necessary that the SR reflects the multiplicity of material aspects concerning the different categories of stakeholders in order to obtain greater benefits over time. Each stakeholder, while pursuing different interests of an economic, environmental, and social nature, is essential to guarantee the future success of the company. The company needs the services and the contribution of all the stakeholders linked to it, albeit from different relationships (Shleifer and Vishny, 1997) to ensure business continuity. Each category will have particular and different expectations, but it is precisely the balancing of multiple interests that will make it possible to obtain the desired benefits (Laplume *et al.*, 2008). Therefore, the role of management is, to address the material aspects relating to all stakeholders to create long-term value for the company.

The analyzes also showed that the effect of materiality on CFP is amplified by the increase in CSP. Achieving higher social performance means confirming the adoption of socially responsible behavior by the company and maintaining the trust of stakeholders (Barnett and Salomon, 2012). Management should invest, together with the materiality process, also in the improvement of its ESG indices to obtain economic and financial returns. The CSP is a distinctive resource for the company and confirms that the latter, after defining the material aspects selected in the report, has taken action to resolve the selected sustainability issues. The interconnection between CSP and CFP is confirmed, however, only when companies include a variety of material aspects relating to multiple categories of stakeholders in the SR. The benefits for the company are different based on the CSR initiatives undertaken to support the different categories of stakeholders.

In order for companies to enjoy the moderation effect carried out by the CSP, they must deal in their SR with material aspects relating to multiple categories of stakeholders. Also, on this occasion, analyzing only some issues of sustainability but in more detail is not enough. Stakeholders could perceive this initiative as a way of greenwashing by the company.

The empirical study allowed us to define some managerial implications. First of all, it is essential for companies not to overlook and underestimate the materiality process. Furthermore, it is important to constantly improve the CSP to expand the positive effect of materiality. The increase in individual environmental, social and governance indicators confirms the goodness and improves the reputation of companies. Finally, it is necessary to identify a variety of material aspects relating to multiple stakeholders. Carrying out the process superficially, selecting a number of material aspects that are important only for a part of the stakeholders means underestimating the balance of multiple interests and does not guarantee the economic and financial success of the company.

5.3 Limitations and recommendations for future research

Important conclusions emerged from the research, demonstrating the relevance of the materiality process. However, there are some limitations that could push future research to further light on the aspects investigated in this study.

A first limitation concerns the sample. Select the sample to give reliability to the study regarding the companies that, due to their large size, are more likely to carry out SRs, have implemented the materiality process and have disseminated sustainability data. It would also be interesting to analyze how the treatment of material aspects influences the economic and financial results of smaller companies with fewer stakeholders. Furthermore, the sample includes only US companies, but it would be interesting to compare the results obtained from these with those achievable in countries with different cultures. Materiality, in fact, could be perceived differently by stakeholders and lead to more or less high financial performances, based on the importance that sustainability has for certain economies.

A second limitation concerns the methodology. The study is based on a content analysis performed on the SRs, therefore, no further channels for communicating materiality aspects were analyzed. It is desirable for the future to be able to do research also evaluating the communication of sustainability through other channels such as websites, annual reports or company social channels. In addition, the material aspects selected are the most common and widely disseminated ones, further research may include material aspects that reflect technical issues and observe how the impact of materiality changes on the financial performance of companies belonging to different sectors.

Finally, since materiality is a very recent process and the sustainability reports are still few, even the years of analysis are not many. It would be interesting to observe how in a few years the results could change by examining the hypotheses over a longer period of time.

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Decommissioning of offshore platform: an empirical analysis in the Italian oil & gas industry[♦]

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Abstract

Objectives. *From a technical, economic, and environmental point of view, the decommissioning of offshore oil platforms is one of the most serious problems facing the oil and gas industry in a long-term perspective. This work aims to investigate the perspective of some stakeholders' categories belonging to the decommissioning industry about the future of these installations.*

Methodology. *An empirical analysis has been carried out based on the definition of a case study regarding the Italian oil and gas industry. Primary data were collected through multiple-choice questionnaires and in-depth interviews.*

Findings. *The results of the analysis show an emerging sustainable approach regarding the decommissioning of offshore platforms. Circular Economic (CE) initiatives are mainly considered as value co-creation driver regarding the future of these structures.*

Research limits. *The main limitation is related to the sample which is restricted to Italian industry and is related only to certain categories of stakeholders.*

Practical implications. *This work offers several insights about different decommissioning scenarios. Further research could regard the possibility to extend the analysis in other industries and contexts.*

Originality of the study. *The study improves the attention towards the decommissioning of oil and gas offshore platform, its environmental impact and public awareness, from users to local governments.*

Key words: *decommissioning; offshore platforms; circular economy; sustainability; case study analysis*

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1. Introduction

Increasingly limited land and resources worldwide have steered national and international attention toward global issues affecting the environment such as the decommissioning of offshore platforms. The number of offshore assets reaching their end of life is rising and their decommissioning process is increasingly receiving attention by the oil and gas sector (Hamzah, 2003; Chandler *et al.*, 2017). Decommissioning can be defined as the final stage of the life cycle of an industrial facility which aims to balance the sensitive boundaries of minimizing financial costs, costs to human life and well-being and to the environment (Fam *et al.*, 2018). Facing the decommissioning of petroleum installations is a relatively new challenge to most producer countries and energy companies. In fact, industry's routines in building offshore platforms are much greater than the one of dismantling them (Parente *et al.* 2006). Even there are many efforts towards establishing international "best practices" standards in this industry, a business model view regarding the opportunities emerging from offshore decommissioning is still missing (Lindgren, 2016). Many platforms are soon to reach or have already reached their mature phase, which means that in the foreseeable future, measures will need to be taken for their eventual removal. In addition, the oil and gas industry is faced two important challenges: the sustainable economic development and the global climate change. Accordingly, a growing attention by the industry in evaluating the environmental impact and the public awareness has been observed. In particular, principles of Circular Economy (CE) have generated the interest of the oil and gas industry due to the possibilities of enhancing economic value and reducing the waste generated during decommissioning.

Furthermore, the process of decision-making about the future of platforms regards a multitude of different actors belonging to a variety of fields: their opinions can be considered by the decision-makers and local governments to select the most adequate decommissioning strategies. In such a scenario, this work aims to investigate the main stakeholder's perception and opinions regarding the future of offshore platform and the opportunities and challenges related to the decommissioning.

The remainder of this paper is structured as follows: section 2 provides a literature review focused on the decommissioning of offshore oil and gas platforms with particular reference to the stakeholder's perspective related to the future of these installations; section 3 is related to the methodology approach, defined through an exploratory approach that follow the case study; section 4 discusses the results of the analysis regarding the Italian context by highlighting the key role of CE principles regarding the future of the offshore platforms; section 5 lastly regards the main theoretical and practical implications and it also draws main conclusions and directions for future research.

2. Literature review

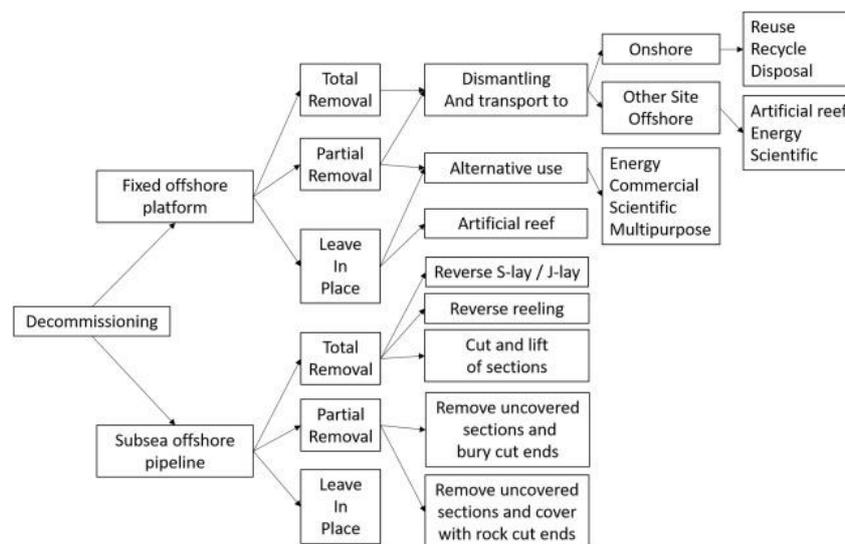
2.1 *The decommissioning of oil and gas offshore platforms*

The decommissioning process can be deemed the last phase of the life cycle of a project. It essentially consists in the deactivation of an infrastructure, which often occurs because the infrastructure is no longer economically viable. Around the world there are more than 7500 offshore oil and gas structures in over 53 countries (Parente *et al.*, 2006; Lakhali *et al.*, 2009; Techera and Chandler, 2015). In the next few decades, more and more of these structures will reach the end of their operational life and will need to be decommissioned (Day & Gusmitta, 2016). Decommissioning activity is projected to undergo significant growth between now and 2040 (International Energy Agency, 2018). The oil and gas offshore structures in the Italian territory are 136 platforms, which extract especially gas (Paini, 2001; Assomineraria, 2004; Trabucco, 2011). These offshore platforms are mainly located along the Northern and Central Adriatic coasts (De Biasi *et al.*, 2006; Maggi *et al.*, 2007), on depths between 10 and 120 meters, but also in the Ionian

Sea and in the Strait of Sicily. These offshore platforms are mainly located along the Northern and Central Adriatic coasts (De Biasi *et al.*, 2006; Maggi *et al.*, 2007), on depths between 10 and 120 meters, but also in the Ionian Sea and in the Strait of Sicily.

Each offshore platform structure is different and therefore requires its own customized approach to decommissioning. Generally, the end-of-life options for offshore infrastructure include (i) total removal, (ii) in situ decommissioning (leaving the infrastructure in place either completely intact or with the topsides removed and legs toppled), (iii) removal and relocation offshore (for example as a dive site or fishery), as well as (iv) partial removal (removing some parts of the infrastructure while leaving others in situ) (Ekins *et al.*, 2005). The main decommissioning options are summarized in figure 1 below.

Fig. 1: Decommissioning options for oil and gas platforms



Source: Martins *et al.* 2020.

Different approaches to decommissioning derive from complex and intercorrelated environmental, technical, economic, and safety aspects that need to be considered by decision-makers and local governments, which may also vary per individual structure (Henrion *et al.*, 2014; Fowler *et al.*, 2014; Day and Gusmitta, 2016). Policies of removal, which are generally adopted by regulation frameworks, assume of leaving the seabed unaltered can represent the most environmentally sound decommissioning option, but they require demanding disposal costs. As alternative to total removal, there are other decommissioning options each one characterized by its own impact on the environment, costs, socio-economic and security aspects. Removal and relocation of structures from the seafloor typically involves diamond wire cutting, abrasive water jetting, hydraulic shears, or explosives (NOAA, 2017), which potentially can damage marine organisms and habitats. Decommissioning options that involve handling and transport of structures pose safety risks (e.g., collisions, accidents, spills), indeed, increase the risk of damage to existing infrastructure and natural habitats, particularly in shallow coastal areas with high prevalence of sensitive habitats (e.g., coral reefs), but also in the deep sea, where cold-water corals are particularly slow to recover (Roberts and Cairns, 2014). On the other hand, platform structures made primarily of steel if left in place will slowly disintegrate and collapse, with full corrosion of the structures expected to take over 500 years (Picken *et al.*, 1997).

One of the main issues in the process of decommissioning regard the environmental concerns. According to the literature (Schroeder and Love, 2004; Sommer *et al.*, 2019), the major environmental issues in decommissioning regard the potential effects in the marine ecosystem, the appropriate use and containment of hazardous substances, including naturally occurring radioactive material and waste management, which includes finding a final destination for the debris

accumulated over the life cycle of a piece of equipment (Cripps and Aabel, 2002; Almeida *et al.*, 2017). In fact, it has been observed that a structure of oil and gas platform may provide important habitats to ensure populations' connectivity: marine ecosystems evolve on and around offshore oil and gas structures throughout their operational life below the surface. In this sense, these platforms present a great ecological opportunity for marine ecosystem enhancement or restoration, present both ecological and economic opportunities.

Although the article n. 60 of United Nations Convention on the Law of the Sea, and the resolution A.672 adopted in 1989 of the International Maritime Organization provided guidelines and a framework for decommissioning, there is a range of alternatives to be exploited case by case in the national and international landscapes (Fowler, 2014). Over the last decades, international and national regulatory, technological, and ideological frameworks have changed significantly by pushing towards a new way to consider the decommissioning. Social movements, who are pushing for ecological modernization and sustainable development, have put emphasis on reducing wastes and sharing resources (Arts and Leroy, 2006; Lytras and Visvizi, 2018). In fact, albeit environmental outcomes of decommissioning options (i.e., total removal, partial remove, topping, live in place, reefing elsewhere, alternative use options) and local and regional factors (e.g., oceanography, biogeography, surrounding habitat) are not fully understood (Fowler *et al.*, 2014), the reconversion of offshore platforms might provide opportunities from an economical and social perspective (Cullinane and Gourvenec, 2017). In this sense, several scenarios have emerged from of reusing and recycling obsolete offshore structures (Techera and Chandler, 2015) which may be reused for marine research facilities, renewable energy technologies, aquaculture, or tourism (Chandler *et al.*, 2017; Buck and Langan, 2017).

2.2 *The stakeholder perspective on the decommissioning of oil and gas offshore platforms*

Oil and gas offshore platforms and all the other related installations are characterized by a limited life of operations. In recent years, to ensure sustainability and prevent damages to the environment, several integrated strategies, action plans, and technologies for the viability use of marine resources have been formulated. The legislation requires the decommissioning, intended as the dismantling, removal of platforms and restoration of the original condition of the area. However, the considerable social and economics decommissioning costs have led to a gradual change of international regulations also in the light of a CE approach. Furthermore, constructing, operating, and removing offshore platforms can affect coastal residents and marine environments.

In this sense, the decommissioning of offshore platform involves a multitude of stakeholders: government bodies, tourism governments, regulatory agencies, non-governmental organizations, labor unions, operators and oil and gas companies, environmental local actors, personal interest groups are some examples of the stakeholders involved. In a more general terms, the process of decision-making about the future of offshore platforms regards a multitude of different actors which can be divided into the classification of direct and indirect stakeholders (Frooman, 1999; Madsen and Ulhøi, 2001; Sie *et al.*, 2018) (see the following Tab. 1). In fact, if undoubtedly local governments, residents, environmental and safety experts in the target area are directly involved regarding the future of local offshore platforms, the decommissioning can be considered as a global issue. As a result, there has also been increasing pressure from a growing number of indirect stakeholders, including NGOs, environmental activists, and so on.

First, local governments are directly involved in decisions which should be carried out regarding the decommissioning of offshore platforms. Always more legislators from the governments side are questioning about the issues and options about the decommissioning offshore oil and gas production platforms, particularly as these relate to fundamental ecological aspects. After the explosion of the British Petroleum operated offshore Deepwater Horizon drilling rig in the northern Gulf of Mexico, which had resulted in one of the most catastrophic oil spill disasters in the history of the United States, supportive political climate in the Gulf of Mexico for “rigs-to-reefs” programs have been developed (D’Andrea and Reddy, 2018). Both local marine ecology and political position are

crucial in the decommissioning offshore platforms, always more focused on the need of understanding environmental impacts of various alternatives (which, as before mentioned, range from total removal to allowing some or all of platform structure to remain in the ocean). From an environmental point of view, the piles may collide directly with sea organisms when moved, and cables and foundation piles may affect marine plankton or produce sediment re-suspension, by increasing the seawater turbidity and bludgeoning the primary production of oceans. Waste of various kinds is produced (from construction, transportation, and machinery) which can harm reefs and other marine organisms, by damaging the marine environment (Sie *et al.*, 2018). Additional scientific evidence consider the evaluation of platform habitat quality, estimation of local impacts, and assessment of the effect of any residual contaminants on the marine populations. Therefore, as far as the principal managerial/organizational goal is assessing environmental priorities (e.g., species-of-interest and marine habitats), the main conclusion from both ecological and political perspectives is that decommissioning decisions should be made on a case-by-case basis (Schroeder and Love, 2004).

Also, safety experts play a central role (Visvizi and Lytras, 2020) by offering report and analysis on the decommissioning alternatives correlated to the different environmental contexts. In fact, the removal of these heavy steel structures is characterized by high risks that may compromise personnel safety and loss of assets as they are based on dedicated barges and heavy lift vessels that may incur in trouble because of mechanical or structural failure. The evaluations about the hazards are based on the experience and failure data obtained empirically through analogous operations, which further introduces ambiguity to the risk analysis. For this reason, new safety analysis approaches for conducting a decommissioning risk analysis of offshore installations are developing to assess the accident causations leading to futile decommissioning operation (Babaleye and Kurt, 2020).

Furthermore, the decisions about the future of offshore structure impact both residents, tourists and those offering accommodation. From the point of view of residents, noise, light, and dust pollution can affect the quality of residential life. Waste can affect coastal areas directly and if containing toxic materials can cause health problems for residents. Such waste problems could be getting worst by platform removal processes if waste disposal regulations are not enforced. Sie *et al.*, (2018) carried out interviews and questionnaire surveys (see appendix) to study residents' and tourists' social acceptance of the offshore platform. Results indicate that most residents stated that they would oppose the development of the platform, whereas most tourists would support it, provided that the platform offers leisure and renewable energy features. It must be said, furthermore, that the reconversion of offshore platforms in multipurpose island could carry out several advantages in terms development of economic advantages and ecotourism initiatives (Zawawi *et al.*, 2012).

Tab. 1: Stakeholders related to the decommissioning process of offshore platforms

DIRECT STAKEHOLDERS	Local Governments	<ul style="list-style-type: none"> ▪ National/regional/local authorities ▪ Territorial water jurisdiction
	Safety experts	<ul style="list-style-type: none"> ▪ Engineers/technicians ▪ Navigation experts ▪ Climate experts
	Tourism Governments	<ul style="list-style-type: none"> ▪ B&B ▪ Hosting business
	Environmental local actors	<ul style="list-style-type: none"> ▪ Fishermen's association ▪ Environmental association
		Residents
INDIRECT STAKEHOLDERS	<ul style="list-style-type: none"> ▪ Worldwide organizations ▪ International technical institutions ▪ Professional bodies ▪ Personal interest groups (labor unions, pressure groups such as environmentalists) 	

Source: our elaboration starting from Frooman, 1999, Madsen and Ulhøi, 2001 and Sie *et al.*, 2018.

3. Methodology

3.1 Research design

With the aim to investigate the perspective of stakeholders' categories involved in the decommissioning process, an empirical analysis has been carried out based on the definition of a case study. In fact, since the issues related to the future of offshore platforms and their decommissioning are related to chaotic context characterized by several variables involved in the decision-making process, set of events, and categories of stakeholders with different interests, the methodology of a case study seems to be more appropriated to frame the point of view in terms of opportunities and challenges of different types of users involved in the process of decommissioning. In this sense, methodology of case study is useful in the development of a holistic standpoint on context-specific and intricate situations (Wilson, 1979; Yin, 2003).

According to Yin (2003), case study is an empirical investigation focused on the phenomena analysis and seeks to observe them “*in their uniqueness, as part of a particular scenario and its interactions*” (Patton, 1985). Therefore, case study is grounded on a qualitative investigation that pursues to investigate the “meaning” of reality by considering people's personal experience and perspective. This methodology is generally adopted when the research questions, generally are “*how?*” and “*why?*” (Yin, 2013); thus, when it is generally complicated control over events and behaviors, or when can be useful to examine phenomena through direct observation and interviewing people involved in the events. The case study, in fact, represents a research path on a particular contemporary phenomenon within its real-life context (Yin, 2003).

Case studies presented many vantages in terms of profundity of the analysis, high conceptual validity, understanding of context and process, and the ability to promote new hypotheses and new research questions for further investigating a phenomenon (Yin, 2013). Through this type of research, “data is not produced in the form of numbers” (Punch, 2013), but, through a qualitative and exploratory approach (Guba *et al.*, 1994), the accurate description of moments, meanings, and problems related to people's lives is obtained by using a wide range of interconnected methods, with the aim to obtain a better solution or understanding on the topic of interest.

Based on the above, the Italian context of offshore platforms has been selected for the analysis. During 2013, Italian government authorized a total of 79 offshore platforms. In Italy, there are 136 platforms are nearing the end of their production cycle and will thus have to be dismantled. In the Adriatic Sea the Italian Oil Company installed 80 gas platforms over the last 50 years.

3.2 Data collection and analysis

The in-depth exploration of the perception about the decommissioning of offshore platforms has been based on a range of primary data collected by multiple-choice questionnaires and in-depth interviews. Specifically, in the time between 2019-2020 the empirical analysis was conducted. First, semi-structured questionnaires were administered online to several Italian stakeholders belonging to the decommissioning industry. To ensure a high response rate, the survey was brief, easy to complete (taking less than 15 minutes). At the end of data collection process, a data set made up of 33 total answers was obtained. All questionnaires were collected immediately, and the information was entered in a database that has been processed with spreadsheet software (Microsoft Excel)..

Additionally, the case study was conducted through the implementation of semi-structured interviews, submitted to three experts of different business area related to the reconversion of offshore platforms and involved in tourism sector, fisheries industry, and circular economy-ecological initiatives. These interviews, carried out during the period March - June 2020 and lasted an average of 45 minutes, have been about the sustainability and reusing of offshore platforms in business terms. Since the interviews contained open-ended questions and discussions diverged from the interview guide, the experts were encouraged to interact. The interviews were transcribed by notes and recorded were for guaranteeing a more consistent transcription (Creswell, 2012). The

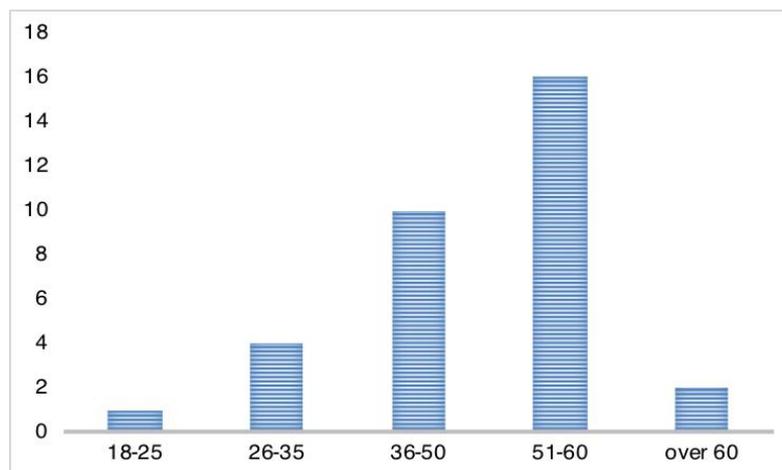
interviews protocols were transcribed, and two-pass process has been adopted for data verification. Afterward, the collected data were analyzed by three authors, whom, at first, to avoid a possible mutual influence, acted separately, interpreting the answers based on their knowledge and experience background. Subsequently, the comparison between the authors became necessary, as well as appropriate, with the aim to better target the perceptions and opinions about the decommissioning of offshore platforms. However, the comparison revealed uniformity in the interpretation of the information extrapolated from the interviews and this aspect underlines the coherence of the research design concerning the link between the objective pursued and the results obtained.

3.3 Results

By following an empirical analysis, several results are emerged with the aim to highlight the perspective of some categories stakeholders involved in the process of decommissioning of offshore platforms, in terms of opportunities and challenges.

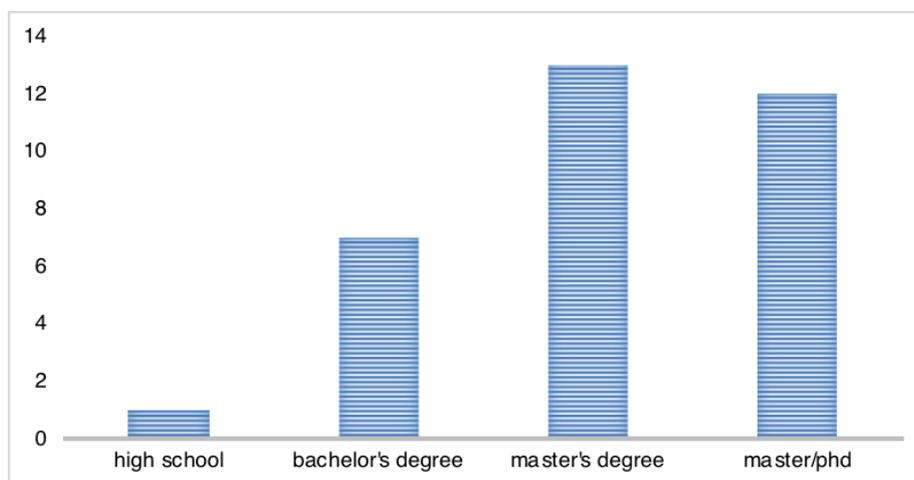
Primarily, the study has shown the demographic characteristics of the sample. Among 33 respondents, most of them belongs to the cluster of age 51-60 (Fig. 2). Also, most of them have a degree and high level of education too (Fig. 3).

Fig. 2: Population characteristics in terms of age



Source: Authors' elaboration.

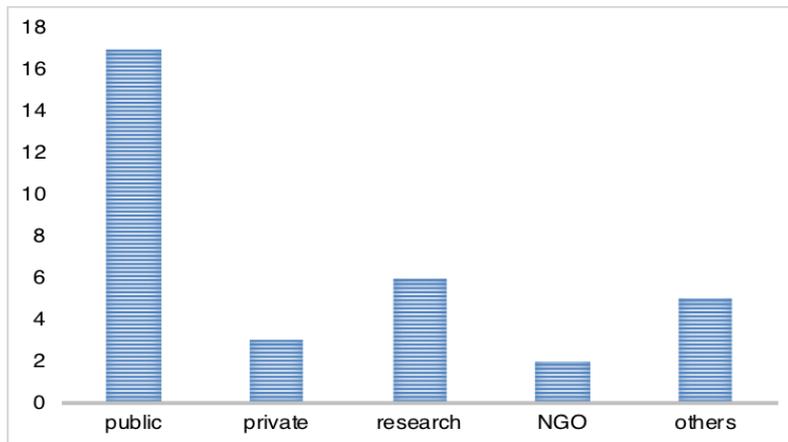
Fig. 3: Qualifications of respondents



Source: Authors' elaboration.

Specifically, the respondents mainly work in the public sector (Fig. 4); for instance, some of them are involved in the Local Governments and refers to the community of stakeholders involved in the decommissioning process of the offshore platforms of the North Adriatic Sea.

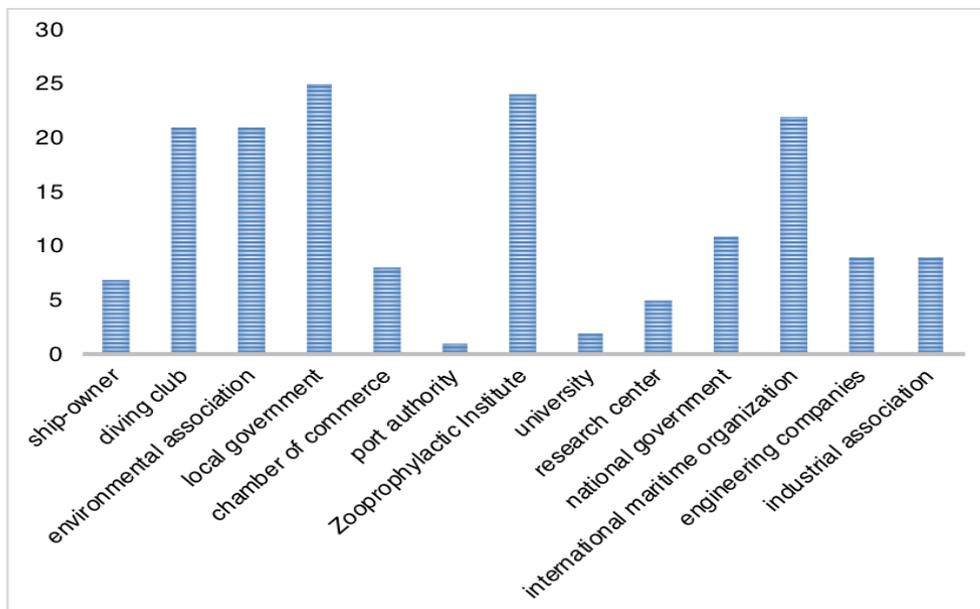
Fig. 4: Employment of respondents



Source: Authors' elaboration.

Afterwards, the participants were asked 5 key partners to involve in the complex process of decision making regarding the decommissioning of offshore platforms. More results highlight the important role of local government as well as international governmental bodies (Fig. 5). Also, considerable attention is given to the environmental and animal life. On the other hand, diving club also is considered as a key partner.

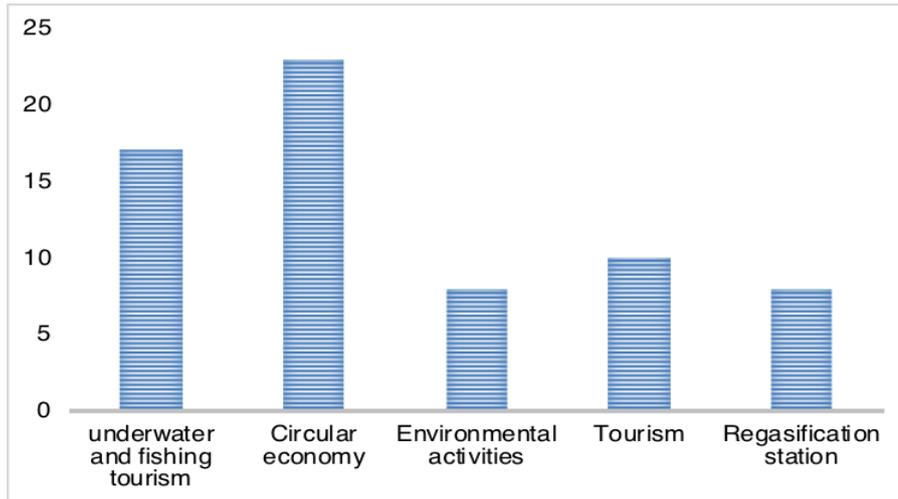
Fig. 5: Key partners in the decommissioning of offshore platforms process



Source: Authors' elaboration.

In addition, the participants were asked 2 specific activities considered more relevant in terms of value creation proposition during the offshore platform decommissioning process for the territory and stakeholders involved (Fig. 6). As a result, activities related to Circular Economic initiatives as well as activities connected with underwater and fishing events are mainly considered as value co-creation driver during the decommissioning of offshore platforms.

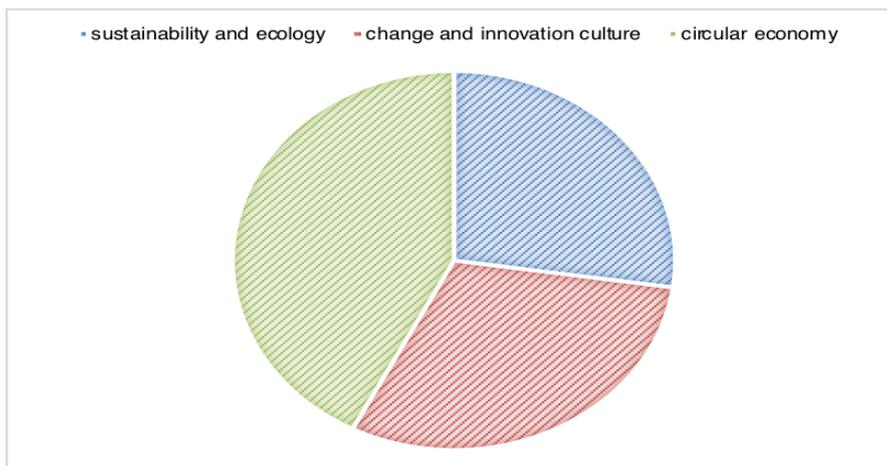
Fig. 6: Value co-creation-oriented activities in the decommissioning of offshore platforms



Source: Authors' elaboration.

Furthermore, main of respondents highlight regarding the fundamental purpose of the decommissioning of offshore platforms the crucial role of the Circular Economy principles (Fig. 7).

Fig. 7: Main purpose of the decommissioning of offshore platforms



Source: Authors' elaboration.

Also, by considering the semi-structured interviews provided to three experts of different business area related to the reconversion of offshore platforms, other significant findings can be discussed which are summarized in the table 2, in accordance with the results previously highlighted.

In the words of one participating belonging to tourism and recreation industry:

“The platforms are optimal sites because they are in the open sea away from underwater currents and therefore does not raise the slime, then along the jackets to the bottom structures of underwater flora and fauna are created very interesting from a recreational-tourist point of view (photojournalists, diving sports), among other things, the platforms act as a shelter for fish, and this amplifies the underwater microenvironment. In this way it is possible to create sustainable value.

In addition, the offshore platforms can serve as a logistical hub for the realization of technical diving operator courses for carrying out necessary training hours of immersion to obtain the patent and be hired by companies in the industry that require these specialized operators”.

Another participant, energy systems engineer, suggests that:

“Sustainability and circular economy are becoming increasingly important. Think also to the possibilities offered in reusing waste from other production processes and biomass to produce renewable energy. [...]. There are companies called contractors who install particular structures to produce renewable energy on offshore platforms”.

The last expert - professional sportsman, journalist, and reporter- has confidence that:

“The possibility of reusing offshore platforms could undoubtedly be an opportunity for freediving. In terms of sustainable and blue growth initiatives, a research center should be created to develop different reuses for offshore platforms. European funds for the circular economy are crucial”.

Tab. 2: Findings related to the reconversion of offshore platforms in the Italian context

<i>Reconversion of offshore oil and gas platforms</i>	<i>Main elements</i>
<i>Renewable energy sector</i>	<ul style="list-style-type: none"> • Hydrogen production • Wind energy • Photovoltaic energy • Tidal energy • Biomass • Regasification
<i>Blue growth sector</i>	<ul style="list-style-type: none"> • Diving • Research center • Artificial reefs
<i>Tourism sector</i>	<ul style="list-style-type: none"> • Underwater tourism (e.g., aquatic photo reporter; snorkeling, freediving; etc.) • Fishing tourism

Source: Authors’ elaboration from primary data

4. Discussion

Based on the results carried out by the analysis, CE principles have emerged related to decommissioning process as value co-creation driver regarding the future of these structures.

Principally, the materials collected from an offshore platform can be sent to recycling services.

In particular, the decommissioning of offshore platforms can adopt the CE principles to different degrees:

- 1) the easiest way is based to improve the separation of high-quality metal alloys, with the aim to make more effective the recycling process;
- 2) another choice regards the reusing of platform assets, also making sure that the sellers are aware of the available equipment at least a year in advance in order to find the right purchasers in an easy way;
- 3) the most radical decision is based on reusing pipelines with the purpose of transporting CO2 instead of gas by eliminating the process of removing them (Benton, 2015).

However, a data integration framework can enable a rapid assessment of decommissioned items to determine the reuse potential of decommissioned items, save on cost, and benefit the environment (Akinyemi *et al.*, 2020). Therefore, all the possibilities are in line with the principles of Circular Economy because, if realized, it would result in reducing raw material extraction and enlightening the system in the oil and gas sector. The total remove of the offshore installations is a time, energy, and economic intensive process and, according to several environmental effects which include energy use, emissions to air, discharges to sea and waste, partial decommissioning can be

generally considered as a better option than complete due to lower energy use during recycling and transportation (Terpou, 2017).

Always in line with the circular economy principles, the results of the analysis highlight the high potential of the idea of a multipurpose offshore platform. In fact, at the end of the industrial life cycle these structures can be converted and reused - in whole or in part - in favour of other initiatives. In this way, offshore platforms, which at the end of their service life turn into heavy assets whose decommissioning process is burdensome from an environmental and economic point of view, could instead become an asset thanks to the process of multi-purpose reconversion. Decommissioned platform, once removed anything that can be recycled, can be turned into strategic hub which could host valuable and sustainable activities in terms of renewable energy, blue growth, and tourism.

As emerged by the results, some oil platforms could become wind or photovoltaic farms aimed to produce green energy near the towns. In addition, some of these assets could become a base for diving and a strategic point for monitoring the marine environment. In this sense, the reconversion of offshore platforms could support the blue growth initiatives by sustaining the growth in the maritime industry as a whole and by harnessing the potential of Europe's oceans, seas and coasts for the creation of blue jobs and the development of local economic. Moreover, socio-economic value can be created through the reconversion of offshore platform by carrying out tourist-recreational initiatives based on sport fishing, aquatic photo reporter, snorkeling, freediving and so on (Sie et al., 2018). Tourism activities, in turn, can help the creation of new jobs related to seafaring and to the enormous range of activities on offer (e.g., health, cultural, creative). Considering the main elements (Tab. 2), it has been observed that there are some PESTLE factors that have a major impact on the outcome of the decommissioning in the short term in terms of potential profitability. So it is crucial to examine which factors are strategically major and which are minor. Once the major factors related to a particular decommissioning project have been determined the next step would be to choose the best possible solution to those factors so that they could be made favourable to Sustainable Development Goals (SDGs) (Assembly, 2015).

According to Roberto Cingolani - Italian physicist and academic who has been serving as Minister for Ecological Transition in the cabinet of Prime Minister Mario Draghi since 13 February 2021: *"...if we want to produce hydrogen immediately on a scale, we must start with blue hydrogen (produced from methane, with the underground storage of waste CO₂). If we want green hydrogen, we immediately need 70 new gigawatts of renewables Otherwise, we have to find other ways"*.

5. Implications, research limits and conclusions

Nowadays, the decommissioning of offshore platforms represents a big and controversy challenge which has acquired always more attention over the years due to its environmental, social, and economic impact. Recently, a sustainable approach to decommissioning has been emerged, based on principles of safety, circular economy, sustainable, and ecological integrity. According to the report "Our Common Future" (1987), the sustainable development can be defined as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* and requires the harmonization of three fundamental elements: economic growth, social inclusion, and environmental protection. In this sense, the decommissioning process could adopt a sustainable perspective and consider the opportunities derived by the application of CE principles to both conserve the environment and create new economic as well as social value. Indeed, the complexity of managing platform end of life activities, the high costs involved as well as the regulatory structure pushes to implement the CE principles during the decommissioning process by hypothesizing to reuse of certain assets and the alternative use or reconversion of these assets in Multi-Use Platforms at Sea (MUPS) (Nassar *et al.*, 2020). According to the concept of circularity and in a prospective of reusing platform' equipment, a MUPS represent an interesting solution for the creation of marine areas in which to start and

develop sustainable and economic activities in harmony with CE and environmental protection which include renewable energy, sea protection, and tourism and recreation initiatives. Therefore, by leveraging on the concept of CE which involves keeping products in use for as long as possible to extract the maximum value from them, there are significant opportunities to unlock the value from the equipment and materials used in oil and gas extraction also.

However, this investigation provides preliminary understandings that pave the way for further examination for a deeper understanding on the decommissioning of oil and gas platforms. The research limitations are mainly related to the case study methodology used for this analysis (Eisenhardt, 1989; Feagin *et al.*, 2001; Yin, 2013) and qualitative methods during the first explorative step, based on in depth interviews on key informants (Tremblay, 1957). In our case, the questionnaire's objectives were to assess the environmental and socio-economic implications of various management options relating to dismissed offshore platforms in the Adriatic Sea (i.e., the Italian context). Therefore, analysis on several international contexts should be carried out to broaden and further generalize the emerged findings. It was tried to reduce this limit using a multi-stakeholder perspective approach in the questionnaire (Tanimoto, 2012). In the next steps it would be needful to expand the enquire through with other other experts in oil and gas industry and international scholars. Furthermore, the interviews with key informants should be redone and expanded (Marshall, 1996) comparing the latest developments of decommissioning strategies and considering the political and environmental choices of governments in line with the objectives of the 2030 Agenda (Colglazier, 2015). Furthermore, Future lines of research could concern the extension of this study in other industries and contexts which are affected by the same issue (e.g., bridges, wind farms, marine turbines, and other structures). Also, it could be interesting to define a sustainable business model (SBM) (Nosratabadi *et al.*, 2019) in the wide context of Circular Economy (Lewandowski, 2016) able to broadly describe how the decommissioning of offshore platforms can create, deliver, and capture values for all its stakeholders without depleting the natural, economic, and social capital it relies on. The evolutionary changes of the current reality, in fact, have pushed to the always more important implementation and evaluation of SBMs that evolve over time within firms and their supply chains, as well as in the marketplace and society (Høgevoid, 2014). In addition, it could be interesting to carry out a PESTLE analysis in the context of the decommissioning. Therefore, this kind of analysis, originally designed as an assessment tool of the external macro environment in which an industry or business operates, could be useful in identifying and understanding the key political, economic, social, technological, legal, and ecological parameters that are likely to affect complex process such as the decommissioning of offshore platforms. It can provide reflections to decision-makers on potentialities or issues that are likely to impact on the success of their initiatives.

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Appendix

(Due to space limitations, the questionnaire will be sent by email on request.)

Websites

<https://bluegrowth-place.eu/>
<https://assomineraria.org/>
<https://www.bsee.gov/>

The Analytical assessment of the relationship between technological aspects of circular economy and smart sustainable cities

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Abstract

Objectives: *The study investigates how smart sustainable city and circular economy concepts are interconnected, both through the systemic perspective and quantitative means.*

Methodology: *After the assessment of state of art to highlight the systemic nature of the connection between a smart sustainable city and a circular economy, we analyze the relationship between the two by operationally quantifying both concepts on the macro level and the level of single components of smartness of circularity. Regression analysis and principal component analysis are adopted as statistical tools.*

Findings: *We find that a significant positive relationship exists between a city's smartness and circularity. The component of a smart sustainable city that seems the most important for the successful adoption of circular economy initiatives is the presence of an advanced ICT infrastructure.*

Research limits: *Analysis is performed for the set of the EU cities. Therefore, the results should not be directly generalizable to the cities outside the EU. Moreover, the indices that operationalize sustainable smartness and circularity are empirically valid but require more in-depth statistical validation.*

Practical implications: *The study suggests that cities' managers and administrators treat a smart sustainable city concept holistically. For example, circular economy initiatives may have a significant indirect effect on implementing sustainable smart city initiatives.*

Originality of the study: *Although the literature treats the two concepts extensively, no attempts were previously made to quantify the relationship between smart sustainable cities and circular economy. We hope this study will shed additional light on the complex systemic nature of the treated domains.*

Key words: *Smart City; Smart Sustainable City; Circular Economy*

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1. Introduction

The development of an urban area is intrinsically related to the rate of its investment in the implementation, use and expansion of modern and smart technologies (European Commission, 2010; Gouvea *et al.*, 2018). The effective disposition and use of smart technologies can increase the innovative growth rate in cities (Gouvea *et al.*, 2018). Furthermore, these technologies are the binding element of sustainability in cities (Gouvea *et al.*, 2018; UNECE, 2015). The role played by smart technologies as ICT, AI, IoT and Big Data (Nica *et al.*, 2020; Bifulco *et al.*, 2016; Quan *et al.*, 2019; Bibri, 2018) in the development of smart sustainable cities cannot be underestimated (European Commission, 2010). Yet, in discussing sustainability and smartness and consequently sustainable practices and smart solutions for cities, we should discern concepts of sustainable cities and smart cities (Treude, 2021). Recent studies endeavor to incorporate sustainability in smart city approaches to smarten up sustainable models used in cities (Al Nuaimi *et al.*, 2015; Batty *et al.*, 2012; Bibri, Krogstie, 2017; Kramers *et al.*, 2014; Neirotti *et al.*, 2014; Shahrokni *et al.*, 2015). One optimal way of doing so is by defining the sustainability pillars of a city and assessing smart technologies' contribution to these pillars.

Moreover, a city's sustainable development is not feasible considering the finite resources and the limited capacity to recycle wastes (Bonviu, 2014). It means the natural reconstruction of resources will not improve substantially. Consequently, we will not guarantee enough and easy resources for future generations (for application of intergenerational justice principles). An economy based on these principles that targets solutions for the issues mentioned above can function as a circular economy. As a traditional vision, circular economy also concerns a production and consumption model based on reusing and recycling materials to contribute to the extension of the product's lifecycle (Awuah, Booth, 2014).

We can also define the circular economy as a regenerative system in which recycling and renewable energy production methods minimize resource input, waste, emission and energy leakage (Geissdoerfer *et al.*, 2017).

The circular economy is beneficial in different areas to create more sustainable processes. In urban development, cities are implementing relevant initiatives to turn them into sustainable circular smart systems. Although the circular economy's application on cities is actively encouraged by many scholars, there is a need to measure and analyze the environmental impacts and correlations (Aceleanu *et al.*, 2019).

Although there are many studies within the state of art assessing the contribution of sustainability on smart cities or the application of circular economy in sustainable development goals, there exist a severe lack of studies that assess interconnection of elements of all these concepts in a concrete manner.

For some of the definitions of a sustainable smart city, circularity is an integral part of the notion. Thus, some researchers might argue that the sustainable smart city includes the concept of a circularity inherently, which means the word *circular* can be left out of the definitions without any substantial loss. However, there are several reasons why the notion of circularity should be emphasized even as a subsystem of a sustainable smart city.

First, even if some sustainable smart city concepts inherently include circularity, this is not the case for all of them, as it does not target circular economy indicators precisely. In their research regarding sustainable smart cities, Kramers *et al.* (2014) argue that only a few of them include explicit environmental sustainability objectives as circularity.

Second, there are real cases of technological cities aiming to become smart cities that have failed to solve circularity issues by means of technology, or even their technological texture has contributed to more intricate sustainability issues (Hotta, Aoki-Suzuki, 2014).

Third, analytical mapping of smart cities initiated by the EU (Mapping Smart Cities in EU, 2014) has found that "smart mobility" is the most common type of smart city's aspect, sharing 21% of all smart initiatives respectively. The other areas of sustainability within the technological perspective are neglected (Janker, Mann, 2020).

Forth, none of the represented smart city concepts sets up a baseline for circularity and its pillars. And while a sustainable smart city concept might deal just fine without defining circularity, the issue becomes even more problematic for a circular smart city (Schipper, Silvius, 2019).

In this article, we argue how circular economy practices are relevant for implementing the Sustainable Development Goals (SDGs) on Smart Sustainable Cities (SSCs).

We present an exploratory analysis of the relationship between the smart sustainable cities concept and circular economy using data on the 393 most populated urban areas within the EU. In this paper, the smart sustainable cities concept is viewed from the perspective of smart technologies like AI, ICT, IoT and Big Data (Nica *et al.*, 2020; Bifulco *et al.*, 2016; Quan *et al.*, 2019; Bibri, 2018). The circular economy is proxied using the most critical elements of circular economy for smart cities' concept (Korhonen *et al.*, 2018; Moraga *et al.*, 2019). Besides enriching the scarce literature on smart sustainable cities, this study yields valuable insights for policymakers in the urban domain on the dynamics of different smart and sustainable development levels and their relationship to circular economy principles for cities within the EU.

2. Theoretical background

2.1 From smart city to smart sustainable city

To outline the smart sustainable city concept is necessary to begin arguing with the smart city's conceptualization.

Upon conducting a literature review, it became evident that there is still no universally accepted definition of the smart city. This situation is also caused by the fact that this concept can be applied in many different areas (Schaffers *et al.*, 2012; Zhuhadar *et al.*, 2017; Chong *et al.*, 2018; Ismagilova *et al.*, 2019). Regarding the objectives of this study, a city is considered "smart" when it has the characteristics of a complex ecosystem (Lusch, Spohrer, 2012) in which sustainable partnerships and cooperation strategies among the main stakeholders must be implemented (Schaffers *et al.*, 2011). This promotes a process of sustainable management of the cities' resources to improve the inhabitants' well-being and quality of life (Bifulco *et al.*, 2016; Pinna *et al.*, 2017; Ismagilova *et al.*, 2019). These considerations are consistent with the definition of smart city formulated by Li *et al.* (2016), who highlight that "Smart cities aim to provide a more efficient, sustainable, competitive, productive, open and transparent place to live." This is also reflected in researches done by Gascó-Hernandez (2018), who believes that "a smart city is an umbrella term for how information and communication technology can improve the efficiency of a city's operations and its citizens' quality of life while promoting the local economy". More specifically, "a city is designated as smart if it balances economic, social, and environmental development and if it links up to democratic processes through a participatory government. SC involves the implementation and deployment of information and communication technology (ICT) infrastructures to support social and urban growth through improving the economy, citizens' involvement and government efficiency" (Yeh, 2017). In this contention, through ICT, it is possible to monitor, understand, verify, evaluate and plan cities, to improve urban sustainability (Bibri, Krogstie, 2017).

From the definitions mentioned above, we can conclude that smart cities aim at a sustainable development, which can be implemented through active participation of the population and exploiting available technologies.

So, smart city and sustainability are interconnected because a non-sustainable city is far from being "smart"; however, concepts of smart city and the sustainable city should not be considered synonymous (Ahvenniemi *et al.*, 2017). As highlighted in the study by Ahvenniemi *et al.* (2017), who take up the definition formulated by Castells (2000), "a city can be defined as sustainable if over time its conditions of production do not destroy the conditions of its reproduction". In this context, since the smart city is considered as a constellation of actors (Treude, 2021), to achieve

sustainability, it is essential to understand all the relationships existing between individuals and, therefore, the social dimension, their activities, and consequently, the economic dimension, the environmental and cultural dimensions (Tregua *et al.*, 2015; Bibri, Krogstie, 2017; Engel *et al.*, 2018; Martin *et al.*, 2018; Treude, 2021). This is consistent with Akande *et al.* (2019), who discussed to implement the concept of the smart sustainable city, stakeholders must use ICT to support environmental sustainability. In this perspective, precise systemic analysis is configured given the fact that the objectives of a system can generate consequences for other systems (Barbier, Burgess, 2017).

Although the environmental and social impact of contemporary cities, regarding the exploitation of resources, the production of waste and the generation of emissions, is proven, to address a dynamic evolutionary co-creation of value adaption of a long-term approach based on sustainability is essential (Bulkeley, Betsill, 2005). Moreover, among the challenges that cities must face is the reconfiguration of land management models and, therefore, of all available resources through participatory governance (Caragliu *et al.*, 2011).

As argued by Akande *et al.* (2019), the principles studies on smart sustainable cities are based on the effects and implication of ICT and infrastructures on urban sustainability (Kramers *et al.*, 2014; Al-Nasrawi *et al.*, 2016), which is possible through the development of integrated frameworks to measure sustainable smartness of cities (Ahvenniemi *et al.*, 2017).

Previous studies have sought to understand the association between smartness and environmental sustainability using regression. Wu and Raghupathi (2018) performed country-level research to examine this relationship and found out that smartness is positively correlated with sustainability and can promote environmental sustainability. However, Higón *et al.* (2017) reported a contrasting result identifying a non-linear relationship between technological development and environmental sustainability in an inverted U-curve shape.

After outlining the state of the art, this study proceeds to measure the effect of the implication of circular economy as a crucial factor of sustainability on a city's smartness.

2.2 *The application of the circular economy models in the smart sustainable city*

As can be inferred from what has been found in the literature, the smart sustainable city qualifies at the concept because, besides the requirements for the smart city, it must be a territorial context that uses ICT and sustainable urban development practices to improve well-being and quality of life of its citizens (Fedele, Romeo, 2020).

To achieve this goal, especially infrastructure digitization should be used to develop circular economy models. Indeed, captured data should be used to identify “potential productive uses of waste streams in real-time” (Martin *et al.*, 2018). On the other hand, it is known that for a sustainable future of cities, the circular economy can be the answer to the challenges that cities face taking into account also the prescriptions published in 2019 by OECD (Bibri, Krogstie, 2017; Bonato, Orsini, 2018; Pevcin, 2019; Yigitcanlar *et al.*, 2019). As indicated by Romano *et al.* (2020), “Many cities are implementing circular economy strategies to maintain a healthy and regenerative economy, while promoting environmental sustainability and liveability. [...]. The circular economy provides precisely the problem context needed for testing, refining, and extending the systems approach in cities. [...]. Cities are concerned with the transition towards the circular economy: first, as already discussed, cities are laboratories for innovation and have the bottom-up entrepreneurial impetus and links to citizens to generate the social, environmental, and economic benefits of such innovations and experimentations, including new forms of businesses and partnerships. Second, in light of the increasing trends of decentralization of public services in OECD countries, subnational governments have greater responsibility for local public services such as transport, solid waste, water, and energy, which are key for the well-being of citizens. Third, governance at the urban level focuses on the realities of the city and the impacts of policies on the lives of citizens”.

Circularity orientation by smart sustainable cities is desirable because of many reasons. For example, waste can be managed to generate new resources; waste can even be transformed into

resources that take on significantly more value than their original value (Thompson, 1979; De Jong *et al.*, 2015; Deakin, Reid, 2018; Yigitcanlar *et al.*, 2019). Circular economic processes can be implemented through reuse, recycling and regeneration of materials, production, use of renewable energy and joint regeneration between cultural heritage and landscape of cities in a win-win perspective. The circular economy applied in smart sustainable cities can be considered “creative” strategy, as it integrates the creation of economic value implemented through consonant interactions between companies, environmental protection, and reduction of social exclusion, starting from the historical-cultural roots.

To achieve these goals, for Romano *et al.* (2020) it would be necessary to apply the 3P model based on:

- coordination between public and private entities including the business world towards the goal of circularity;
- coordination across policies to make sectors complementary through interactions appropriately planned during the design and implementation of urban policies;
- coordination across places because the different territorial contexts (urban, rural, etc.) should not be considered as isolated systems, but as global areas in which materials, resources and products are exchanged.

The same authors highlight that “the variety of actors, sectors, and goals makes the circular economy systemic by nature. It implies a re-thinking of governance models based on multi-stakeholder and multi-sectoral approaches. For the circular economy to happen, policies need to be aligned, stakeholders informed and engaged, legal and regulatory frameworks updated and supportive of innovation. Also, technical, human, and financial resources need to be adequate; new capacities need to be built; and progress and results need to be monitored and evaluated to stimulate economic growth, social well-being, and environmental sustainability (Romano *et al.*, 2020)”.

Also, in the context of the relationship between smart sustainable cities and the circular economy, it is necessary to adopt a systemic approach since a multiplicity of actors, sectors, and goals are involved. In this scenario, interdependencies, circular processes and implemented synergies increase entrepreneurship, resilience and, therefore, the growth and development of smart sustainable cities. Furthermore, smart sustainable cities can be considered as vital systems because they act as dynamic, complex systems, capable of transforming themselves and adapting to the continuous pressure of change deriving from the external environment. They also can modify their physical structure of space, organization and functions, combining infrastructures, services, etc., while maintaining their own identity. To face globalized economic competition, energy needs and ecological-social challenges, smart sustainable cities must envisage synergistic and efficient interactions based on circular economic models that stimulate citizens’ creativity (Fusco Girard, 2013; Yigitcanlar *et al.*, 2019). Keeping this perspective in mind, many European cities have included in their agenda objectives aimed at the transition to the circular economy to reduce systemic entropy through cultural projects aimed at empowering civil society (Talamo *et al.*, 2019).

3. Methodology

To investigate the relationship between an urban center’s propensity towards smart sustainable city initiatives and circular economy initiatives, we devised a quantitative study. The subset of EU cities was selected as the starting point of analysis. We have chosen EU cities mainly for two reasons. Firstly, there is a certain homogeneity on the above-national level in terms of the types of initiatives, usually established in the form of regulations, directives, decisions, recommendations, and opinions (Gargiulio *et al.*, 2013; Paskaleva, 2011; Domenech, Bahn-Walkowiak, 2019, Hartley *et al.*, 2020). Not only the homogeneity is legislative, though. There is also a high degree of cultural homogeneity between the EU Member States due to the geographical proximity and shared burdens of history (Akaliyski, 2017). This is important, as the methodology we propose is not entirely immune to the local background. By removing the problem of heterogeneous contexts, we hope to

make the indices we derive comparable across the countries. Secondly, given the status of “developed countries” detained by most EU Member States (Rozmahel et al., 2013), the EU cities are the proximal candidates for being both sustainably smart and actively implementing circular economy initiatives. To study how those two are interconnected on the macro-urban level, we need to analyze cities currently making substantial progress towards both goals.

A total of 27 countries were selected for the analysis (Great Britain was excluded, given its recent withdrawal from the EU). The dataset we created was built upon the most recent edition of the free-to-use version of the World Cities Database (2020). As stated by the creators of the database, “cities for all non-U.S. countries comes from the National Geospatial-Intelligence Agency. [...] The basic population data comes from Natural Earth Data” (World Cities Database, 2020). Overall, we identified 4804 cities within the EU. The number is not exact, as different countries usually have different legislative criteria for distinguishing cities from minor urban centers (Macionis, Parrillo, 2004). Also, it is not clear what criteria were adopted by the database creators to define a city. The issue is, however, not substantial. Out of 4804 cities of the EU, we selected only the urban centers with over one hundred thousand inhabitants as the analysis’s starting point. We recognize this may seem like an arbitrary criterion, and some critical high-tech cities might have been left out of the analysis. However, as most technological innovation and adoption usually happens within larger urban realities (Makkonen *et al.*, 2018), the cut-off point of one hundred thousand inhabitants is not without a strong rationale. 393 of such cities were identified in the EU.

The additional gathering of data was performed through the Google Scholar service. For each city with over one hundred thousand inhabitants, we perform a set of Google searches. All the searches were performed with the ‘in title’: specifier to obtain the results only when a search term appears in the title of academic papers and other related scientific literature.

We first searched a city’s name only. As a result, we obtained for each urban center an approximate number of all academic papers and other related scientific literature that contains that city in its title. We denoted this result as the variable named “all Google results for a city”. Then, for each city, we performed additional Google Scholar (‘in title’: searches by looking for a city’s name paired with a specific keyword (or a key phrase in most cases). Each keyword identifies a specific technological component of a smart sustainable city or a particular circular economy element. We identified five keywords for a smart sustainable city (Smart City, Internet of Things, ICT, Big Data, Artificial Intelligence) and four keywords for a circular economy subset (Circular Economy, Waste Management, Renewable Energy, Recycling). While the latter denotes the most critical elements of circular economy (Korhonen *et al.*, 2018; Moraga *et al.*, 2019), the former identify the most frequently implemented technologies in smart sustainable cities (López, Bolívar, 2018). We denoted the number of Google Scholar results for each of those searches as a set of variables denominated “all ‘keyword’ Google results for a city”, where ‘keyword’ is a specific keyword (or a key phrase) among the nine above mentioned. To determine particular indices that measure a city’s performance in the core aspects of sustainable smartness and circular economy, we applied for each of 393 cities the following set of formulas:

$$\text{'keyword' index} = \frac{\text{'keyword' Google results for a city}}{\text{all Google results for a city}}$$

The result is the set of indices (Artificial Intelligence index, IoT index, Waste Management index, etc.) measuring how well a particular city is doing in those aspects of sustainable smartness and circular economy. Lastly, “Smart City Google results for a city” and “Circular Economy Google results for a city” variables do not capture the amount of academic interest towards specific components of a city’s sustainable smartness and circular economy. However, they serve to identify an additional number of articles related to both smart sustainable city and circular economy aspects of an urban center, to count the articles not identifiable by the specific keywords. Meanwhile, to not further complicate the exposition, we choose not to rewrite the above expression specifically for the two.

To quantify the general predisposition of a city towards smart sustainable city initiatives, we applied the following formula:

$$\text{Sustainable Smartness index} = \frac{\sum \text{'smart sustainable city keyword' Google results for a city}}{\text{all Google results for a city}}$$

Where ‘smart sustainable city keyword’ Google results for a city represent the number of search results on Google Scholar for a particular sustainable smart city-related keyword (Smart City, Internet of Things, ICT, Big Data, Artificial Intelligence) paired with a name of an urban center.

To quantify the general predisposition of a city towards circular economy initiatives, we applied the following formula:

$$\text{Circular Economy index} = \frac{\sum \text{'circular economy keyword' Google results for a city}}{\text{all Google results for a city}}$$

Where ‘circular economy keyword’ Google results for a city represent the number of search results on Google scholar for a particular circular economy-related keyword (Circular Economy, Waste Management, Renewable Energy, Recycling) paired with a name of an urban center.

To eliminate cities that may create a significant distortion from the dataset, we calculated the two macro-indices only when the sum of the five ‘smart sustainable city keyword’ Google results for a city and four ‘circular economy keyword’ Google results for a city variables was more or equal to four. The cut-off point was not arbitrarily set but came from an empirical observation that when the number of Google Scholar search results was small for the variables in the numerator and denominator of Sustainable Smartness and Circular Economy indices (which was often the case for less known urban centers), the results were distorted in an upward manner, inflating the significance of a city for its sustainable smartness or circular economy initiatives. Out of the initial 393 cities, the two macro-indices were calculated for 193 cities. For each city, we considered its population, the two macro indices of Sustainable Smartness and Circular Economy, and the nine indices related to the individual components that contribute to a city’s sustainable smartness and its circular economy initiatives.

The indices operationally define sustainable smartness and its components and the extent of circular economy initiatives and their elements for each specific city. The biggest issue here is how closely an operational definition matches reality. They capture more proximally the amount of academic interest towards the different aspects of a city’s sustainable smartness and circular economy. Is academic interest correlated with the actual amount of smart sustainable city and circular economy initiatives? Do cities with a significant presence of academic institutions generate more Google Scholar searches on average? The methodology requires substantial statistical validation.

Nevertheless, an empirical observation revealed that cities with a high Sustainable Smartness index have a substantial amount of ongoing or planned sustainable smart city projects. This is Varna’s case, a Bulgarian seaside city scoring the highest in Sustainable Smartness index. The city is an urban center substantially investing in sustainable smart city initiatives and has a great potential of becoming one of the first real European smart cities (Kostadinova Popova, Malinova Malcheva, 2020). The second “sustainably smartest” city, as defined by the index, is Funchal, the central city in Madeira Island (Portugal), which is famous for its smart projects for tourism (Rodrigues, Virtudes, 2019). The third “sustainably smartest” city of the dataset is Oulu (Finland), commonly recognized as an important innovation center of the EU (Rantakokko, 2012). The same empirical validation applies to the Circular Economy index, with cities in Poland (Zabrze, Wałbrzych) and Croatia (Split, Płock) - two countries that are the common destination of circular economy initiatives of the EU - leading the list (Zielińska, 2019; Smol *et al.* 2020; Andabaka *et al.*, 2018; Sverko Grdic *et al.*, 2020). The weak point of methodology is perfectly captured by Barcelona, which is the city that produced the highest number of Google Scholar results related to

sustainable smartness and is considered one of the leading European cities in terms of its smart cities initiatives (Bakici *et al.*, 2013), but its Sustainable Smartness index is positioned at the end of the first percentile of the related distribution.

Both macro and specific indices have the apparent advantage of being relative and expressed by pure numbers. It makes the comparison between various cities possible while transcending the issue of different units of measurement. By definition, the indices vary in the range between zero and one. Zero denotes a city that has generated no academic literature with a city's name in titles, which operationally defines the lowest possible city's smartness/amount of circular economy initiatives. One represents an ideal case in which all the topics concern either smart sustainable city and its components, or circular economy and its elements among all the academic literature on the city. It operationally defines the highest possible city's smartness/amount of circular economy initiatives.

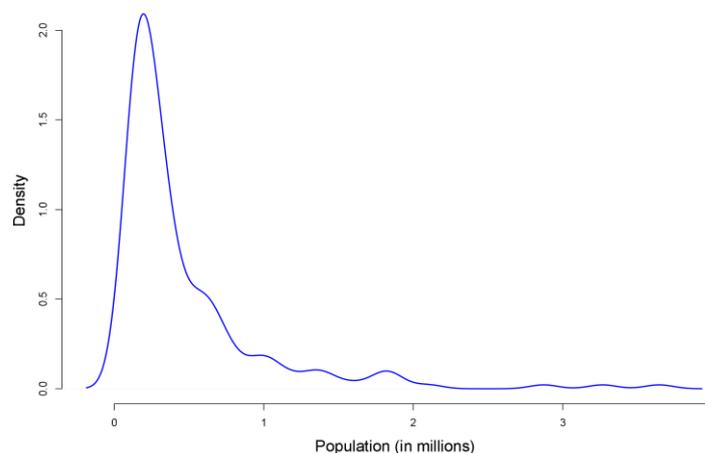
To understand how the indices of Sustainable Smartness and Circular Economy are related, we performed regression analysis. European cities we have chosen to investigate do not come from a random sample, but, according to the methodology, they are the most prospective EU smart and sustainable cities of the future. Therefore, the models proposed in the article are not inferential with regards to all possible variants of urban realities, so any conclusion given here can be applied only to cities in similar contexts and with similar characteristics of major EU cities. On the other hand, not having data coming from a random sample simplifies the analysis, as the distribution of residuals is not conditioned to any set of stringent assumptions.

Finally, to understand how individual components of a smart sustainable city are contributing to the number of circular economy initiatives of a city and how different pillars of a circular economy are related to the city smartness, we analyze the spatial distribution of indices along the two most significant dimensions of principal component analysis (PCA). The results and the discussion are reported in the following sections.

4. Results of the analysis

Out of 193 cities identified as the potential smart sustainable cities with substantial investments in the circular economy of the EU, the majority is populated with one or less than one million inhabitants. The distribution is asymmetrical and right-skewed, with an average number of inhabitants equal to 0.472 million and the median equal to 0.2783 million inhabitants. The kernel density estimation of the cities' distribution according to their populations (bandwidth = 0.09529) is shown in Figure 1 (Fig. 1).

Fig. 1: Kernel density estimation of the cities of the dataset according to their populations

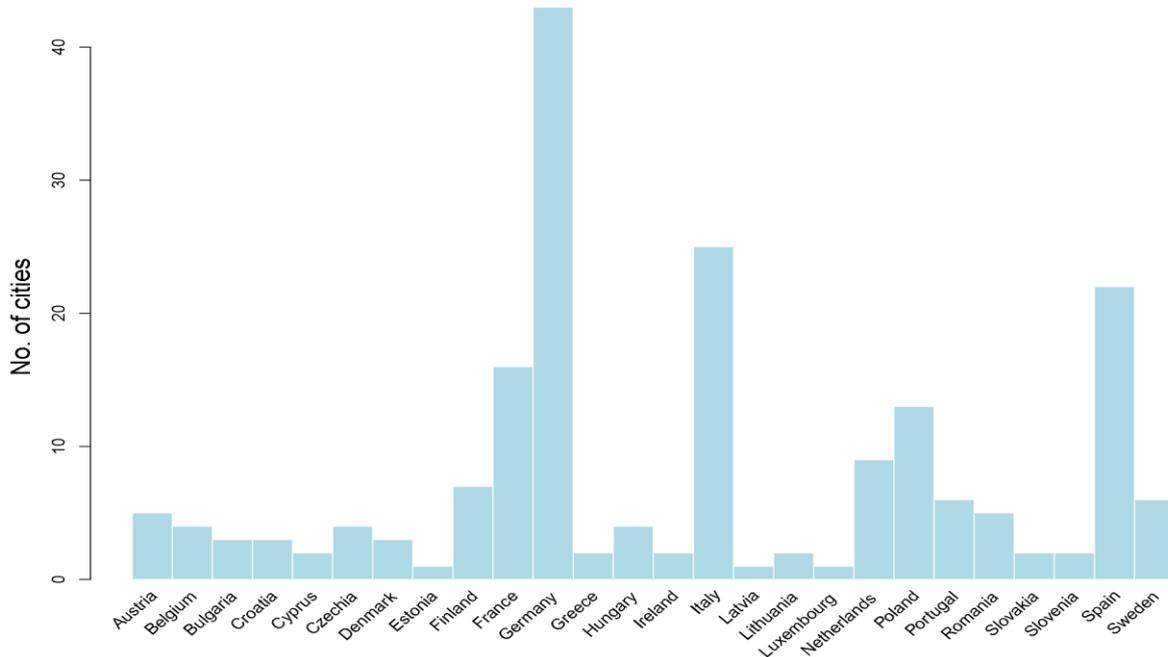


Source: own elaboration

Among all the EU countries contributing to the dataset, most cities are German (43), with Italy and Spain occupying second and third place, respectively (with 25 and 22 cities). However, these

numbers are likely not correlated with the actual amount of smart sustainable city and circular economy initiatives developed in each country. Still, they mainly reflect the EU Member States' geographical and demographical composition and underlying cultural aspects. The bar plot reporting the countries' distribution according to their contribution to the dataset in terms of the number of cities is shown in Figure 2 (Fig. 2).

Fig. 2: Distribution of countries in terms of the numbers of cities in the dataset



Source: own elaboration

A simple linear regression between the Circular Economy index and Sustainable Smartness index was performed.

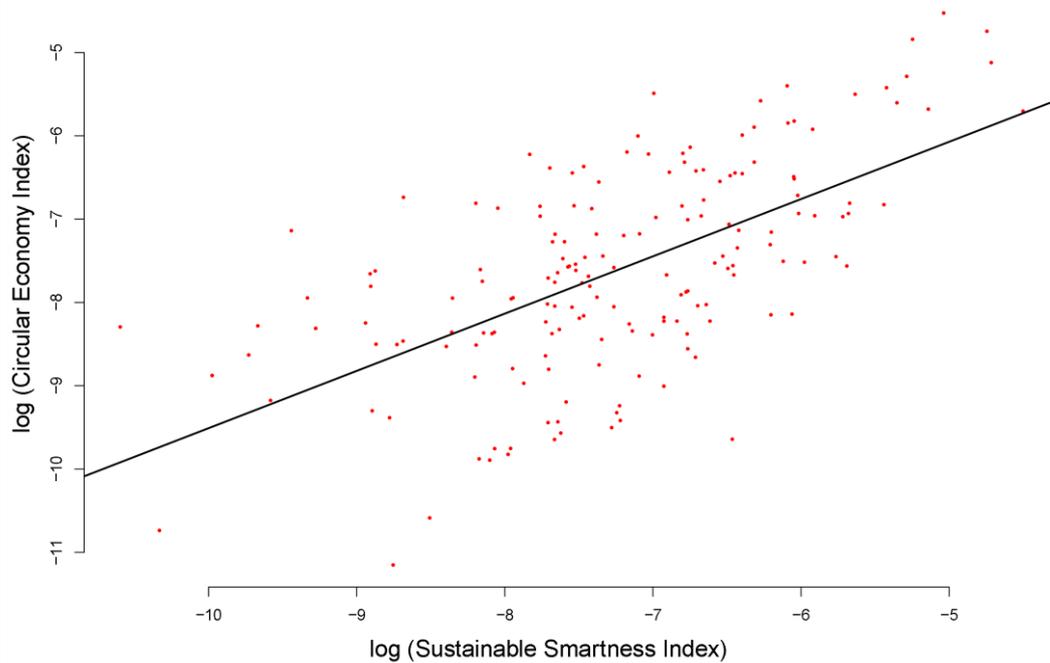
$$\text{Circular Economy index} = 0.0005015 + 0.4571193 * \text{Smartness index}$$

The resulted model revealed the existence of a moderate-to-strong positive correlation between the two indices (p-value for the angular coefficient equal to 2.28e-13). The R-squared index equal to 0.2419 suggests that approximately 24 percent of the Circular Economic index variation is related to the variation of the Sustainable Smartness index. However, due to the relative nature of indices (which vary between zero and one), the above relationship's interpretation is not an easy task. To capture the nested dynamic between the indices, we applied logarithmic transformations to both and then performed another linear regression. The following expression captures the resultant log-log relationship between the indices:

$$\log(\text{Circular Economy index}) = -2.63422 + 0.68755 * \log(\text{Smartness index})$$

The expression, which denotes the relationship between the two indices in terms of elasticity (p-value for the angular coefficient equal to 2e-16), indicates that to have a percentage increase in the Circular Economy index, a 0.68 percent increase in the Sustainable Smartness index is needed. Figure 3 shows the scatter plot and the regression line for the log-log relationship between the indices.

Fig. 3: log-log relationship between Circular Economy index and Sustainable Smartness index



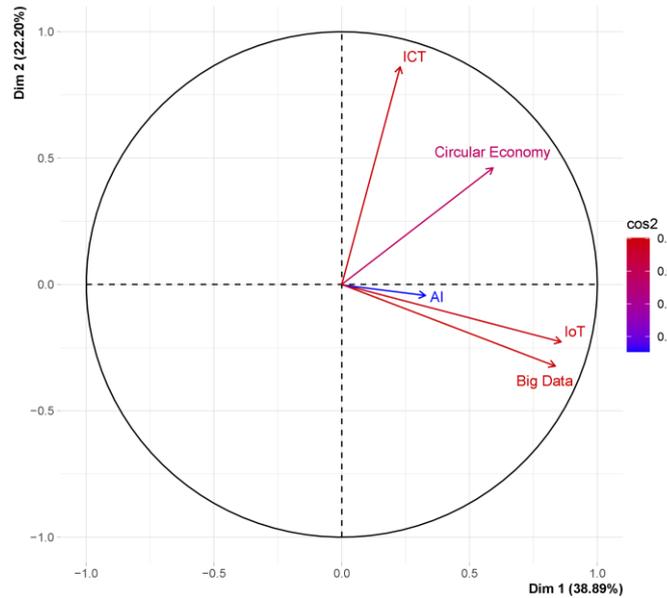
Source: own elaboration

Finally, to understand which components of sustainable smartness contribute the most to the Circular Economy index and vice versa, which elements of the circular economy contribute the most to the Sustainable Smartness index, we performed a principal component analysis (PCA).

Firstly, four specific smart city-related indices (Internet of Things index, ICT index, Big Data index, Artificial Intelligence index) and the general Circular Economy index entered the analysis as active variables. PCA has generated five dimensions, with the first two capturing more than 60 percent of the cumulative variance. Figure 4 (Fig. 4) indicates the PCA graph of variables inside the correlation circle. Coordinates of active variables are the squared correlation ratios between each active variable and the two dimensions of the plane; \cos^2 denotes each active variable's quality of representation on the two most significant PCA dimensions. By analyzing the contribution of variables to the plane's definition, we noticed all of them were positively correlated with the first dimension. Alongside the second dimension, however, the ICT index and Circular Economy index were positively correlated, while others were negatively correlated. The first dimension may be defined as the general propensity towards smart and circular economy initiatives. The second dimension distinguishes specific indices closely related to smart sustainable cities (Artificial Intelligence index, Internet of Things index, and Big Data index), negatively correlated with the second dimension and the more general indices of Circular Economy and ICT. It illustrates that what is important for the proliferation of circular economy initiatives within a city are not the specific technologies like AI, Big Data and IoT, but the general presence of an ICT infrastructure.

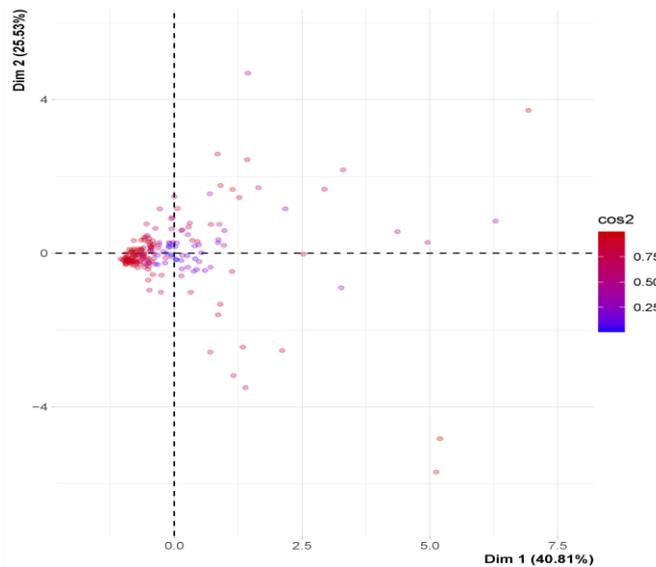
According to PCA, cities on the right side of the graph are overall more innovative from the point of view of sustainable smart city initiatives. The distribution of all the urban centers alongside the two most significant dimensions of the PCA factor map is shown in Figure 5 (Fig. 5).

Fig. 4: Squared correlation ratios between individual components of sustainable smartness and Circular Economy index



Source: own elaboration

Fig. 5: Distribution of individual cities of the dataset along the two most significant dimension of PCA



Source: own elaboration

As seen in Figure 5, most EU cities of the dataset (clustered around the origins of axes) are not doing particularly well (nor bad) in terms of their smart city initiatives. In contrast, many cities (on the right of the vertical axis) are very proactive about what concerns their smart sustainable future.

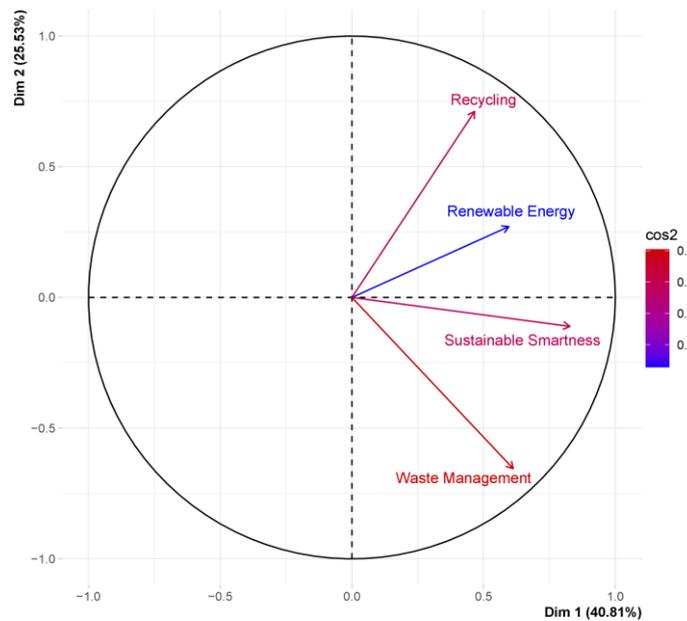
Secondly, three specific circular economy-related indices (Waste Management index, Recycling index, Renewable Energy index) and the general Sustainable Smartness index entered the analysis as active variables. PCA has generated four dimensions, with the first two capturing more than 66 percent of the cumulative variance. The PCA graph of variables inside the correlation circle is shown in Figure 6 (Fig. 6).

Again, all the variables were positively correlated with the first dimension. Over the second dimension Recycling index and Renewable Energy index were positively correlated, while the Sustainable Smartness index and Waste Management index were negatively correlated. The first

dimension may be again defined as the general propensity towards smart and circular economy initiatives. We did not find any specific way of describing the second dimension. However, the important result is that the circular economy's element contributing the most to the sustainable smartness of a city is waste management. Because waste management is such a critical aspect of everyday city life, new smart technologies are addressing it more frequently.

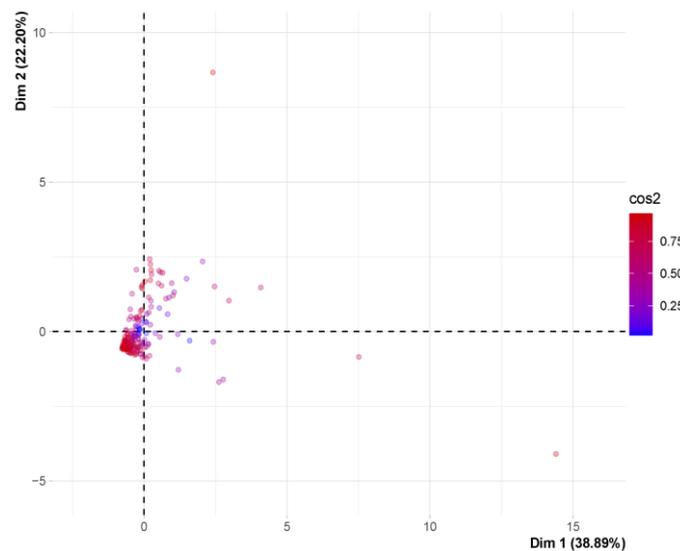
According to PCA, urban centers on the right side of the graph are overall more innovative from the point of view of circular economy initiatives. The single EU cities' distribution alongside the two most significant dimensions of the PCA factor map is shown in Figure 7 (Fig. 7). Most cities from the dataset are clustered around the origins of axes, meaning they are doing neither good nor bad in circular economy initiatives. Some cities, though, are very innovative.

Fig. 6: Squared correlation ratios between individual components of circular economy and Sustainable Smartness index



Source: own elaboration

Fig. 7: Distribution of individual cities of the dataset along the two most significant dimension of PCA



Source: own elaboration

5. Discussion and conclusions

As can be deduced from the results obtained in this study, we might assume that smart cities are also sustainable. Both sustainability and ICT can be viewed as the two enabling pillars of a city's smartness (Bifulco *et al.*, 2016). The opposite is, however, debatable. For example, we may think of a city as environmentally sustainable without relying on a substantial ICT infrastructure. To overcome the issue and shift the focus towards major problems within state of the art, some authors recommend using the term Smart sustainable city (Ahvenniemi *et al.*, 2017). The term elevates both smartness and sustainability on the same conceptual level, making them equally important for the researchers. Too often, the previous research efforts overlook sustainability aspects of urban development, making it the proverbial "elephant in the room." On the other hand, as the first two decades of research on smart cities reveal, the (more "thrilling") technological aspects were treated more often, but those treatments were lacking cohesion and were very heterogeneous (Mora *et al.*, 2017).

Only recently, sustainability issues within a smart city have acquired the necessary attention from scholars. From the suggestions to rescale the studies of smart cities from large urban realities to the eco-friendlier smart villages (Visvizi, Lytras, 2018), the proposals of the bottom-up smart city initiatives "that facilitates participation and collaboration among city stakeholders" (Veeckman, Van Der Graaf, 2015), and the attempts to study the quality of life within smart cities (Coenen *et al.*, 2014), the novel urban literature is blooming with sustainability topics of every kind. The application of circular economy principles to smart cities is undoubtedly part of this bigger trend, as even a brief assessment of the related literature shows (Petit-Boix, Leipold, 2018; Del Borghi *et al.*, 2014; Aceleanu *et al.*, 2019; Schipper, Silviu, 2019).

The developed methodology allowed us to rank the biggest cities of the EU according to the amount of smart sustainable city initiatives and circular economy initiatives. Whether the indices of Smartness and Circular Economy perfectly capture the real situation is left to the further analysis of the "goodness" of fit between operational definitions of smartness and circularity (as defined by both indices) and the reality itself. What mattered for us was to obtain a way to rank the cities in the dataset according to some universal criteria to transcend the variables that only matter within the local context. The indices we obtained through the methodology do not (and should not) be considered the most precise or proximal. This comes as no surprise, once again, given how much heterogenous is the perception of a smart city within state of the art (Yigitcanlar *et al.*, 2018).

Interesting are the results of the regression analysis. The moderate-to-strong positive linear relationship between smartness and circularity reveals how much close the issues of technology and environmental sustainability are connected. It also confirms the assertion of Bifulco *et al.* (2016) about the importance of sustainability for smart cities. Among the specific technological components of a smart sustainable city, only ICT seems closely related to the Circular Economy index. This makes sense, as what seems to count for circularity is the general presence of an ICT infrastructure within the city. As for the contribution of specific components of circularity to a city smartness, only the Waste Management indicator positively correlates with the Sustainable Smartness indicator on both dimensions produced by PCA. This may be because of the critical importance of waste management for a city. Given the importance, the issue is addressed more in the academic papers on AI.

From a managerial point of view, the obtained results imply a set of important implications. Firstly, environmental issues should not be neglected during the planning of smart city initiatives. Those two are, in fact, closely and positively linked. Indeed, it is not uncommon to highlight this relationship by invoking a smart sustainable city concept. Secondly, most big European urban centers are ready to implement circular economy and smart city initiatives; however, only a minority of them scored highly on both indicators. The other ones are clustered near the origin of the axes. From the PCA maps of individual cities, it becomes clear that smartness issues are addressed more frequently than circularity issues. We advise city planners to consider circular economy initiatives more willingly while planning for a city smartness. Not only may it produce

benefits of their own, but given the positive relationship between circularity and smartness, there will be an indirect positive effect on the latter through the implementation of the former. Thirdly, a presence of a well-developed ICT infrastructure will undoubtedly benefit the future circular economy initiatives of a city. While planning for both circularity and smartness, city managers should consider the synergetic relationships between them.

Given that the cities' dataset was not based on a random selection, there is an obvious limitation to the analysis results. The above conclusions and suggestions apply to cities of considerable size in the EU (more than one hundred thousand inhabitants) and are already adopting smartness and circularity initiatives. The generalization of the results is impossible unless the city in question presents similar characteristics of a generic big urban center of the European Union.

Regardless of the good face validity of the indices of Sustainable Smartness and Circular Economy, more in-depth statistical validation of both is needed. Further replication studies should also be performed to assess the reliability of indices. The principal component analysis revealed itself as a good method to uncover the latent relationship between the indices and formulate the model inductively. However, to validate the model, a more formal and structured analysis of its components is needed. This can be achieved in future studies by applying a more formal and standardized statistical framework, like structural equation modeling.

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The logistics functions of packaging: sustainable innovations toward a sustainable supply chain

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Abstract

Objectives of the paper. *The aim of the paper is to investigate the innovation initiatives for a sustainable packaging in a logistics perspective.*

Methodology. *The paper is organized in two parts: a theoretical part, based on literature review on logistics, packaging and sustainability; an empirical one, briefly describing some successful cases of packaging innovations towards sustainability.*

Findings. *Packaging can contribute to achieving the business's sustainable development goals/targets along the supply chain. The preliminary considerations arising from the theoretical and empirical insights underline that there is no one-size-fits-all solution for sustainable packaging, but many elements to be considered and evaluated for a concrete sustainable objective.*

Practical implications. *From a logistics perspective, innovation for sustainable packaging is a potential area of interest not only for the individual firm but for the several actors in a supply chain.*

Limitations of the research. *The paper is a first attempt to briefly explore sustainable packaging and logistics innovation, as a preliminary base for other and wider research.*

Originality. *The paper adopts an original perspective: logistics assumes a key role for sustainable packaging innovation in theory and in practice; that may be of particular interest to both academics and professionals in different sectors and with different roles along the entire supply chain.*

Key words: *Packaging; Logistics; Sustainability; Innovation; Supply chain.*

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1. Introduction

Logistics assumes an innovative role in the processes of adoption, dissemination and enhancement of sustainable practices (Linton *et al.*, 2007), especially in a competitive context that increasingly requires to overcome the “limit” of one’s own company boundaries (Carter and Rogers, 2008), to face a competition that is now between supply chains and no longer between individual economic actors (Christopher, 2005). The importance of the supply chain becomes visible, in particular, in the “exploitation” of resources (Srivastava, 2007), and in the procurement processes that can determine the effective ability of suppliers to adopt sustainable practices (Wolf and Seuring, 2010).

A large body of survey evidence has been gathered to show that companies around the world are taking steps to promote their sustainability through logistics (McKinnon, 2015). Dey *et al.* (2011) identified four reasons why it is important to invest in the environmental sustainability of logistics: brand value, misuse of resources, institutional intervention, and international standards and regulations. Ciliberti *et al.* (2008) developed a taxonomy of the Logistics Social Responsibility (LSR; i.e., the socially responsible management of the supply chain under a cross-functional perspective) practices adopted by firms. The taxonomy involves 47 different LSR practices classified into five areas, namely, Purchasing Social Responsibility, Sustainable Transportation, Sustainable Packaging, Sustainable Warehousing, and Reverse Logistics. Among the managerial practices, companies define and analyse economic, social, ethical, and/or environmental criteria to select suppliers (Ciliberti *et al.* 2008).

Over the years, researchers have shown that, in response to the growing importance of logistics, the evolution of intermediate and final markets, the emerging sensitivity to ethical and environmental issues, packaging has become a key interface in the working relationships among suppliers, producers, distributors and end-users, and in their interaction with the physical context all along the supply chain (Coles *et al.*, 2003). Sustainability-focused initiatives around logistics innovation and the need for change in the use of packaging are combining also with other major industry trends affecting the packaging industry: for example, cost pressures, e-commerce and digitization (in general), and shifting consumer preferences (Berg *et al.*, 2020).

The idea of a “sustainable packaging” has been growing in academia and professional contexts. The concept of sustainable packaging may be connected with a strategic, systemic and holistic view, going beyond a formal - accounting, social (and environmental) - responsibility, imposed by rules and regulations, according to a sustainability that works “toward a triple helix for value creation, a genetic code for tomorrow’s capitalism, spurring the regeneration of our economies, societies, and biosphere” (Elkington, 2018).

Along the supply chain, logistics constantly conveys the life of products/services, from design, through creation, to transport/delivery to the end customer, but also in reverse processes and those relating to the end of life (Verghese and Lewis, 2007; Mollenkopf *et al.*, 2005). The most pressing interest in sustainability from a supply chain perspective is not on individual activities or logistics functions that ensure sustainability requirements at specific points in the supply chain, rather on the sustainability of the entire supply chain; this implies paying particular attention to that “object” that most of all expresses the constant presence of logistics along the entire supply chain: the packaging (Massaroni *et al.*, 2016). As Fitzpatrick *et al.* (2012, p. 5) declare “packaging can contribute to achieving the business’s sustainable development goals/targets”.

Given this background it seems to be interesting and useful to investigate logistics innovations implemented to assure sustainable packaging along the supply chain. Packaging represents a concrete flywheel for the sustainability of the supply chain (Massaroni *et al.*, 2016; Massaroni *et al.*, 2015), and within this perspective the logistic innovations will be analysed in the present paper, fostering a burning topic in professionals area and contributing to the existing academic literature. So that the aim of the research is to identify what are the main innovation initiatives for a sustainable packaging in logistics perspective (RQ).

In pursuit of this aim, the present work is organized as follow: in the next sections we present the conceptual framework that considers packaging (Section 2), and logistics and sustainability (Section 3). Section 4 presents innovation cases and comments on packaging, logistics and sustainability. In the final section (Section 5) some conclusive considerations are presented, including implications, limitations and future directions.

2. Packaging and logistics

Many authors have emphasised the “close relationship between the concepts of ‘packaging’ and ‘logistics’ which focuses on the synergies achieved by integrating packaging and logistics with the potential of increased supply chain efficiency and effectiveness” (Garcia-Arca et al., 2014; Azzi *et al.*, 2012 p. 441; García-Arca and Prado-Prado, 2008; Hellström and Saghir , 2007; Vergheze and Lewis, 2007; Saghir, 2002; Lockamy , 1995; Twede, 1992). Packaging is an integral part of the logistical system and plays an important role in the supply chain (Coles and Kirwan, 2011). So that with the expression “packaging logistics” we refer to the integration of packaging design with logistic management, with a particular emphasis on strategic aspects (Garcia-Arca et al., 2014; Saghir, 2002; Hellstrom and Saghir, 2006).

Packaging fulfils in logistics a fundamental role in assuring the availability of “the right product, in the right quantity, in the right condition, in the right place, at the right time, to the right customer, at the right price” (Shapiro and Heskett, 1985). Such “rules of availability” lead, in today’s competitive landscape, to the formulation of original packaging “complete logistical solutions” (Chapman *et al.*, 2003), oriented to solve “complex process involving different actors to consider, many functions to serve, different requirements to satisfy and conditions to pay attention to” (Hellström and Saghir, 2007). In this sense, the packaging has seen itself as a complex system so that Twede (1992) refers to the “packaging system”, composed by three levels of packaging that can be distinguished (intimately related to logistics) in: primary packaging (or “sales packaging”, or “consumer packaging”), secondary packaging (or “group packaging”, or “distribution packaging”), and tertiary packaging (or “transport packaging”). This explicitly recognises packaging as a hierarchical system, the performance of which is affected also by the interactions between levels, and not only by the performance of each single packaging level (Hellstrom and Saghir, 2007).

In logistics, packaging is recognised as having a significant impact on costs and services (Hellstrom and Nilssonon, 2011): the costs and performance of the logistics system (Ebeling, 1990; Fernie and Sparks, 2004; Gustafsson *et al.*, 2006; Lancioni and Chandran, 1990; Bowersox *et al.*, 2002); and, the efficiency of many logistics activities such as transport and warehousing (Ballou, 2004; Fernie and McKinnon, 2003; Lambert *et al.*, 1998).

Many scholars have highlighted that the principal logistical functions required of this packaging system, in pursuit of optimum efficiency, cost reduction, time saving, and qualitative service performance, are manifold (Friedman and Kipnees, 1977; Paine, 1981 1991; Harkham, 1989; Ebeling, 1990; Paine and Paine, 1992; Twede, 1992; Twede and Parsons, 1997; Lambert *et al.* 1998; Saghir and Jonson, 2001; Soroka, 2002; Hellstrom and Saghir, 2007; Robertson, 2006; Williams *et al.* , 2008; Yam, 2009; Vernuccio *et al.*, 2010). In synthesis they are mainly the following (Vernuccio *et al.*, 2010):

- a) protection and conservation;
- b) transport, handling and storage;
- c) information.

Protection and conservation (a) refers to the primary key function of primary packaging. Packaging, on one side, safeguards the physical, thermal and chemical-bacteriological integrity of the product; on the other side, it prevents injury to the user or damage to the external environment in which the product is used, in case of a hazardous or potentially polluted content.

Transport, handling and storage (b) refers to all the levels of packaging (primary, secondary, and tertiary), that collectively permit and facilitate various operations throughout all the phases and the actors of the production, distributive and consumption processes along the supply chain.

Information (c) refers to the communicative function of packaging. There could be messages incorporated into the materials used: they can deliver both practical instructions to those involved in the movement of goods through the distribution chain, and information about the contents.

The capacity to speed products through the supply chain, especially in the “downstream” segment of the chain (where packaged goods are especially often found) by means of efficient and integrated service-oriented operations, has immediately significant implications for initiatives linked to emerging changes in the end-market, in the productive context, and in the regulatory framework especially in a sustainable perspective (Vernuccio *et al.*, 2010), as described in the following section.

3. Packaging and sustainability

Packaging may have a great importance in achieving sustainable goals and targets (Fitzpatrick *et al.*, 2012). In particular, the environmental impact of packaging has been in the last years an increasingly important issue for businesses (Svanes *et al.*, 2010; Lewis *et al.*, 2007; Verghese and Lewis, 2007; Hellstrom and Nilssonon, 2011; Boz *et al.*, 2020; Nguyen *et al.*, 2020). Min and Galle (2001) stress that when there is a demand for green purchasing, it affects packaging, which in turn affects logistics. Furthermore, packaging influences product development and design, and production. The debate on the impact of packaging on the natural environment has more recently shifted towards a more holistic discussion of the impact of the packaging life cycle throughout the supply chain (Sarkis, 2003). In this way a sustainable packaging is supported through the development of guidelines, standards and scorecards with the following objectives (Fitzpatrick *et al.* 2012 p. 22):

- to recognize the role of packaging and its interaction with the product;
- to encourage the application of Life Cycle Assessment;
- to promote criteria such as efficiency, renewability of materials and recovery after use during the design phase of packaging.

The packaging industry has been under pressure for more than twenty years to reduce the environmental impact of its products considered “bad for the environment” due to the generation of high volumes of waste. In some countries, “take-back” legislation on packaging has made packaging production and planning two critical aspects for “green” logistics (Ciliberti *et al.*, 2008). More in general, governments, on all continents, have responded to public concerns regarding packaging waste, especially single-use packaging waste, and are implementing regulations to both minimize environmental waste and improve waste-management processes (Berg *et al.*, 2020).

It is not the packaging alone to be sustainable, but the packaging-product combination. Moreover, the logistics functions of packaging can play an important role not only regarding environmental impact, but also in the direction of the wider concept of sustainability, based primarily on the three dimensions, termed Triple bottom line (Elkington 1998; 2018): economic, environment, and society. And they may have a crucial importance also considering the entire supply chain and its sustainability (Massaroni *et al.*, 2016).

Thus it is of interesting focus the attention on how logistics functions may contribute to design and implement a “sustainable” packaging. Environmental footprints are by far the most discussed; nonetheless, consideration for the social equity and economic value generated by innovations in packaging systems should also be considered (Azzi *et al.*, 2012). The concept of “sustainable packaging” is growing in international literature, but it is still not easy to univocally define it “due to the multitude of criteria which should be considered, a large variety of packaging materials, as well as the dynamic development of the industry” (Kozik, 2020, p. 3), and with different actors

involved and along the whole life cycle of the products and of the packaging-product combination. In a general view, sustainable packaging “compared to conventional packaging, meet higher environmental, economic and social standards, have better performance and quality features, and at the same time bring new possibilities in the field of the recovery and waste management. These standards should apply to the entire packaging life cycle - from production, through packaging, distribution, transport processes, to use and disposal” (Kozik, 2020, p. 3).

In the academic literature, a well-known definition, one of the first, is given by James *et al.* (2005) and Sonneveld *et al.* (2005), they define the “sustainable” packaging as following:

- adds real value to society by containing and protecting products as they move along the supply chain and effectively supporting conscious and responsible consumption;
- it is designed to use materials and energy as efficiently as possible for the entire life cycle of the product;
- it is composed of materials that can be recycled several times (through natural or technical systems), thus minimizing the degradation of the material and / or the use of additives;
- is made up of components that pose no risk to human health or natural ecosystems.

Most of all, researchers trying to describe sustainable packaging usually refer to definitions developed by non-profit organizations (Kozik, 2020). Institutions and associations at global level have made several attempts to define sustainable packaging (see Table 1), and the main contributions have been obtained from the following organizations (Massaroni *et al.*, 2016):

- Sustainable Packaging Alliance;
- Sustainable Packaging Coalition;
- Consumer Good Forum Sustainability Pillar;
- Europen - The European Organization for Packaging and the Environment.

Tab. 1: Definitions of sustainable packaging (from Massaroni *et al.*, 2016).

Source	Definition
Sustainable Packaging Alliance, Sustainable Packaging Framework (http://www.sustainablepack.org)	<ul style="list-style-type: none"> • Effective (fit for purpose) • Efficient (minimal use of materials, energy, water) • Cyclic (generates minimal waste) • Safe (non-polluting and non-toxic)
Sustainable Packaging Coalition, Definition of Sustainable Packaging (https://sustainablepackaging.org)	<ul style="list-style-type: none"> • Is beneficial, safe & healthy for individuals and communities throughout its life cycle • Meets market criteria for performance and cost • Is sourced, manufactured, transported, and recycled using renewable energy • Optimizes the use of renewable or recycled source materials • Is manufactured using clean production technologies and best practices • Is made from materials healthy throughout the life cycle • Is physically designed to optimize materials and energy • Is effectively recovered and utilized in biological and/or industrial closed loop cycles
Consumer Good Forum Sustainability Pillar, Global Packaging Project. A global language for Packaging and Sustainability (https://www.theconsumergoodsforum.com/)	<ul style="list-style-type: none"> • Designed holistically with the product in order to optimise overall environmental performance • Made from responsibly sourced materials • Able to meet market criteria for performance and cost • Manufactured using clean production technologies • Efficiently recoverable after use • Sourced, manufactured, transported and recycled using renewable energy
EUROPEN - The European Organization for Packaging and the Environment (http://www.europen-packaging.eu)	<ul style="list-style-type: none"> • Be designed holistically with the product in order to optimise overall environmental performance • Be made from responsibly sourced materials • Be designed to be effective and safe throughout its life cycle, to protect the product • Meet market criteria for performance and cost • Meet consumer choice and expectations • Be recycled or recovered efficiently after use

Many other organizations interested in sustainability are developing definitions, measures and standards for a sustainable packaging, as, citing some of them:

- International Standards Organization;
- Ecr Europe (Efficient Consumer Response).

In Italy also this approach is valid: the Italian Consortium of Packaging (Consorzio Nazionale Imballaggi - CONAI) and the other Consortia, the Italian Institute of Packaging (Istituto Italiano Imballaggio) and other no-profit organizations give their overview and definitions on the topic. Some of them in particular are engaged in the promotion of innovative concrete solutions implemented by different companies towards a sustainable packaging, showing successful cases of implemented sustainable innovations in their Websites, publications and prizes, some of which are described in the next section.

4. Packaging, logistics and sustainability: cases of innovations and some preliminary insights

From a logistics perspective, packaging innovation is a potential area not only for the individual firm but for several actors in a supply chain (Hellstrom and Nilssonon, 2011). The intense level of innovation in packaging, which is particularly noticeable in the retail grocery sector, has driven in this direction by changes in patterns of consumption behaviour; lengthening distribution chains; new materials and technologies; environmentalism; regulation; and the obligations of corporate responsibility (Vernuccio *et al.*, 2010 p. 333).

In Vernuccio *et al.* (2010), the authors described packaging as a strategic tool that merits holistic management that consider its multidimensional nature-in terms of marketing, logistics, and ethics – in a more integrated approach. Along this direction they analyse by quantitative content analysis several cases of packaging design. In Hellstrom and Nilssonon (2011), the authors described the need to consider packaging as a strategic component, which contributes to overall supply chain performance. They apply an in-depth case study that was conducted at a large global retailer implementing an innovative unit load carrier.

Arising from the considerations from Vernuccio *et al.* (2010) and Hellstrom and Nilssonon (2011), it is possible to declare that packaging innovations towards sustainability can go in many directions. In a different way from the authors mentioned, in particular here we focus on the logistical aspects, referring to the key functions of logistical packaging (before described), and considering the three levels of packaging simultaneously; and we focus on several cases from different sectors.

Here we briefly consider packaging “innovation” as a “discontinuity” (Garcia and Calantone, 2002) that refers to a new product design, new product features, new benefits in terms of quality, and/or new processes; and where “new” is not necessarily new in absolute, but it could be an improvement for the specific packaging investigated (Vernuccio *et al.*, 2010 p. 334).

4.1. Methodological approach

Aiming at exploring this emerging topic of the innovation initiatives for a sustainable packaging in logistics perspective, we have decided to proceed with a restrict setting of investigation, as a preliminary base for other research.

To answer the research question, an exploratory case study approach is used. The case study approach is a useful instrument for this empirical part of the research, that explores an area where theory is developing, and this approach, more than other methods, facilitates an in-depth understanding of complex phenomena (Eisenhardt, 1989; Ellram, 1996; Yin, 2003). It also provides a better understanding of events regarding concrete context-dependent knowledge (Andersen and Kragh, 2010; Flyvbjerg, 2006; Ridder, 2017) such as the case investigated in the present paper. The technique of analysis used in this research is based on a descriptive investigation that provides an overview of the current state of the business decisions and innovations at the base of the logistics packaging. This is not limited to a static description of the business initiative, rather, it represents a starting point for new solutions with a future-looking approach.

Cases are selected from the CONAI database entitled “Successful cases” of eco-design prevention. The CONAI’s purpose aims to raise awareness on prevention topic for all the supply

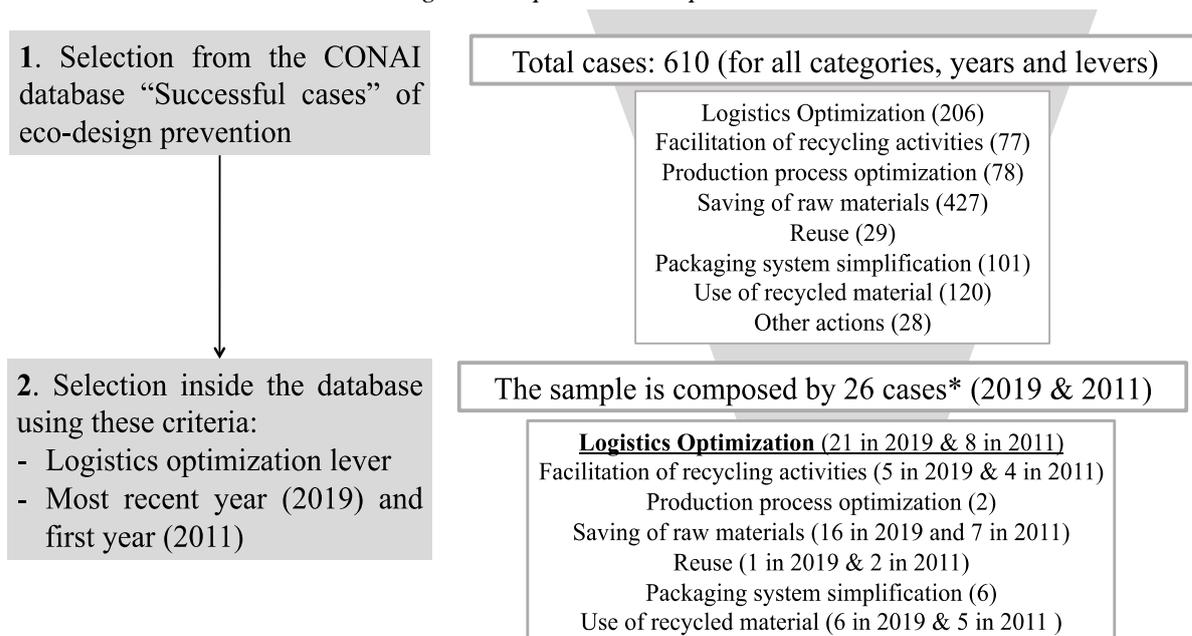
chain, from producer to consumer, to realize the transaction toward both circular economy criteria and sustainable development goals (www.conai.org). Prevention for CONAI is a set of policies, programs and best practices, taken before a substance, material or product has become waste. In reference to packaging solutions, one of the most important challenges is to minimize environmental impacts with a life cycle approach (www.conai.org). Following this direction, the Consortium presents a consultable showcase of the range of virtuous packaging materials on the Italian market in the last years (<https://www.conai.org/prevenzione-eco-design/casi-di-successo-conai/>).

From a total numbers of cases of 610, referring to all the categories (liquid food, solid food, personal care, domestic detergent, container ideas, ideas for abroad, other areas), years (from 2011 to 2019) and levers (logistics optimization, facilitation of recycling activities, raw materials saving, optimization of production processes, reuse, simplification of the packaging system, use of recycled material, other), 29 cases have been obtained in the respect of the two criteria of selection (see Figure 1):

- logistics optimization lever;
- most recent year (2019), with 21 cases, and first year of the initiative (2011), with 8 cases.

The final sample is 26 because 3 cases (2 cases in 2019 and 1 case in 2011) on the same projects are not included in the analysis.

Fig. 1: Sample selection process.



*(3 cases on the same projects are not included in the sample)

For each of the selected cases we reported the following information, arising from the database: case number, name of the case, description of the case, year, sector, type of material; and, the prevention levers of logistics optimization, facilitation of recycling activities, raw materials saving, optimization of production processes, reuse, simplification of the packaging system, use of recycled material, and the results of the life cycle analysis (simplified LCA) of the packaging, according to the three environmental indicators of CO₂ emissions, energy consumption and water consumption. Another indicator, recently introduced in the database, is MPS (Materia Prima Secondaria generata-Generated Secondary Raw Material). Evaluates the quantity of secondary raw material that can be generated by the enhancement of packaging at the end of its life, considering the average Italian scenario. This material can thus re-enter as a raw material within another production process. The higher this value, the greater the amount of Secondary Raw Material generated.

The data that was collected was analysed through qualitative content analysis and frequency analysis. The collected information are described in the following section and organized into different tables that present the main results.

4.2. Results

Table 2 shows the cases and their main characteristics referring to year 2019.

Tab. 2: Innovation packaging cases – year 2019 (from CONAI).

N	CASE	DESCRIPTION	YEAR	SECTOR	MATERIAL
1	Floor tiles 80 × 80	The intervention carried out on the packaging system of the 80 × 80 tiles involved the reduction of the polystyrene protection elements, therefore reduced in weight (-83%), and the optimization of logistics with a greater quantity of product transported on the pallet (+ 25%).	2019	Other areas	Paper/plastic
2	Full lid for apple crate Try Pack Cover	The intervention was carried out on the corrugated cardboard lid of the apple box. Production waste has been reduced by 49%, thanks to the optimization of the production process - from double-pass production (rotary printing and fold gluing) to single-pass production on case-makers. In addition, more recycled paper is now used (40% to 72%).	2019	Solid food	Paper
3	HP W9051MC Toner Cartridge	In 2019, HP redesigned toner cartridge packaging for color printers to improve recyclability and optimize the use of raw materials. The weight of the cardboard box has been reduced by 36%, the HDPE side protections have been replaced by elements in 100% recycled paper, thus preferring a single material solution, and the quantity of units per pallet has been increased by 43%. thanks to the reduction of the box size.	2019	Other areas	Paper
4	HP Chromebook 11 G8 Education Edition	In 2019, HP implemented multi-unit packaging for the delivery of business notebooks and workstations. In fact, the products are no longer delivered to B2B clients with single packaging but with a system that contains 5 units. This solution made it possible to optimize the packaging in terms of both raw material savings and simplification and allowed a greater number of items transported on the pallet.	2019	Other areas	Paper/plastic
5	HP LaserJet M1005 MFP	HP is constantly engaged in the search for solutions that can optimize logistics. In this case, the packaging system of the LaserJet M1005 MFP, consisting of the corrugated box, the HDPE bag and the EPS protectors, has been reduced in size. This intervention allowed the saving of raw materials for all components and an increase of 20% of the products loaded on the pallet.	2019	Other areas	Paper/plastic
6	Organic delicate shampoo Bimbi for children	In 2019 the company undertook the reformulation and restyling of the packaging for the Linea Bimbi organic delicate shampoo of the I Provenzali Bio brand: the virgin PP cap has been replaced with one in 100% post-consumer recycled PP; the cardboard box has been eliminated; the secondary packaging was replaced, a corrugated cardboard box with 85% recycled material, with a new 100% recycled FSC certified box; the shape of the bottle has been changed, allowing the optimization of logistics.	2019	Personal care	Paper/plastic
7	Minorca Wall-Mounted Boiler	In order to make the packaging intended for the Minorca model wall boiler mono-material, Fondital now uses a corrugated cardboard box with self-assembling corrugated cardboard protections to replace the PS ones previously used. The intervention saw an improvement in the recyclability of the system and also allowed a reduction in the overall volume of the finished product for sale, with an increase in the number of fully loaded pallets that can be transported on containers. different products made by the company.	2019	Other areas	Paper/plastic
8	Duracell Plus AAA 6 count	The company has modified the primary packaging of the AAA 6 batteries of the Plus and Ultra lines, initially consisting of a blister with a cardboard base and a PET valve. The new simplified solution provides for a single cardboard box with a higher percentage of secondary raw material. The transition to a single material packaging has resulted in an improvement in the recyclability of the same packaging. In addition, the new case, reduced in size, also had a positive effect on logistics.	2019	Other areas	Paper
9	Magellan 3400VSi	The intervention carried out concerns the reduction in volume and weight of the corrugated cardboard box of the counter barcode reader product. Compared to the previous version, the box used is lighter as a filling and protection element, the polyethylene foam elements have been replaced by bubble wrap bags. The reduction in packaging volume has made it possible to load a greater number of packages per pallet, thus optimizing logistics.	2019	Other areas	Paper/plastic
10	Giubbino	The intervention carried out concerns the reduction of the number of corrugated cardboard boxes used for the shipment of goods thanks to the elimination of the hangers that accompanied the product. The shipment of goods to customers (jackets for adults and children) is now carried out without the relative hangers, allowing the use of smaller boxes and a greater number of items transported on the pallet (+ 40%).	2019	Other areas	Paper/plastic

11	Balm cases display box	The intervention carried out concerns the redesign of the display unit containing balsam cardboard boxes consisting, initially, of a base, a lid and a crowner in corrugated cardboard. The new solution is made up of a single cardboard element that can hold 18 conditioner cases instead of 12. In addition to this simplification, the weight of the conditioner case has been reduced by 31%. Overall, the intervention allows to transport 20% more product on the pallet and to reduce process waste, thanks to the optimization of the die-cutting yield of the display (2 pieces instead of 1 on sheet) and of the boxes (24 pieces instead of 16 on sheet).	2019	Personal care	Paper
12	Corrugated cardboard tray for the food industry (12 x 400)	The company has reduced the thickness of the corrugated cardboard tray intended for the canned market by 20%, moving from corrugated cardboard in wave B to one in wave T. This intervention made it possible to save 10% of raw materials and helped to optimize logistics by increasing the number of pieces per pallet by about 20%.	2019	Other areas	Paper
13	Stretch film	Hipac has created a new and innovative technical stretch film in LLDPE, intended for the packaging of industrial products, which combines a reduced thickness of 48%, compared to the film normally used for the same purpose, with the use of 67% of recycled material. The reduction in thickness has allowed for the saving of raw materials, the optimization of logistics, thanks to the increase in the number of reels transported on the pallet, and the decrease in energy consumption during the production process (-35%). In addition, the cardboard core on which the film was wrapped was eliminated, simplifying the system.	2019	Other areas	Paper/plastic
14	“Ecocoating” food tray	Sifa Spa has created a single-material corrugated cardboard food tray, with a silicon-based treatment called “eco coating” that makes the packaging water-repellent. The new solution has replaced the previous tray in paper-based poly laminate (paper + PET + glue) and has been reduced in weight thanks to the reduction in thickness. This last intervention has allowed greater stackability and the consequent increase in the number of primary packaging per pallet.	2019	Solid food	Paper/plastic
15	Bathrobes C2107, C2108, C2109	In 2019, the company replaced the gift boxes of the entire bathrobe, gift set and bib line, originally in glossy printed cardboard with a glossy finish and now in printed cardboard only. The intervention also resulted in a reduction in the height of the packaging box, with a consequent reduction in weight (-17%). The transparent window is unchanged in weight, but a substitution has been made from PVC to PP + PET poly laminate. The reduction in volume made it possible to optimize logistics with a greater number of packages per package and per single transport.	2019	Other areas	Paper/plastic
16	Double corner shelf for Twinnny shower	The intervention carried out concerns the re-design of the packaging system of the Twinnny double corner shelf for shower which made it possible to reduce the weight of the primary packaging by 53% and the secondary packaging by 58%. The reduction in the volumes of the packaging system has also allowed the optimization of logistics with an increase in the number of shelves transported per pallet.	2019	Other areas	Paper
17	Box for assembly, packaging and storage of Led modules, Genius Box	Luceconcept Srl has redesigned the packaging system for the LED modules. Before, the modules were placed individually in LDPE bubble wrap bags, which in turn were placed in a box with some corrugated cardboard protection elements. The new system consists of a low-density polyethylene foam box with 100 holes for positioning 100 LED modules. The box is used during the assembly, product quality control, delivery and warehouse storage phases at the customers’ premises and at the end of each cycle of use it is reused for a new process without having to be regenerated.	2019	Other areas	Paper/plastic
18	Curtain accessories	BB Line continued with the creation of new packaging for the Leroy Merlin curtain accessories line which includes numerous models. The previous solution was composed of a sheet of cardboard and a PVC valve. For the new packaging, the valve has been replaced by a thin polyurethane strap that fixes the accessories, contained in a polypropylene bag, to the cardboard. This change has improved the recyclability of the packaging system, has allowed an overall saving of raw materials of 82% and has doubled the number of products transported on standard pallets.	2019	Other areas	Paper/plastic
19	Fusilli bio	New display package for Organic Pasta: the intervention involved the replacement of an American crate with a tray system with lid, ready to be placed on the shelf with the function of display. This intervention has brought practical benefits for the operators of the points of sale, has allowed the optimization of the loading operations of the shelf, the optimization of logistics, improving the containment of the pallet (+ 7% of transported product), and the saving of materials. first, as the new display weighs 11% less than the previous box.	2019	solid food	Paper

Table 3 shows the cases and their main characteristics referring to year 2011.

Tab. 3: Innovation packaging cases – year 2011 (from CONAI).

N	CASE	DESCRIPTION	YEAR	SECTOR	MATERIAL
1	Scorritenda 4	BB Line, in collaboration with Leroy Merlin, has created the packaging for curtain rails that allows an overall raw material saving of 16% and an increase in the percentage of recycled material for the cardboard which goes from 95% to 100%. Finally, the smaller footprint of packaged products has allowed for an important optimization of logistics	2011	Other areas	Paper/plastic
2	Scorritenda 2	The new packaging solution, proposed by BB Line in collaboration with Leroy Merlin, reduces the overall use of raw material by 35% by offering curtain accessories directly attached to the cardboard, eliminating the previously used PVC valve. The cardboard used is made with 100% recycled paper (previously it was 95%). Finally, the intervention carried out allowed an 80% increase in the number of products transported on standard pallets.	2011	Other areas	Paper/plastic
3	Scorritenda 1	BB Line, in collaboration with Leroy Merlin, has created a new packaging for the awning accessories line which includes numerous models. The previous solution consisted of a sheet of cardboard, containing 95% recycled paper, and a PVC valve that contained the curtain rails. For the new packaging, the valve has been replaced by a thin polyurethane strap that fixes the curtain rails to the cardboard, now made from 100% recycled paper. This modification allowed an overall saving of raw materials of 45% and an increase of 50% of the product transported on standard pallets.	2011	Other areas	Paper/plastic
4	Transparent case for hair dye	The intervention carried out by Cristina The Transparent Packaging concerned the replacement of the material for the realization of the hair dye case. Initially made of PVC, the packaging is now produced in PET of which 85% is recycled. The carton has also been reduced in weight (almost -2% compared to the previous version) and, thanks to the technical characteristics of PET and the technologies used in the production processes, it is thinner, favoring a load on the pallet greater than 5. %.	2011	Domestic detergent	Plastic
5	Natural mineral water	Fonte Spa has redesigned the 2-liter Milicia natural mineral water bottle, intervening both on the primary packaging (overall weight reduction of 7.5% considering bottle-label-cap) and on the secondary / tertiary packaging (reduction of 20% of the weight of the film per bundle and reduction of 24% of the weight of the film used for palletization). Furthermore, the new bottle design has made it possible to obtain an improvement in logistics activities thanks to the increase in the number of packages on the pallet.	2011	Liquid food	Paper/plastic
6	Window cleaner - bathroom cleaner	Interchem Italia has redesigned the packaging system of the glass cleaner, proposing a solution with refill containing the concentrated detergent to be diluted with water (the diluted refill is equivalent to 750 ml of product). The consumer uses the trigger bottle several times to dilute and subsequently use the detergent, favoring the reuse of the packaging. This intervention, which also concerned the bathroom detergent reference, also allowed a reduction in the weight of the container by over 70% and an optimization of logistics.	2011	Domestic detergent	Paper/plastic
7	Floor display GPP Industrie Grafiche Srl	GPP has created a new reusable floor display, with the same weight compared to the previous version. To create it, he studied a system so that the crowner and the column can be replaceable, as elements subject to change of graphics according to promotions, while the central body of the exhibitor, maintaining a universal graphics, can be reused. In this way, complete reprinting is avoided, while also obtaining benefits on logistics.	2011	Other areas	Paper

The description shows how the innovation project has been implemented, in particular with a focus on the logistics optimization lever. The main area represented is “other areas” (14 cases), solid food (3 cases), and “personal care” (2), in 2019; and “other areas” (4 cases), “domestic detergent” (2 cases), and “liquid food” (1), in 2011.

“Materials” refers to paper (7) and paper/plastic (12), in 2019; and paper (1), plastic (1) and paper/plastic (5), in 2011. This underlines how most innovations take into consideration paper packaging, a material that is widely used and extremely interesting from the point of view of reuse and recycling.

Table 4 shows the levers combined to the logistics optimization one in 2019, and Table 5 shows the levers combined to the logistics optimization one in 2011.

Facilitation of recycling activities lever is combined with the Logistics optimization lever 4 times in 2019, and 3 times in 2011 (7 in total); Raw materials saving lever 15 times in 2019, and 5 times

in 2011 (20 in total); Optimization of production processes lever 2 times in 2019, and it is null in 2011 (2 in total); Reuse lever only 1 time in 2019, and 3 times in 2011 (4 in total); Simplification of the packaging system lever 6 times in 2019, and it is null in 2011 (6 in total); Use of recycled material lever 5 times in 2019, and 4 times in 2011 (9 in total).

This information underlines how companies and retailers have mostly focused on reducing weight and materials usage to enable them to lower their packaging costs, but it is needed also a wider approach to go far beyond traditional light-weighting initiatives (Berg *et al.*, 2020). Referring to levers of Optimization of production processes and Simplification of the packaging system it is possible to say that in 2011 there were not at all considered in those cases, but in 2019 they seem to become more important: that could be a good point because they are related to a more “holistic” approach on the innovation, focused on processes and systems.

Table 6 presents the main results of the LCA (Life Cycle Analysis) and MPS (Materia Prima Secondaria generata-Generated Secondary Raw Material) in 2019. and Table 7 presents the main results of the LCA (Life Cycle Analysis) in 2011, MPS is not reported. This point on MPS analysis could be interesting, because more recently new instruments and methods with an attention to the sustainability of packaging are going to be introduced.

Tab. 4: Levers of the innovation packaging cases – year 2019 (from CONAI)¹.

N	Logistics optimization lever	Facilitation of recycling activities lever	Raw materials saving lever	Optimization of production processes lever	Reuse lever	Simplification of the packaging system lever	Use of recycled material lever
1	1	0	1	0	0	0	0
2	1	0	0	0	0	1	1
3	1	1	1	0	0	0	1
4	1	0	1	0	0	1	0
5	1	0	1	0	0	0	0
6	1	0	1	0	0	0	1
7	1	1	0	0	0	0	0
8	1	1	0	0	0	1	1
9	1	0	1	0	0	0	0
10	1	0	0	0	0	1	0
11	1	0	1	1	0	1	0
12	1	0	1	0	0	0	0
13	1	0	1	1	0	1	1
14	1	0	1	0	0	0	0
15	1	0	1	0	0	0	0
16	1	0	1	0	0	0	0
17	1	0	1	0	1	0	0
18	1	1	1	0	0	0	0
19	1	0	1	0	0	0	0

Tab. 5: Levers of the innovation packaging cases – year 2011 (from CONAI)².

N	Logistics optimization lever	Facilitation of recycling activities lever	Raw materials saving lever	Optimization of production processes lever	Reuse lever	Simplification of the packaging system lever	Use of recycled material lever
1	1	1	1	0	0	0	1
2	1	1	1	0	0	0	1
3	1	1	1	0	0	0	1
4	1	0	0	0	1	0	1
5	1	0	1	0	0	0	0
6	1	0	1	0	1	0	0
7	1	0	0	0	1	0	0

¹ 0 is absence, 1 is presence.

² 0 is absence, 1 is presence.

Tab. 6: LCA in the innovation packaging cases – year 2019 (from CONAI)³.

N	LCA - CO2	LCA - Energy	LCA - H2O	MPS
1	<	<	<	0
2	=	<	<	0
3	<	<	<	1
4	<	<	<	0
5	<	<	<	0
6	<	<	<	0
7	<	<	<	1
8	<	<	<	1
9	<	<	<	0
10	<	<	<	0
11	<	<	<	0
12	<	<	<	0
13	<	<	<	0
14	<	<	<	0
15	<	<	<	0
16	<	<	<	0
17	<	<	<	0
18	<	<	<	1
19	<	<	<	0

Tab. 7: LCA in the innovation packaging cases – year 2011 (from CONAI)⁴.

N	LCA - CO2	LCA - Energy	LCA - H2O	MPS
1	<	<	<	-
2	<	<	<	-
3	<	<	<	-
4	>	<	<	-
5	<	<	<	-
6	<	<	<	-
7	<	<	<	1

All the cases present a better impact after the packaging innovation project. Only some of them (4 cases) also have evaluated MPS in 2019, but with good results: a higher value after the innovation initiative, with a positive effect on the amount of Secondary Raw Material generated.

This underlines how a life cycle assessment is a very important process to evaluate environmental burdens associated with a product, by quantifying the energy and materials used and the wastes and emissions released over the entire life cycle (Pauer *et al.*, 2019).

In a supply chain perspective some implications for managers on how to better orient their supply chains to be more sustainable for packaging decisions may arise from these preliminary results. The strategic importance in adopting the supply chain perspective in this area lies in the careful consideration - in all its phases and through all the actors involved - of the different needs of the life cycle of the packaging-product combination, as well as of the packaging as a product itself. In addition, the specific attention to logistics functions allows us not to underestimate the packaging system, and the functionality and quality that it guarantees throughout the supply chain. Sometimes, in fact, although it may seem sustainable, a reduction in the packaging material could be excessive (underpackaging) and along the way be harmful: for example, waste due to deteriorated food or damaged electronic products can have an economic, environmental and / or socially enormously higher than that of packaging waste. The debate about possible innovations in this sense is becoming more and more intense both in the academic and in the business world, this is a manifestation of the relevance of this issue, and also of how much it is a harbinger of further

³ 0 is absence, 1 is presence. < is minor impact after the innovative action.

⁴ 0 is absence, 1 is presence. < is minor impact after the innovative action.

interesting insights that consider not only “punctual” innovations, but also “system” ones that embrace a supply chain management perspective.

These preliminary results have helped at mapping some first insights on data and situations that concern the achievement of innovative and sustainable packaging solutions in logistics area. They may be useful as basis for necessary further investigation and future steps of the research.

5. Conclusive considerations and possible future steps of research

The cases of “logistics packaging” innovations with a view to supply chain sustainability have grown considerably in recent years compared to the previous ones. Some preliminary results the research carried out on sustainable innovations affecting the logistics functions of packaging along the supply chain, in the Italian market, through cases from Conai database are presented in this paper, with a special focus on optimization of logistics (for example, allowing to load a greater number of packages per pallet or by means of transport, and / or improving stackability, etc.). Such innovations:

- they have almost doubled in recent years;
- they are combined with other innovative levers concerning the saving of raw materials, the simplification of the packaging system, the use of recycled material, the facilitation of recycling activities, the optimization of production processes and reuse;
- also show improved results in the context of Life Cycle Analysis - LCA;
- take into consideration a wide variety of product sectors;
- have as their object packaging of different materials, mainly paper, which is widely used and extremely interesting from the point of view of reuse and recycling.

The empirical research carried out could represent the initial phase of an exploratory research. The information collected at this stage hardly lead to the identification of theoretical or managerial implications. However, they could be useful for identifying possible future steps in the research on the topic. We then propose at least some possible future steps that could be follow starting from the preliminary considerations arising from the present paper.

Therefore the considerations arising from the previous theoretical and empirical insights tend to underline that the key implications for a sustainable logistics packaging are at least the following:

1. There is no one-size-fits-all solution that innovators in this field can embrace as they work on strategies for sustainable logistics packaging. According to Berg et al. (2020), there are complexities and trade-offs to consider if they are to navigate through these sustainability challenges in order to find the most effective route to growing and preserving value with application innovations, driving toward sustainability in packaging, but beyond the “quick wins”. Packaging “innovators” towards sustainability need to consider how to help customers innovate and capture opportunities to bridge current sustainability shortfalls (Berg et al., 2020). This could be done clearly benchmark packaging alternatives in terms of sustainability, cost and convenience; fully understanding sustainability requirements; having the right partnerships for innovation and technology to respond to consumer and customer packaging demands going forward.
2. The central idea is that to best implement an innovative packaging project in a sustainable sense, a new business model is needed that involves relationships and collaboration between the different skills that are typical of a network of organizations belonging to the supply chain and not those of a single company: suppliers of raw materials, manufacturers of packaging materials, manufacturers of packaging machines, manufacturers of packaging, companies that use packaging, product design and graphic design agencies, communication agencies, prototyping and engineering organizations, research, logistic service operators, final consumers, operators in the disassembly and rework phase, trade associations, consortia and consumer associations, etc. Only this broader perspective can usefully serve to identify the criteria that allow understanding when and how one pack is preferable over another in terms of environmental, social and

economic impact on the entire production system, throughout its life cycle. This is an approach that could well convey by Consortia and associations of packaging.

The logistics innovations in this direction are crucial, especially in a supply chain perspective, capable to manage reflections and impacts on many aspects and on different actors.

Even if the paper permits some preliminary consideration on the topic, it deserves to be more developed, especially in term of the analysis of the cases. The analysis should be developed including a higher number of cases, representative of a more holistic perspective, considering not only the environmental element, but also the economic and the social ones inside the packaging innovation project.

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The B2B relationship with a quality approach

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Abstract

Objectives. *This paper proposes a qualitative approach, based on heuristics, to assess the quality of B2B relationships between SMEs, according to the Relational Capability (RC) framework proposed by Alves et al. (2016).*

Methodology. *A total of 56 Relationship Quality Descriptors were defined. Each descriptor was extrapolated from the definitions of RC features proposed in the literature.*

Findings. *The proposed approach was applied to the case study of a real relationship between SMEs. The experimental results suggested that it could support the understanding of how specific characteristics of a relationship can affect the success of jointly produced products.*

Research limits. *Further studies are needed to demonstrate the effectiveness of this methodology. The limitation of this approach lies in the lack of weights used in the scoring of descriptors. Because some descriptors or dimensions are probably more important than others, further studies have to be carried out to better analyse mutual relations of the considered RC domains and the respective features, and to understand their relative importance in determining the quality of business relationships.*

Practical implications. *The proposed approach can be helpful to enhance the analysis and understanding of the nature of relationships and underline the aspects most related to power-dependence situations, which may compromise synergy between partners and negatively affect the success of the alliance.*

The originality of the study. *Despite several studies that have attempted to propose constructs and scale items useful to measure the RC, no method has yet been proposed that can support the general evaluation of the RC according to an RC framework.*

Key words: *B2B; business relationship; relational capabilities; business relationship assessment; dyadic relationships; the relationship between SMEs*

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Introduction

Over the past two decades, dyadic relationships and inter-organizational cooperation have become increasingly common as they are considered key factors for business success in an increasingly competitive market (Pagano, 2009; Pham *et al.*, 2017).

Nowadays, relationship development has recently become a central research focus in business management literature and is currently gaining more prominence when addressing the small firm sector (Samouel; 2007).

Dyadic business-to-business relationships play a critical role in today's business success in business-to-business environments. (Anderson et al.; 1994).

Relationship can be defined as a connection between two entities, in our case enterprises, in which an exchange of resources take place (hence Social Exchange Theory), necessary to seize opportunities and to be able to jointly face the challenges proposed by the surrounding environment (Ross and Robertson, 2007).

Business-to-business markets should be viewed as vast networks of interconnected companies that continually interact with one another. (Hakansson and Ford, 2002). This is the so-called "Industrial Network Approach", where companies and their relationships can be viewed as part of a complex network of interconnected relationships (Mengoni *et al.*, 2017).

A business network can be defined as a set of two or more connected business relationships. Each exchange relation is between business firms that are conceptualised as collective actors (Emerson, 1981). According to Cook and Emerson (1978; p. 725), "*a business network is important to measure how an exchange in one relation is contingent upon exchange (or non-exchange) in the other relation*".

In 1959, Thibaut and Kelly coined the Social Exchange Theory by primarily considering dyadic relationships and their group functioning (Carman, 1980; Kelley and Thibaut, 1978).

Social Exchange Theory holds that interaction between individuals can result in mutual support through the exchange of tangible or intangible resources (Homans, 1958). The basic assumption of this theory is that mutual aid serves to keep the relationship strong, and satisfy both partners (Blau, 1968; Homans, 1958).

Social exchange leads to the achievement of alliance goals but also to a strengthening of mutual trust; companies are more committed than ever to maintaining the exchange relationship for the long term (Lamble *et al.*, 2008).

According to Pierantonelli, "*the network shapes relationships, and relationships shape the network: in a network, firms are interdependent*" (2013; p.146). It is impossible to think that a company, taken individually, possesses all the resources necessary to achieve its goals: that is why it becomes important to establish a partnership: the members are interdependent and together they can achieve all the goals set (Baraldi *et al.*, 2012).

Hakansson and Snehota suggests that "*the outcomes of a business relationship can be described in terms of actor bonds, activity links and resource ties between the counterparts*" (1995; p.13). Each layer is interconnected to the others, and each effect is affected by the constellation of resources, pattern of activities and web of actors in the more comprehensive network.

In literature, several models identify the different stages companies pass through to create a value chain. Each model considers each stage as a time-bound process (Mandjak *et al.*, 2015).

Lee and Johnsen reported, also based on studies done by Ford (2011), four stages for relationship building: "*pre-relationship stage, exploratory stage, developing stage, and stable stage*" (2011, p.697). There is no compulsory chronological order: firms can also follow a scattered order, even skipping some steps. However, the basic premise remains the same: there must be a willingness, on both sides, to lend and share their resources and to adapt to the other party (Mandjak et al., 2015). Such adaptations may also increase dependence (e.g. social, cultural, and technical) between the actors, resources, and activities of both parties, as the company's ability to adapt to other actors may reduce (Mengoni *et al.*; 2017).

However, despite the proliferation of strategic alliances, empirical evidence showed that approximately 50% of partnerships do not live up to expectations and consequently fail (Schilke and Goerzen, 2010). In this regard, many researchers have taken steps to understand the factors that explain why some alliances are more successful than others (Cedrola, 2006).

Several studies, including this article, confirm that Relational Capability (RC) strongly conditions alliance goals and success (e.g. Pagano; 2006; Theoharakis *et al.*; 2009; Alves *et al.*; 2016).

This article aims to understand the relational factors on which the success or failure of a partnership depends. A concrete case study is presented to evaluate the quality of the alliance through the qualitative approach proposed by Alves *et al.* (2016), determining the relational dimensions that most influence the partnership's success. The case study presented may be generalisable, especially in the context of SMEs. SMEs are unable to adopt sudden changes to meet the vast and changing demands of the market. It is essential to establish a partnership to solve this problem. With the benefits that an alliance can bring, it will be possible to respond efficiently to market demands. (Ngugi *et al.*, 2010; McGrath, 2008).

1. Research background

Researchers have become increasingly interested in the organizational-level factors that explain why some companies have tremendous success with regard to alliance, and others have less (Cedrola, 2006; Baraldi *et al.*, 2014). Within the literature on alliance that focuses explicitly on collaborative value creation, it is possible to recognise two main research threads (Schilke and Goerzen, 2010).

The first one focuses on individual alliances or dyadic ties among firms, to analyse the impact of various relational and governance aspects that characterise the collaboration on value creation. In particular, much attention has been devoted to exploring the context within which these relationships take place, how firms stay connected and develop business opportunities in a synergic way (Giraldi, 2017; Hahn and Gold, 2014).

The first line of research consists of two fundamental models: sensing, studying the surrounding environment to search for new opportunities, and transformation.

Sensing means paying particular attention to information from the external environment in order to identify potentially valuable new opportunities as well as market demands (Zaheer and Zaheer, 1997). Thus, sensing and studying the environment requires some proactivity on the part of the firm (Sarkar *et al.*, 2001). Once the environment has been explored and the alliance has been forged, it is necessary to renew and adapt the business logic by adjusting it to the partner.

At the beginning of the partnership, the lack of a perfect alignment among its members is to be expected: one can foster such coupling through interaction and adaptation (Doz, 1996). Several researchers (e.g., Helfat *et al.*, 2007; O'Reilly and Tushman, 2007; Zahra *et al.*, 2006) have developed Teece *et al.*'s ideas, highlighting the importance of coordination, learning, sensing, and transformation in a dyadic relationship.

In literature, there are various types of alliances. These relations can be created in either tacit or planned conditions and can be either induced or routine (Aggarwal, 2019; de Leeuw; Gilsing; Duysters, 2019; Rothaermel, 2001; Torkkeli *et al.*, 2019). The tacit alliances are based on spontaneous and routine behaviours in which the company shares and obtains know-how through the partners (Gulati *et al.*; 2000; Rothaermel and Hees, 2007; Zhang *et al.*, 2019).

The induced network relationships focus on the resource requirements of the different firms that participate in the network. The firms aim at reaching their innovation goals by primarily planning long-term, usually cross-industry, network relationship strategies with other firms to obtain access to crucial competencies that they may lack (Adams *et al.*, 2019; Giacomarra *et al.*, 2019).

It is also possible for companies to create collaborative relationships with other companies to add value to the product, to propose an innovative solution or a competitive market offering (Nassimbeni, 1998).

Another type of alliance is the "value-adding partnership", which, as Johnston and Lawrence argue is, "a collection of independent companies working together with the aim of managing the flow of goods and services along the value-added chain" (1988, p.94), thus enabling clusters of small businesses to compete against large, established companies (Ytterhus *et al.*, 1999).

Finally, the "virtual corporation", a transient network of firms that focus on a specific market opportunity and only band together to achieve it, then dissolve the partnership (Bryne *et al.*, 1993).

The other stream of research mentioned focuses on the firm as a unit of capability and skills. It examines the possibility that partnership performance may be motivated by heterogeneity in alliance capabilities and the variability among firms to create and capture value from the alliances (Alves *et al.*; 2016).

Alliances are an opportunity to source needed resources that are typically found outside corporate boundaries (Pas and Teng, 2000).

Know-how transfer turns out to be a strategic key in alliances (Goerzen and Beamish, 2005). Learning from each other within the partnership positively impacts resources and knowledge (Steensma, 1996).

At the same time, the nature and quality of the established relationship play a significant role in the strengthening of a firm's RC because they are idiosyncratic (Espino-Rodríguez and Rodríguez-Díaz; 2008).

So, to explain the reasons for the success of a partnership, it is necessary to analyse the capabilities that partners must put into play to achieve their goals. In particular, several studies evidenced that Relational Capability (RC) strongly influences goals and partnership success (e.g. Pagano, 2006; Theoharakis *et al.*, 2009; Alves *et al.*, 2016).

2. The proposed approach

The approach proposed by Alves *et al.* (2016) is part of this line of research. It is a qualitative approach that aims to assess the quality of business relationships and determine the relationship skills (RC) involved, dimensions that influence the partnership's success (or failure).

The consequent rapid rise of studies in different scientific fields determined a lack of consensus regarding terminology and definition. The definition considered in this report is the study by Alves *et al.* They focused on research carried out in the context of SMEs' networks. They conceptualised RC as the "purposeful creation and combination from shared resources, of structures within and between firms to jointly develop, manage conflicts, promote trust, transfer knowledge and information, with a view to organization value and learning among firms and achieving joint process improvements, adaptations and/or innovations in the inter-organizational cooperation" (2016, pp. 1650012-4). The conceptualisation proposed in Alves *et al.* (2016) is closer to the definition of RC as "strategic/operational capabilities" provided in Kohtamäki *et al.* (2018).

Alves *et al.* (2016) stated that the evaluation of RC in inter-organizational cooperation might identify factors that should be improved in these relationships; if the previous statement is true, the author's opinion that the RC construct could be indirectly used to assess the quality of these relationships. It is possible to assume that the Relationship Quality represents "the potential for improving the different RC dimensions" (Kohtamäki *et al.* 2018).

Based on the results of five studies (i.e. Johnsen, Ford; 2006; McGrath, 2008; Sarkar *et al.*, 2009; Ngugi *et al.*, 2010; Schilke, Goerzen; 2010), the authors proposed an RC theoretical framework based on five dimensions: coordination, culture, knowledge, technology and coadaptation. Each dimension included several sub-categories, called components. Below (Tab. 1), a table with the RC dimensions and components, the relative relationship quality descriptors and their code are presented.

Tab. 1: RC dimensions and components

RC dimensions and components defined by Alves <i>et al.</i> (2016)		Relationship quality descriptors	Code	
Knowledge	Behavioural norms	Partners improve their ability to deal with conflicts and inconsistencies in the relationship.	CUL_7	
		Partners agree to adopt specific behavioural norms	CUL_8	
	Knowledge acquisition	The alliance allows partners to generate knowledge from external sources and absorb new capabilities.	KNOW_1	
		The alliance promotes new and relevant information flows between partners and reduces the time spent searching for information.	KNOW_2	
		The alliance encourages partners to acquire, integrate, share and use knowledge/skills for new co-creations	KNOW_3	
		The alliance results in new business	KNOW_4	
	Communication	Partners undertake formal and informal actions for knowledge creation and control.	KNOW_5	
		Partners successfully integrate their existing knowledge with the information acquired from partners.	KNOW_6	
		Partners are encouraged to improve communication with other players to extract information and increase the likelihood of accessing them.	KNOW_7	
		Partners adopt a structured approach to managing communication.	KNOW_8	
	Rewards and incentives	The alliance experience improves partners' perception about networks as a source of reliable information and as a feasible method for the creation and transfer of knowledge.	KNOW_9	
		Partners adopt/develop specific techniques to facilitate collaboration.	KNOW_10	
		The alliance experience improves partners' perception of the rewards, and the real and apparent risks of participating in partnerships.	KNOW_11	
Partners develop strong and effective resources and capability management skills that enable them to have well-managed or structured resources.		KNOW_12		
The alliance encourages partners to develop bilateral business plans		KNOW_13		
Technology	Technology transfer	The alliance promotes a combination of resources and capabilities of partners to facilitate the development of new products.	TEC_1	
		The alliance promotes the creation of ideas based on partners' abilities of self-reflection by encouraging the identification of bilateral technological needs and the determination of opportunities to combine the technologies available	TEC_2	
		The alliance promotes proficient use of knowledge in production, investment, and innovation.	TEC_3	
	Collaborative innovation	Partners improve their ability to collaborate with other organisations specialised in different areas to facilitate collaborative innovation development and co-creation of value	TEC_4	
		Partners exploit technological opportunities and human resources of partnership towards co-innovation	TEC_5	
		The realisation of co-innovation and collaboration and it allows partners to reduce the time-to-market	TEC_6	
	Technical routines	The alliance allows the construction of strong relational links between partners that make new ideas spread more rapidly and facilitate their development and integration.	TEC_7	
		The alliance allows partners to improve their ability to create custom, integrated value systems.	TEC_8	
		Partners work out effective routines to improve product development	TEC_9	
Coadaptation	Change and solutions	Thanks to the alliance, partners access external resources in pursuit of their opportunities.	COA_1	
		To achieve alliance objectives, partners have to change features and ways of working.	COA_2	
		The alliance results in new and more effective products, processes, and solutions	COA_3	
		Partners are encouraged to identify future opportunities of coadaptation aligned with each other's needs and aspirations.	COA_4	
		To pursue the alliance goals, partners sacrifice short-term benefits (including economic) for long-term ones.	COA_5	
		Partners heavily invest in the adaptation process of network members	COA_6	
		The alliance accommodates changing demands, thanks to—the development of a specific flexible organisational form of the management process.	COA_7	
		Partners have previous experience with partnerships	COA_8	
		Partners are currently involved in other partnerships	COA_9	
	Evaluation		Partners have already built competitive alliance networks	COA_10
			Partners know their needs and requirements	COA_11
			Partners identify opportunities they want to gain and what they aim to achieve thanks to the partnership.	COA_12
		Close relationships	Partners build strong relationships between them	COA_13
			Partners have a strong interest in maintaining close relationships between them, to find and exploit opportunities.	COA_14
			Partners proactively manage the network to strengthen the value ties and expand their business.	COA_15

Source: RC dimensions and components by Alves *et al.* (2016)

The proposed descriptors can be used as heuristics to support expert evaluation of the relationships' quality. For this purpose, at least three experts must be involved in the evaluation. Evaluation can be performed by answering each descriptor using a 1-5 Likert scale (i.e. 1 = strongly disagree; 5 = strongly agree).

The scores related to the components are estimated as the mean of the scores collected by the respective descriptors. Similarly, for each dimension, the score is computed as the mean of scores of the respective components.

The materials used to find information can be found by analysing company documents and archives, organising interviews, surveys or collecting direct/indirect observations.

3. The case studies

In the case study presented below, the RC theoretical framework by Alves *et al.* is applied. The work refers to a partnership between two small Italian companies: Antrox and Nel Design.

Antrox is a small Italian company specialised in providing tailored LED and Cold Cathode lighting solutions. It was founded in Italy (Ancona, Marche Region) in 2000 on the initiative of two business partners. In 2014, the Antrox governance changed: two young partners, respectively in charge of management and marketing strategy, and technical and sales processes, replaced the old ones. The company payroll consists of four employees: an engineer, a salesperson, an IT expert and an accountant.

The cold cathode represents the technology that has provided the most business opportunities; it is highly customisable in terms of shape and colour, but it requires substantial technical knowledge to be realised. Antrox only approached the overall market of LED lighting to bring new business opportunities in 2015.

Antrox is composed of lighting tech designers, who create custom designs based on customer requirements, which lead to the production of highly customised lighting systems.

The production of the solution is carried out by different first-tier suppliers, located internationally. Antrox's customers are primarily distributors of lighting solutions, architect, and contractors. Most of its revenues come from abroad, particularly from extra-EU countries, which alone make up 80% of the total. The company's revenues range from 700,000 Euro to 2.4 M Euro according to the size of the architectures they supply to.

Nel Design is an Italian micro company located in the Abruzzo Region, founded in 2010. It is specialised in polystyrene carving for construction and design purposes. Their products are not simple blocks of polystyrene: they are highly resistant but very lightweight. The company produces objects in any shape at a minimal cost. Two people run the company: one in charge of management and strategy, and the other in charge of technology development. The company also employs three cutting machine operators. Every year, revenues vary from 200,000 Euro to 250,000 Euro.

Nel Design invested highly in technological equipment, most of which is numerically controlled. The company also supports its customers in the design process. In particular, it is an expert in virtual prototyping. Once the final approval comes through, the 3D digital models are sent to production to create tailored shapes, subjected to a coating process to make the structures resistant. The material resulting from this process is called Porotex. Porotex is primarily sold to the construction industry and specifically to specialised companies as outdoor decorations for buildings, and objects for interior design.

The company sells exclusively in the Italian market for reasons related to its lack of capabilities to engage with foreign distributors; the marketing function is not developed, and nobody speaks English.

Antrox and Nel Design not only differ in the type of products they design and produce, but also in turnover (i.e. Antrox: 1 million Euro; Nel Design; 200,000 Euro), sales expansion (i.e. Antrox: 90% foreign customers; Nel Design: 100% customers within 150 km), customers' organisation, personnel skill, and exploited information communication technologies. Instead, they share the

following elements: (a) the manufacturing paradigm they follow, which is based on solid product customisation, and (b) the market sector in which they operate, i.e. architecture and contract furniture.

There are points of convergence between the two companies, identifiable in the intense personalisation of the product and the same reference market (for both architecture and furniture). However, some points of divergence, such as the products sold, are different, as is the turnover generated and the expansion of the sales market (national/local vs global).

The current owners of Antrox and Nel Design have known each other for over 15 years. Looking back, the origins of this business relationship can be traced to an accidental event that took place in 2008. At that time, the Antrox CEO offered consulting services at Policolor, a small polystyrene carving company. This was where they met, and a relationship of mutual respect gradually developed between them. In 2010, the future CEO of Nel Design left Policolor to create Nel Design with a pool of other people. In 2012, after a few years of adjustments, the CEO of Nel Design tried to reconnect with the CEO of Antrox. Nel Design was participating in a project with a contractor to realise turnkey furniture solutions. The CEO of Nel Design asked Antrox to join the project for the lighting part. This time the CEO of Antrox turned down the collaboration, as he was sceptical about the contractor's reliability. But the business relationship eventually got off the ground in 2014. The Nel Design CEO contacted the Antrox CEO again, asking him for help in trying out the idea of inserting led lights into a Porotex shell, and the CEO of Antrox accepted.

The analysis of the business relations between these two firms was divided into two main phases:

1. The first phase was based on a commercial relationship established to produce LED polystyrene lamps.

The final product, called Antrox Lab, however, came up against numerous critical issues: the sceptical attitude of the public towards polystyrene, considered a low-quality material, the excessive price when taking into account the material used, and an increase in time-to-market and delivery time due to custom production requests.

Six months after marketing, only 2 Antrox Lab products had been sold. It was a failure for the partnership, but it also proved to be a turning point (Giraldi et al., 2017). Antrox decided to enlist the help of a researcher to investigate the reasons behind the poor market results.

2. The second phase led to a decisive qualitative leap in the partnership thanks to the application of the qualitative approach proposed by Alves et al. (2016) based on the Relational Capabilities. The two companies realised that their relationship quality was relatively poor. They thus proceeded to adopt significant improvements in various Relational Capabilities dimensions. This led to a "rebirth" of the partnership, and to its commercial success.

4. The applied method

The investigation adopts the action research methodology because it can capture the dynamism of the context, it pursues action and research outcomes at the same time, it is reflective, participative, and responsive to a continuously changing situation such as that which characterises the B2B relationship between the two companies under studied (Eden and Hyxham, 1993).

After the failure of Antrox Lab in 2015, the Antrox company wanted to evaluate the causes of failure and the effectiveness of the partnership, strictly connected to its relational capability qualities.

Ten face-to-face interviews, each of from 30 minutes to one hour in length, were conducted with the respective CEOs of Antrox and Nel Design to investigate the quality of the partnership under the five dimensions of Alves et al. (2016): level of coordination, culture, knowledge, technology, and co-adaptation. Data were collected from September 2014 to April 2016 through face-to-face interviews.

To increase case validity, we had triangulated between different data sources (Eisenhardt, 1989): participation in meetings, email and websites analysis, internal reports, and brochures.

During these interviews, the researcher asked the CEO questions that referenced the dimensions of the Alves *et al.* (2016) approach. In this experimental field research, the CEOs' contributions provided detailed insights into the relationship development process and all the technical and social interdependencies established between the two companies (Pierantonelli *et al.*, 2015).

The enterprises wanted to investigate the reasons behind the poor market results. The researcher started with a qualitative interview, requesting the CEOs' opinions on cooperation, co-adaptation, and knowledge exchange within the partnership. He then asked them to express a quantitative judgment, i.e., a rating, on a Likert scale of 1 to 5, on what had been said thus far. Through the evaluation of the relational capabilities (RC) by Alves *et al.* (2016), using the Likert scale (1-5), the researcher pointed out some criticalities of their project.

In the darkest period of the partnership, the researcher was called to analyse the "health" of the partnership and make a comparison between the alleged benefits and the potential failure. It was essential to understand the critical factors for the outcome of the relationship, and this was done through the application of the approach of Alves *et al.* (2016). However, it was equally important to study the competitive dynamics inherent in the manufacturing context and whether the partnership was truly capable of benefiting partners and products.

The above shows that creating a partnership may not lead to successful outcomes in the short term (Hartley *et al.*, 1997).

In light of this, market research was carried out to understand the level of competition of that product and, more generally, where the polystyrene market was heading.

The characteristics of the partnership were determined with the approach of Alves *et al.*. To ensure multidisciplinary evaluation, an expert manager was involved. The Consultant was asked to express their judgments of the relationship for each quality descriptor using a 1-5 Likert scale. Then, the score for each descriptor was computed as the median of votes, and the score related for each component was determined as the mean of the score of the respective components.

From the consulting, the researcher was able to ascertain that in the lighting sector, there had been an extensive and rapid diffusion of LED technology compared to the previous technology based on the cold cathode (used by Antrox). In particular, reference was made to the broader access to potential users regarding, above all, the greater predisposition to industrial level processing through widespread replicability on a large scale. Furthermore, LED materials were considered more reliable, of medium-long life, with reduced maintenance costs and reduced consumption correlated to a low environmental impact (Mangiacristiani; 2017). Feedback was requested from lighting experts to test their perceptions and the main criticalities; Porotex material proved lighter in weight, more customisable and slightly more affordable than traditional lighting solutions, but Nel Design needed to work on the coating to increase the feeling of resistance and durability (Mengoni *et al.*; 2017).

Having identified the factors that influenced the outcome of the relationships based on the approach of Alves *et al.* (2016), after an accurate analysis of the competitive landscape and also taking into consideration the relationship between the two owners of the respective companies, the manager predicted that the alliance would only achieve its hoped-for benefits in the medium-long term by implementing a process of transformation of its inter-organizational relationships.

Following the detection of the constant growth in demand for LED light sources at the expense of the demand for cold cathode fluorescent lamps, Antrox and Nel Design combined their expertise to jointly produce Deko, a wall lamp composed of a paintable Dekorex panel, and routable with a LED profile inserted inside the panel.

The strategic process within the alliance must develop in an interactive and joint manner (Håkansson, Ford; 2002). For this reason, companies must work together, making new proposals and comparing themselves with the partner, in order to achieve the set goals (Baraldi and Ciabuschi, 2010).

To adapt to the change in the sector, the changing demands of the market but also to the characteristics of the partner Nel Design, Antrox had to change its "direction", with a consequent change in the partnership (for the better!) (Mengoni *et al.*, 2017).

The relevance of the relationship in the B2B field (Ford *et al.*; 2011) was a constant for Antrox and Nel Design. As also stated above, small enterprises have few resources and a low level of capital investment: in order to develop, they must necessarily resort to partnerships, allying with other companies to make up for their limitations (Capaldo, 2007; Mangiacristiani, 2017). Therefore, the model proposed by Alves *et al.* (2016) is generalisable to any type of partnership and business case.

5. Results

An action research methodology is applied to a case study to show the shifting in the goals that occurred during the relationship evolution and to give evidence of the impact on both companies' initiatives, reactions, and interdependencies (Mengoni *et al.*; 2017).

The action research methodology applied to the presented case study showed a shift in the goals that occurred during the relationship evolution. Two significant phases in the history of the relationship can be identified:

The first phase, characterised by a structured business relationship, aimed to produce innovative lamps with a polystyrene structure. This business idea resulted in poor market results.

A second phase, characterised by business cooperation, aimed to supply architectural decorations. This shift had an impact on inter-firm dependences, initiatives, and strategies, and resulted in business success.

The first phase began in 2014 thanks to Antrox's idea of combining LED technology with new materials, including polystyrene decorations: the "Antrox Lab" product was patented to take advantage of Antrox's established reputation in the professional lighting market and the industrial supply sector. In this way, Antrox benefited from Nel Design's technical skills and machinery. At the same time, Nel Design was able to take advantage of Antrox's commercial network to make itself known in foreign markets.

The design process was quite complex and was characterised by iterative cycles to adapt solutions to customers' needs, manufacturing and installation requirements, and LED limitations—this increased time to market and delivery time. In addition, the companies came up against a sceptical attitude towards polystyrene, as it was generally considered a fragile and low-value material. Also, the Lab Antrox price was considered too high for the customer.

In March 2015, after six months of commercialisation, Antrox Lab products registered only two sales: it was a failure.

In April 2015, the relationship between the parties was at a dead end: the companies could not cut production costs without losing quality. Two months later, they decided to put aside the Antrox Lab project and to change the purpose of their collaboration: the second phase of the relationship started.

Nel Design proposed to Antrox to sell its products - architectural decorations - under the name of AntroxLab. The idea was to "exploit" Antrox's worldwide network of contacts to offer their expertise. Antrox would have to propose Nel Design's realisations to its distributors, retaining a commission for their sale Nel Design. Antrox would manage the promotional and sales processes; Nel Design would oversee the physical realisation of the products. In November 2015, Antrox oversaw the email promotional campaign for the new Deko Wall project and the sales process, while Nel Design was in charge of the physical realisation of the project components. The product was very successful from the launch of the email campaign. Antrox proposed furniture made of Porotex walls to Palm Jumeirah Hotel in Dubai and won the contract. Figure 1

Thanks to this experience and other similar ones, the two companies renewed the Antrox Lab project. This time, they thought up a new product line consisting of lighting walls (i.e. Wallux) and decorative architectural lighting elements (Deko).

Fig. 1: Examples and applications of decorative architectural lighting elements (Deko)



Source: Antrox Catalogue 2017

New lines were created by merging the companies' competence and specialisation.

Antrox witnessed an increase in sales of about +20% in 2016, while Nel Design entered the global market.

From a careful analysis and comparison of the two phases, it was possible to see an increase in relational quality in the second phase compared to the beginning of the partnership. Relationships that characterised the first phase of the alliance reveal several critical aspects, most related to the Knowledge, Technological and Coadaptation dimensions. In particular, the coadaptation components "Changes and solutions" and "Previous experiences" resulted in low quality.

In this first phase, Nel Design was more of a supplier than a partner with equal responsibilities. Actually, 70% of the Lab outcomes were achieved by Antrox and the remaining 30% by Nel Design. Although both parties were highly committed, Antrox had control of the overall process and put more energy into the shared project realisation. Nevertheless, Nel Design's machinery and capabilities were fundamental for the project, and Antrox depended on them.

Partners do not succeed in the same way when accessing external resources to pursue their opportunities (COA 1 = 2): while Nel Design can profit from Antrox's network and know-how, Antrox fails to exploit the knowledge of Nel Design in the same way. This also limited the possibilities of identifying other opportunities aligned with the partners' needs and aspirations (COA 4 = 3).

Moreover, the effort required of Nel Design was superior to that of Antrox: Nel Design had to re-adapt to the partner's characteristics and way of working (COA 2 = 3), investing heavily in the co-adaptation process (COA 6 = 2).

Other aspects that limited the quality of the "Changes and solutions" component were low-risk propensity (COA 5 = 1), deficiency in organisation flexibility (COA 7 = 2) and poor results in the effectiveness of new product and processes (COA 3 = 3).

Also, the quality of the "Previous experience" component was poor because only Antrox had previous experiences in partnership (COA 8 and 9 = 3).

6. Discussion

Both Antrox and Nel Design realised that the initial project failure was explicitly due to the high cost of production and the complicated realisation process implemented to meet client requirements and respect the technical constraints of LED coupled with Porotex. The main criticalities of the Antrox Lab project were:

- The lack of specialised human resources capable of creating competitive artefacts to enter the market of decorative and architectural design lamps;

- The numbers of iterations, which sometimes lost the initial design purpose, due to the numerous iterations necessary to satisfy the customer need and the production constraints;
- The complexity of the production and sale processes;
- The lack of unique control of the overall process that guarantees delivery time is respected;
- The poor market perception of Porotex that considers the artefact to be composed of a less-valued material compared to traditional ones (plasterboard, for instance);
- The higher price (+30%) than expected by the architectural market.

The relationship quality that characterises the second phase has significantly improved, particularly in the “Knowledge” and “Change and solutions” dimensions.

However, upstream of these reasons, the analysis of the quality of relationships characterising the first alliance period highlighted a significant issue: relations between partners are mostly power-dependent. Antrox played the leading role in this phase: it managed the design process of the lamps, as the company knew better than Nel Design which solutions would satisfy the customer requirements, both in terms of shapes and functionalities, and had the control of the overall production process, taking responsibility for all the promotion and marketing activities.

Contrariwise, Nel Design was mainly a supplier rather than a partner with equal responsibilities. Despite being the only one with expertise in the manufacturing process of Porotex products, Nel Design accepted and implemented the suggestions made by Antrox regarding how to organise the production activities.

Results evidenced that the Antrox-centric organisation of the partnership resulted in low synergy between partners (“Integration and synergy” = 3:29) and prevented communication (“Communication” = 3), information sharing (“Knowledge acquisition” = 3), technology transfer (“Technology transfer” = 3:33), and co-adaptation actions (“Changes and solutions” = 2:29). Moreover, it hampered the development and integration of new ideas (“Technical routines” = 3).

In this way, the quality of the relationship was compromised, although both parties were highly committed to pursuing the alliance’s goals (“Close relationship” = 4; “Collaborative innovation” = 3:67).

In the same way, results show that the quality of the relationship strongly increased in the second phase of the alliance, when Nel Design assumed a more decisive role to redirect Antrox Lab towards a different brand identity.

Indeed, the relationship’s growth, the exchange of knowledge, the years spent together, and the awareness of their own limits improved the partnership’s strength and reduced the propensity for risk. However, this was not enough to motivate further improvement. Indeed, the primary reason for the relationship improvement had to be sought to improve the synergy between the partners, made possible by a more flexible partnership organisation. There was no longer a bond of dependence, but a relation of interdependence.

While in the first phase, Antrox’s more excellent experience with partnerships, and its notoriety in the professional lighting market and the contract furniture industry, placed it in a dominant position compared to Nel Design, while a more distinguishable balance between the roles of the partners characterised the relationship in the second phase. In fact, in this phase, Nel Design abandoned its “wait and see” position and challenged the previous partnership structure. This shift produced a change in the power-dependence structure of the relationship, the activities performed, the actors performing them, the use of resources, and the parties’ level of commitment.

This resulted in the improvement of features of the relationship most related to “Integration and synergy”, “Knowledge acquisition”, “Technology transfer”, and “Changes and solutions” components. The new strategy made it possible to reduce time-to-market, positively impacting both delivery times and price. The shift also produced changes in proposed solutions that were more competitive in both the lamp and architecture markets.

At least one element could be identified as necessary in having affected the ‘recovery’ and ‘transformation’ phase of AntroxLab: the mutual interest of Antrox and Nel Design in rescuing part of the investments made to start up the second AntroxLab project. Antrox Lab turned out to be a

significant ‘test’ platform where the two companies scrutinised their capabilities and understood their business models. Therefore, some kind of relationship energy allowed the company to reshape the relationship when it seemed to be over, facilitating potential new market opportunities.

The case study presented here deals with an already existing social relationship (a relationship of mutual esteem already existed between Antrox CEO and Nel Design CEO) that was consolidated to the point of becoming a lasting business relationship, despite the initial setback (Håkansson and Snehota; 1995), whereas business relationships established solely for economic exchange purposes tend to collapse more easily. The purpose of the partnership was strategic and long-term, as it was seven years old. The result that emerged from the consultancy allowed an awareness of the past relationship dependence on power and the ideal relationship between interdependence and cooperation.

Antrox and Nel Design possess distinctive and non-overlapping competencies. As Pierantonelli argues, “*both companies know that they could create innovation by combining their skills and knowledge*” (2015, p.144).

This case study shows how the development of a new business is nonlinear and onerous. Indeed, the companies had to adapt, through intense interactions, to the counterpart’s resources as each one was using different software packages and different ways to approach the product design (Giraldi, 2017). As interaction and collaboration between employees from both companies increased, so did interorganizational trust (Ashai *et al.*, 2015). Only through intensive interaction between the actors, it was it possible to overcome common obstacles to relationship formation.

7. Conclusions

Results suggest that the proposed method could be adequate to assess the quality of the considered relations.

In particular, the proposed approach can be helpful to determine poor factors of relationships and understand the nature of relationships better. It made it possible to underline the aspects most related to power-dependence situations, which may compromise synergy between partners and negatively affect alliance success.

Results evidenced that when power-dependence situations mainly determine relations, the relationships are characterised by low synergy, unilateral knowledge acquisition, scarce technology transfer between partners, and a low capability of the partnership with regard to changes and solutions. Therefore, when such a situation occurs, the quality of the relationship is low, and the product performances resulting from the collaboration are poor.

Conversely, when high scores concerning features most related to coadaptation characterise relationships, knowledge and technological dimensions, more competitive products and a more significant revenue are achieved.

However, despite results suggesting that the proposed qualitative method can be a valuable tool for deeply analysing and understanding the main features that characterise B2B relationships, further studies are needed to prove this.

At present, the method does not consider using weights in the scoring of descriptors. Since some descriptors or dimensions are probably more important than others, further studies need to be carried out to better analyse the mutual relations of considered RC domains and their respective features and to understand their relative importance in determining the quality of business relationships.

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The Intersection of spirituality and succession in family firms: a systematic literature review and research agenda

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Abstract

Purpose of the paper. *This paper provides a systematic review of existing research related to the role of family firms' spirituality and values in ensuring a successful succession.*

Methodology. *This study adopts a Systematic Literature Review (SLR), retrieving articles from Clarivate Analytics' Web of Science and Google Scholar databases, covering the last 30 years of scholarly contributions on the theme. Close adhering to SLR guidelines, the systematic review analyses 115 articles published in leading journals.*

Findings. *Results show five main themes and two sub-themes that synthesize the content of sampled articles based on three different streams: the integrality of people (spirituality as an integral part of human experience), the reciprocity (the relationship between family and business in the family business), and the coexistence between economic logic and spiritual logic. These three constructs are moderated by the quality of relations between the predecessor and successor. Finally, this study identifies a rich research agenda.*

Practical implications. *This study is particularly tailored either for the non-self-identified or self-identified spiritually-oriented family firms and to the researchers to advance study in the field. Family firms serve as fertile ground for spirituality, hence nourishing a family's legacy through the bond of mutual respect. This paradigm change, beginning with an integral perspective of a leader as a person, regards his leadership as part of one's human development. The reciprocity between family and business through spiritual values continues when each generation of the predecessor and the successor enter into a formal collaboration and co-create business policies, praxis and vision-update that express family values business. Without ignoring the generational differences in terms of how they put preferences on different values, its continuity across generations happens when the owning family holds occasions to celebrate values. The economic and spiritual logic is reflected when owners' synergy enables them to generate business policies and practices coherent with family values.*

Limitations of the research. *The main drawback is that the examined literature is not exhaustive because it is based only on two databases and focused exclusively on articles. Future research can consult other databases and combine them to obtain a more inclusive dataset, considering books, proceedings, and other documents that can improve the analysis.*

Originality. *This paper provides the first systematic literature review on spirituality in family business studies while investigating how it intersects with the problematic issue of succession.*

Key words: family firms; spirituality; values; succession; Systematic Literature Review

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1. Introduction

The 21st-century is complex, dynamic, fast-paced, non-linear, multicultural, and knowledge-intensive (Waddock, 2006). It has been suggested that spiritually-based organizations cannot be a passing fashion but need to be imperative for the third millennium (Vasconcelos, 2015). Wisker *et al.* (2019) underline the contribution of the early spirituality scholar Frankl (1959), who has suggested that society's major problem in the 21st century is that society lacks knowledge of meaning in life he termed as an "existential vacuum". A better understanding of the motives and deeply held values behind the integration of spirituality in the business workplace shows a significant increase in interest both for scholars and practitioners (Cavanagh, 1999; Driscoll *et al.*, 2019). How spiritual values and meaning are manifested (Driscoll *et al.*, 2019), how values are formed and preserved (Astrachan *et al.*, 2020), and how spirituality can be integrated into business processes and behaviours are reflected in seminal works in the field of this nascent domain. In other words, spiritual values are innate in people (Lepherd, 2015) and have always existed in the workplace (Reave, 2005).

The extant literature has mainly focused on the spirit found in the workplace dynamics under the influence of employee-organization perspective in the search for meaning and purpose (individual level), sense and community (group level), and alignment with organization's values (organizational level) (Hill, Jurkiewicz, Giacalone, and Fry, 2013).

This paper deepens the study on a specific kind of businesses: family-owned firms that are those firms fully owned and managed by members of the founding family, having owners with a clear intention to pass the business to their offspring and have owners who perceived their business to be pervaded by family beliefs and values (Aronoff and Ward, 2001). Understanding how family businesses operate is important because they represent the most popular kind of firm throughout the world, function in different territories, and have to face social, political, economic, and cultural changes and challenges (Tobak and Nábrádi 2020). Specifically, this study focuses on the espoused spirituality of family business owners and its possible influence in the succession process both in ownership and management. Succession being considered as one of the most critical issues in family-business management (Shen and Su, 2017) is relatively little-studied specifically on how spiritual values are transmitted among leaders of family firms in view of both values and business continuity. In this perspective, Fry and colleagues (2017) introduced "spiritual leadership", and although this kind of leadership is in harmony with the definition of spirituality in family firms where we anchor our study, we choose not to limit the horizon instead of embracing all other kinds of value-based leadership.

Literature on family business values and succession appear fragmented, and empirical and theoretical studies recognize the need for a more deepened understanding of how values are transmitted across generations (Zwack *et al.*, 2016; Koironen, 2002, Eze *et al.*, 2020), starting from personal values which could be relevant factors in the success or failure of family firms (Camfield and Franco, 2019). Intending to contribute to this ongoing debate, this study proposes a Systematic Literature Review (SLR) of the last 30 years of academic publications in leading journals to understand *what, how* and *why* (Krishnakumar and Neck, 2002) family owners' spiritual values affect and sustain family business succession.

Here we refer to spiritual values as a "*unique experience to every individual*" from a pioneering description offered by Freshman (1999) using grounded theory, which according to Marschke *et al.* (2009), best suits in defining this phenomenon for its complexity and highly personal in nature. Under this primitive definition, contemporary scholars identify attributes to describe this transcendental experience. Scholars' contributions to the definition like Giacalone and Jurkiewicz (2003), Dunchon and Plowman (2005), Gotsis and Kortezi (2008) will thus at least contain the concepts of meaningfulness, completeness and joy, connectedness, and the experience of transcendence (Schutte, 2016). This is in line with Hoffman's (2007) finding that the notion of making work meaningful and integrating work with the rest of life is consistently seen in the workplace's numerous research and approaches to spirituality (Schutte, 2016). This definition is

suitable in the analysis of family businesses because, in line with Chrisman and colleagues (2005), family involvement in family businesses results in certain distinctive value-based behaviours.

Findings show five main themes of research and two sub-themes and provide pertinent insights into understanding spirituality as an integral part of human experience which cannot be left out of many facets of human life, the reciprocal relationship between family and business in family business dynamics and the coexistence between “economic logic” and “spiritual logic”. The succession process and management serve as the common denominator of these three main findings.

Through the analysis and interpretation of the family firm spirituality literature, this study contributes to family business literature offering an extensive review of the state of the field. Suggestions for future directions through propositions on the understanding of spirituality and value-based succession offer a foundation from which future research can build. Main recommendations include undertaking longitudinal and quantitative research, a cross-cultural case study employing a more holistic approach of a broader range of cultural and geographic contexts.

2. Methods

To ensure a thorough review of the extant family business literature on spirituality and the transgenerational passage, we adopt a comprehensive, objective, and reproducible search strategy to capture all relevant sources of evidence through a systematic literature review. Since family firm studies are still in its maturing stage, many publications are reviewing, summarizing, and rethinking developing trends and future development of this field from different perspectives (Debicki *et al.* 2009; Chrisman *et al.* 2010; Wright and Kellermanns 2011; Gedajlovic *et al.* 2012; Sharma *et al.* 2012). We searched the *Web of Science (ISI)* and *Google Scholar*, as identified by Martin *et al.* (2018), being the two most widely databases consulted by researchers having a citation index as a function of a credible database. In the attempt to look for the availability of some hand-searched articles, we explore databases such as Proquest, Business Source Complete (EBSCO), and EconLit (EBSCO) and contacted authors to complete the copy of searched articles. We focused on peer-reviewed international journals published in English. Tennant (2018) considers peer review as one of the strongest social constructs within the self-regulated world of academia and scholarly communication, therefore excluding books, book chapters, and other non-refereed publications due to the more significant variability in the peer-review process and limitations to their availability (Jones *et al.*, 2011).

We used a systematic approach following the four stages of the selection process used by Calabrò *et al.* (2019). However, some modifications have been made to suit the nature and context of the present research.

1. Search and elimination of duplicates

To ensure the relevance of the extracted papers, we used a combination of the following keywords in the title or abstract to scan for possible articles that suit the study. Starting from a fundamental criteria “articles only” and upon applying the restrictions identified above, the first step in the search process included identifying family firm articles (Family Firm* or Family Entrepreneurship* or Family Enterprise* or Family-Owned Firm* or Family-Owned Business* or family Run firm* or Family Run Business* or Family Run Enterprise* or Family Business*) from mainstream literature. The first broad article search resulted in 16,036 hits. In the next step, using the search string: (value* or reciprocity or religion* or communion or spirituality or unity or solidarity or altruism or philanthropy or trust or quality or resilience), we combined the result of the first hit obtaining 4,741 hits. Then we combined these research results with the succession search (succession or “generational passage” or “transgenerational passage” or “legacy” or “baton”), coming out with a reasonable number of 264. While using the Google Scholar search string: Spirituality / Religion / Values in Family Firm Succession, we found another 69 articles with a total

of 333. We then eliminated 84 articles that were either duplicates or substantively irrelevant, given the focal topics. Summarizing these steps in the search process produced 249 potential articles, and all were included for the preliminary evaluation to ensure a wide-reaching search. Since our objective is to find the intersection between spirituality and succession, most of the chosen articles do not contain them both, so we had to assess carefully and handpick those articles on succession that have reference to considering spiritual values or values directly or indirectly.

2. Title and abstract analysis

Following Tranfield and colleagues' (2003) prescriptions, independent assessments were made of the abstracts of articles identified, making substantial empirical, conceptual, and theoretical contributions to the family business spirituality and succession literature. For empirical papers, the abstract needed to indicate spirituality as an independent, dependent, mediating, or moderating variable. For conceptual papers, spirituality and values needed to be the dominant topic in the paper. Instead for theoretical studies, we refer to the workplace spirituality development that gives essential reference to translating spirituality from concept to science. A total of 217 studies were admitted to the next step.

3. Full-text assessment

Then, we examined the selected sample more closely and (cross-) read the entire articles to guarantee a sufficient level of rigour and relevance. Due to non-compliance with the following selection criteria, 133 other articles were excluded.

4. Hand Searching

We found 31 hand-searched articles through citation tracking; thus, the final dataset comprised 115 articles published in 63 journals (see Table 2). The procedures mentioned above are shown in Table 1.

Tab. 1: Systematic literature review procedure

Filter	Description	Web of Science ISI	Google Scholar	Total
Step 1	Articles with selected keywords	264	69	333
	After merging the results from the different databases and deleting duplicate articles			249
Step 2	After reading the titles and abstracts, eliminating the non-relevant articles			217
Step 3	After reading the full articles and eliminating the non-relevant articles (We extracted articles that explicitly deals with Spirituality and Transgenerational Passage jointly)			84
Step 4	Hand searching and citation tracking		31	31
	Final sample			115

Search criteria for Web of Science: Time Span: 1990-2020 (Maximum range available for this database). Citation Databases: Science Citation Index Expanded (SCI-Expanded) 1991-present; Social Sciences Citation Index (SSCI) 1991-present; Arts & Humanities Citation Index (A&HCI) 1991-present. Lemmatization Mode On. Document Type (Article); Language (English); Countries/Territories (All); Web of Science Categories (Management; Business; Family Studies; Economics; Sociology; Social Sciences Interdisciplinary; Psychology Developmental; Anthropology; Political Science; Demography; History; Social Issues; Communication; Business Finance).

Search criteria for Google Scholar: Period Covered (All); Document Type (Article); Language (English); Search strings: Spirituality / Religion / Values in Family Firm Succession

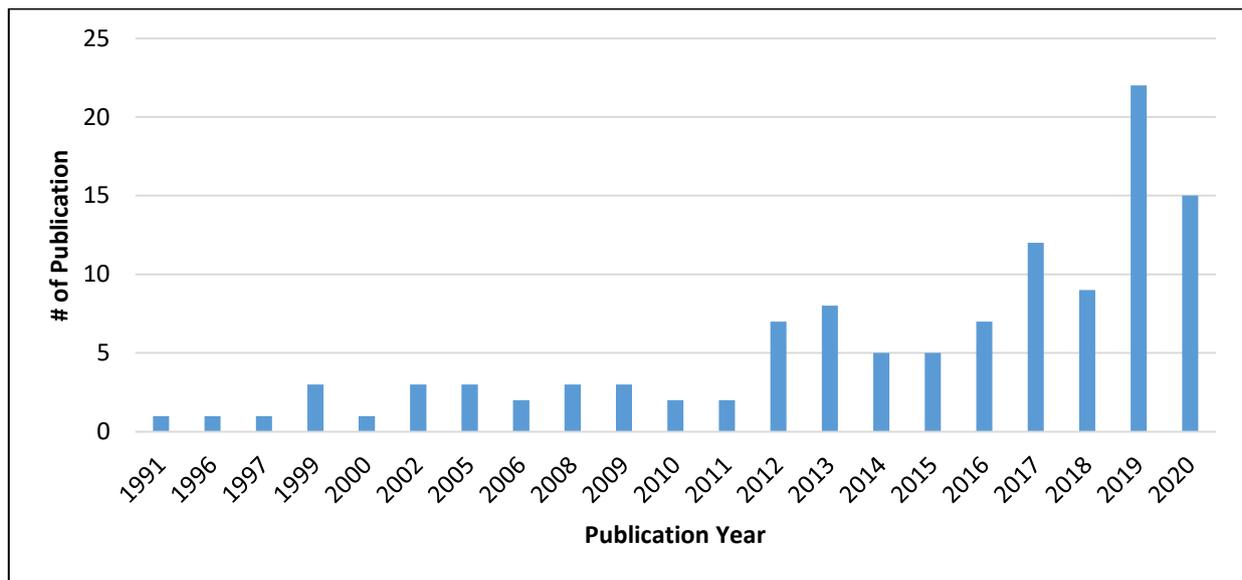
Descriptive results

Publication Distribution

Following the descriptive reviews adapted by Samara (2020) and Pret & Cogan (2019), the study on family enterprises' spirituality and values continue to progress in number. Scholars have studied

family firm spirituality for about 30 years. The early contribution that can be traced back to 1991 (1 article) has steadily increased over ten years (12 articles) and continued to rise from 2006 to 2016 (42 articles) and has substantially increased from 2017 to 2020 (57 articles). The distribution of these publications per year is clearly presented in Graph 1. These articles are widely dispersed throughout scholarly publications (see Table 2), noting that it is the Journal of Business Ethics (10) that has a dominant number of contribution to the topic, followed by the Journal of Management, Spirituality & Religion (9) and both the Journal of Family Business Management and Family Business Review has the same quantity (8). Although numerous research in the field has been published in highly ranked journals (using Scimago Ranking), we broaden the scope of considering all other articles satisfying the criterias mentioned above.

Graph 1. Spirituality / Values in Family Firm Succession Publication Distribution



Source: Authors' elaboration

Tab. 2. List and Distribution of Journals

Journal of Business Ethics	10
Journal of Management, Spirituality and Religion	9
Family Business Review	8
Journal of Family Business Management	8
Journal of Family Business Strategy	6
Journal of organizational change management	4
The Leadership Quarterly	4
International Journal of Gender and Entrepreneurship.	3
International Journal of Entrepreneurial Venturing	2
International Small Business Journal	2
Journal of Business Venturing	2
Journal of Entrepreneurship in Emerging Economies.	2
Academia Revista Latinoamericana de Administración	1
Ageing and Society	1
Asia Pacific Journal of Management	1
Business History	1
Cambridge Journal of Regions, Economy and Society	1
Cogent Social Sciences	1
Corporate Communications: An International Journal.	1
Cross Cultural & Strategic Management Journal	1
Economic Research-Ekonomska Istraživanja	1
Entrepreneurship Theory and Practice	1
Entreprises et histoire	1
EuroChoices Journal	1
European Planning Studies	1

Gender in Management: An International Journal.	1
Handbook of the psychology of religion and spirituality	1
HTS Theological Studies	1
International Entrepreneurship and Management Journal	1
International Journal of Entrepreneurial Behavior & Research.	1
International Leadership Journal	1
Journal of Asia Entrepreneurship and Sustainability	1
Journal of Banking & Finance	1
Journal of Beliefs and Values	1
Journal of Biblical Integration in Business	1
Journal of Business & Economics Research	1
Journal of Business and Management.	1
Journal of Business Finance & Accounting	1
Journal of Corporate Finance	1
Journal of economic perspectives	1
Journal of Family and Economic Issues	1
Journal of Human Values	1
Journal of Institutional and Theoretical Economics	1
Journal of Islamic Marketing.	1
Journal of Management & Organization	1
Journal of Management Control	1
Journal of Management Education	1
Journal of managerial psychology	1
Journal of Public Affairs	1
Journal of Small Business and Enterprise Development.	1
Kybernetes	1
Leadership Journal	1
Management Learning	1
Organization Development Journal	1
Organization Science	1
Procedia-Social and Behavioral Sciences	1
PURUSHARTHA- A journal of Management, Ethics and Spirituality	1
Quality & Quantity	1
Social Behavior and Personality: An international Journal	1
Social Responsibility Journal	1
Strategic Management	1
Sustainability Journal	1
The Journal of Asian Finance, Economics, and Business	1
The Journal of Entrepreneurship	1
The Quarterly Review of Economics and Finance	1
The Sociological Review	1
Work, Employment and Society	1
Total	115

Source: Authors' elaboration

Research contexts and perspectives

This review shows that studies on family firms' spirituality have been conducted within various countries. It is worth to note that all continents are represented by looking at their geographical research context, where the majority of studies are set within Europe (41) and North America (35), with moderate studies conducted in Asia (22). The continents like Africa (5), Latin America (5), Oceania (3) and Middle East (4) represent the under-studied regions where an investigation is encouraged to offer a global perspective in the field (Astrachan *et al.* 2020). Most of these papers have been published in the UK (40), followed by the US (35), the Netherlands (11), and the rest of the countries has less than 10, with a majority of these countries producing only a single article (see Table 3). Would this mean no such issue on succession in other countries outside Europe and North America? In Chau (1991) "*Approaches to Succession in East Asian Business Organizations*", she demonstrates aspects of business organizations that make East Asian family firms distinct. She stated how Americans see East Asian culture as monolithic and admire how they become business tycoons of the 21st century. For example, Japan attributes this success to the traditional family value-based management system and primogeniture as a succession style. She further argues that some Japanese business enterprises have been in existence for one or two hundred years by using

this method. Hence, research that crosses national boundaries should be advanced and investigate how the physical and material aspects of culture are connected in processes (Pret and Cogan, 2019).

Tab. 3: Country of Publication

UK	40
USA	35
Netherlands	11
Germany	8
Canada	4
Australia	3
Switzerland	3
China	1
Finland	1
France	1
Greece	1
Hungary	1
India	1
Italy	1
Korea	1
Mexico	1
New Zealand	1
South Africa	1
Total	115

Source: Authors' elaboration

Research Method and Approaches

Through this SLR, we find out that the extant literature over the last 30 years (see Table 4) mostly apply the agency theory as a scientific lens (10) (e.g. Harris and Ozdemir, 2020; Madison *et al.* 2016), followed by the theory of planned behaviour (6) (e.g. Mussolino and Calabrò, 2014), and entrepreneurship and spiritual leadership theory (4,4) (e.g. Eze *et al.* 2020; Tabor *et al.* 2019; Low and Ayoko, 2020; Madison and Kellermanns, 2013) and the use of a combination of two or three theoretical approaches are increasing in numbers to prove the validity of their findings (Pret *et al.* 2016). It is also important to note that 11% of the reviewed publications embraced the social dimension as a theoretical lens, such as social capital, social exchange, social identity, socio-emotional selectivity and socio-emotional theories, rendering it as one of the dominant paradigms of family business literature in the last decade (Gomez-Mejia, Patel, & Zellweger, 2018). The proliferation of this social perspective, precisely the socio-emotional wealth taken from the spiritual workplace, is explained further in the theme of spiritual development. Approximately one-half of the papers did not use any analytical lens, representing the exploratory stage (Samara, 2020) of family firm spirituality and succession. Many of these results about theory include fertile avenues for future studies. As shown in Table 5, the studies done in the field are relatively well distributed among the identified approaches in terms of research methods. Most articles have used a qualitative approach (41%), and one fourth has used a quantitative approach (25%), while only two articles have used mixed methods (2%), and a significant amount of articles were conceptual in nature (32%). Pindado and Requejo (2015) support that this finding is consistent with the notion that management scholars have been developing a comprehensive theory on the family firm. This type of study offers a more detailed investigation of how family firms' process unfold and how they are affected by various intra-family dynamics over time (Bammens *et al.* 2011); however, this preliminary finding suggests that more quantitative research and other research methods should be employed. For instance, case studies, specifically the longitudinal ones, are particularly relevant to organization and management studies, as they shed further light on various dynamics presented within individual set up.

Tab. 4: Theoretical Perspectives

Agency Theory	10
Theory of Planned Behavior	6
Entrepreneurship Theory	4
Spiritual Leadership Theory	4
Prospect Theory	3
Stewardship Theory	3
Authentic Leadership Theory	2
Expectancy Theory	2
Grounded Theory	2
Personal Values Theory of Schwartz	2
Social Capital Theory	2
Socio-Emotional Theory	2
Boundary Theory	1
Cultural Dimensions Theory	1
Leader-Member Exchange Theory	1
Neo-Institutional Theory	1
Organizational Knowledge Creation Theory	1
Reciprocity Theory	1
Relational Leadership Theory	1
Resilience Theory	1
Resource-Based Approaches	1
Social Exchange Theory	1
Social Identity Theory	1
Socio-emotional Selectivity Theory	1
Stakeholder Theory	1
Strategy-as-Practice Theory	1
System Theory	1
Succession Theory	1
Theory of Family Business Succession	1
Theory of Matriarchy	1
Unification Theory of Succession	1

Source: Authors' elaboration

Tab. 5: Summary of Research Methods

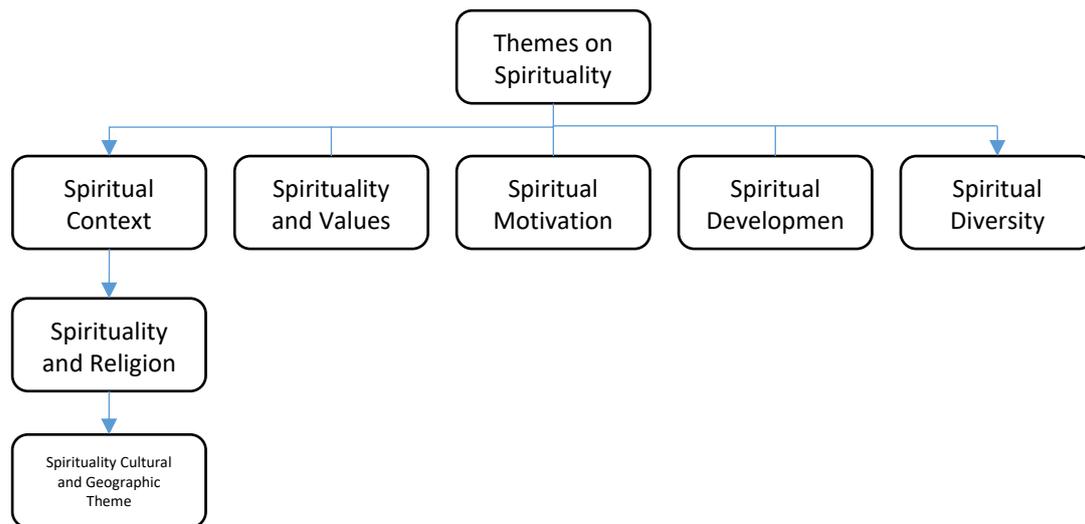
Years and Level of Analysis	Empirical n (%)			Systematic Literature Review n (%)	Conceptual n (%)	Total n (%)
	Quantitative	Qualitative	Mixed			
Publication Years						
1991-2006	1	6	1	0	5	13 (11.30%)
2007-2016	7	13	1	0	10	31 (26.96%)
2017-2020	21	28	0	0	22	71 (61.74%)
Total n (%)	29 (25.22%)	47 (40.87%)	2 (1.74%)	0 (0%)	37 (32.17%)	115

Source: Authors' elaboration

5. Findings

The in-depth analysis of the sampled articles is summarized in figure 1, presented to facilitate the flow of discussion of the themes.

Fig. 1: Graphical Presentation of Spirituality Themes



Source: Authors' elaboration

First thematic group: Spiritual Context Theme

Throughout the literature, the family firm's context is embedded firmly, thus stimulating how spirituality is translated into business activities. The studies reviewed context offers a frame of reference that constitutes and controls the interrelationship between the parts and the whole. Academics demonstrate an awareness that people's religious affiliations, place, culture and traditions, and family norms could have a significant impact in shaping spiritual values and vice versa (Eze *et al.* 2020; Cruz, 2013; Paterson, 2013; Samara, 2020, Kavas *et al.* 2020; Kamoche and Pinnington, 2012; Bhatnagar, 2019; Low and Ayoko, 2020; Driscoll *et al.* 2019; Camfield and Franco, 2019).

Given those premises about spiritual values, each individual's value system is influenced by the context of belonging. In a macro-social context, the personal value system ends up receiving the impact of social values, through different events, from exposure to and observation of the society's culture (Hynie *et al.*, 2006). However, it is in the family context or microsystem that an individual's value system is constructed (Bronfenbrenner, 1986), created and maintained through social relationships in the family sphere, which are usually transmitted by the different generations over time, generating a behavioural system according to the beliefs, models, and values of all its members (Bengtson *et al.*, 2002). In this group, articles have deepened two main aspects: spirituality and religion and spirituality's cultural and/or geographical features.

Spirituality and Religion

Spirituality and religion are frequently used together and interchangeably. While the two constructs share similar features, there are significant variations (Karakas, 2008). Out of 22 reviewed articles that explore spirituality from a religious context, 24% uses the two constructs interchangeably, 14% instead argues that they are entirely different, 19% underlines the coexistence relationship, another 19% shows differences but concludes with the relationship between them and the rest which is 24% of which despite putting in evidence their significant differences, emphasizes too their similarities and therefore the connection that binds them. However, it is not the purpose of this study to extend the rigorous investigation done in religious semantics in contrast to spirituality and vice versa. Across the investigations, it is evident that organizations are wary of opening discussions and meaningful dialogues about spirituality because spirituality has often been understood as no different from religiosity (Schutte, P. J. (2016). Giacalone and Jurkiewicz (2003)

and Mitroff and Denton (1999) commonly assert that workplace spirituality should be dissociated from religion. According to Mitroff and Denton (1999), who did an empirical study on spirituality in the workplace, their respondents answered that one could have a negative view of religion but a positive view of spirituality. It is possible to be spiritual without believing in or affirming a higher power. Furthermore, Marschke *et al.* (2009) recognize that every human being is a spiritual being; however, not every human being is a religious person. Although the literature shows this polarity of views, Neal and Vallejo (2008) agree with Wedemeyer and Jue (2002) recognizing the benefits that can come from participation in an organized religious community, while Kellermanns (2013); Paterson *et al.* (2013) Dieleman and Koning (2019) acknowledge religion as a critical source of workplace spirituality and values. “At the same time, any efforts to create a more spiritual business must respect that people in the workplace may be uncomfortable or even fearful of explicit expressions of religious faith in the workplace. Moreover, it is important to respect the diversity of belief systems, including respect for those who do not feel aligned with any spiritual or faith tradition” (Neal and Vallejo, 2008: p.118).

Scholars distinguish between the two terms, but many individuals feel that the concepts overlap (Reave, 2005) as made evident by major religions such as Christianity, Buddhism, Hinduism, Islam, and Judaism (Case and Gosling, 2010; Deckop *et al.*, 2003). Authors that support this idea tie the definition of spirituality with religious practice- meaning, the formal, organized, collective observance of one or more of the world’s major religions. Researchers repeatedly face the thorny issue of whether spirituality in the workplace should be connected to or independent of religion for scientific study to advance. Hill, Jurkiewicz, Giacalone & Fry (2013) emphasized the importance of considering whether workplace spirituality is being conceptualized at the individual or organizational level. They suggest conceptualizing and measuring spirituality at the individual level could be either independent of religion or best perceived through codified beliefs. From this point of view, they continue that “spirituality is necessary for religion, but religion is not necessary for spirituality. Workplace spirituality can therefore be inclusive or exclusive of religious theory and practice”. At the organizational level, though, workplace spirituality should be segregated from a religion unless, of course, religion is connected explicitly to the organisation’s mission (Hill, Jurkiewicz, Giacalone, & Fry, 2013: pp. 5).

Through a qualitative study of two Anatolian-based family firms in Turkey, Kavas *et al.* (2020) investigate how Islamic religious values affect business activities. They find that religion is a source of at least some of the repertoire of practices that people draw on business contexts through the owning family’s adherence to religious values. Their studies demonstrate not only how family imports religious practices into everyday business activities but further show how the observance of religious values define and limit the nature of rationality that guides business activities (Kavas *et al.* 2020). This reveals a strong interconnection between religion and business, where the former establishes a comprehensive framework of meanings through which business decisions are formulated (Astrachan *et al.*, 2020). Along with this thought is Hicks (2002) that spirituality as an integral part of human experience cannot be left out of many facets of human life and action. These viewpoints give contradictory proof of Freeman’s common belief separation thesis (1994) and Wicks (2014), which argues that religion and business cannot coexist harmoniously due to their distinct and seemingly contrasting goals. Thus, their study provides evidence that religion plays a key constitutive role in business within organization theory in a faith-based context. Particular attention is given to “Respectful Pluralism” proposed by Douglas Hicks (2002), as it is suggested that this theoretical framework is the most well-founded, elaborated, and systematic up to date (Gotsis and Kortezi, 2008; Schutte, 2016). He uses this expression to indicate the complexity of religions, ideology, and orientation in the workplace. Spirituality is, according to him, an essential aspect of human culture. An individual who comes to work carries his or her whole person’ to work.

Using rhetoric analysis, Dieleman and Koning (2020) find that out of three sources of identity (religious, cultural, corporate), the Christian identity work emerged as the most influential, despite it not being part of the founder’s legacy. This leads to a wide-ranging discourse on the development

of values rooted in religion, culture, and sustainability. The way these values are expressed is highly contextual, relational, and aspirational, rather than (as previously assumed) historical (Astrachan *et al.* 2020). Fathallah *et al.* (2020) data allow them to distinguish between how different religious values and principles affect decision-making. Muslim family firms tend to apply a rule-based, while Christian family firms favour a principle-based approach to decision-making. Bhatnagar *et al.* (2019), on the other hand, explore how Hindu spirituality influences founded on two fundamental spiritual beliefs of *dharma* (duty towards society) and *karma* (right to act without expectation of rewards) instil a duty-bound giving culture in Hindus. However, the strength of each belief varies in controlling families.

Fernando and Jackson (2006) report their in-depth interview findings with thirteen prominent Sri Lankan business leaders drawn from Buddhist, Christian, Hindu, and Muslim religious traditions. When the leaders were asked why they engaged in a faith-based workplace, their responses were often associated with decision-making. They said that in “challenging” moments, the numerous management tools they have in hand need to be complemented with the transcendent reality- god, or truth that is more powerful, better, and good. This result agrees with Shen and Su (2017), who find that Eastern religious beliefs, especially Buddhism, strengthen Chinese family firms’ religiosity-succession relation.

Proposition 1.1: When practised within the family dynamics, the spirituality of the founder/predecessor anchored in religion can facilitate the smooth transgenerational passage.

Spirituality Cultural and Geographical Context

The literature gives us the key to looking at culture by referring to two perspectives and its interface: the national culture and the organizational culture (Ansah *et al.*, 2019). The former refers to the culture of a specific group of people. Therefore, its relationship with spirituality and vice versa, and the latter refers to the spiritual culture element seen in the organization, thus bringing to the actual business environment.

Cruz (2014), referring to the Christian family business, underlines society’s impact where it is embedded from which particular sets of values, attitudes, laws, and business practices are reflected. In the study of the dynamics of spirituality in Indian ethos in the workplace, Gupta *et al.* (2011), on the other hand, reported that firms use spirituality more as a tool to resolve motivation and productivity problems rather than as an encounter to bring about cultural change in company decisions making and orientations. Their review shows how the spiritual dimension and business have always coexisted and are responsible for all human development and evolution in the Indian tradition. Both the spiritual and physical aspects converge in the principle of “Darma” (righteousness) reflected in the Indian culture. The relationship between the spiritual values and culture lies in the mechanics of initiating, managing and sustaining cultural change making spiritual values (their specific ethos as Indians) as a scaffold for this organization’s cultural change.

The Sri Lankan collectivist culture is known to reflect a high need for affiliation; consequently, according to Fernando and Jackson (2006), this cultural characteristic among Sri Lankan people could result in a higher level of regard for others’ welfare, and therefore, emphasize the need to accommodate others in the decision making process. This collectivist culture, which is the need for connection with others and the ultimate, and their sense of rightness in decision-making, are attributed to the leaders’ spiritual practices (Fernando and Jackson, 2006).

On the research on spirituality and national culture as antecedents to ethical business decision-making, Beekun and Westerman (2012) compare the United States and Norway. The data from this study indicate that the more spiritual were Norwegians, the more ethical was their decision-making. In contrast, the more spiritual were Americans, the less ethical was their decision-making. Their speculation to these contradictory findings could be attributed to the fact that spirituality may mean different things to different people (Cavanagh, 1999; Driscoll *et al.*, 2019), in this case, the Norwegians’ conceptions as compared to that of the Americans. From the authors’ view on

spirituality that underlines connectivity and desires of many above others' needs, they postulate that spiritual Americans do not share the same meaning.

Proposition 1.2: Local embeddedness that is the involvement of economic actors in a geographically bound social structure with specific values, traditions and common beliefs, plays a crucial role in family firms succession.

Second thematic group: Spirituality and Values

Values define what is essential to organizations, and values are often linked to spirituality (Sorenson, 2013). The business spirituality literature does not give an unequivocal reference that differentiates spirituality from values concepts and vice versa. Instead, what is interestingly noticeable is that when authors refer to values in workplace spiritual context, they use them homogeneously; as observed by Kellermanns (2013), family business values may be influenced by the level of spirituality and religious beliefs of the owning family. They use these two terms fused into one, such as 'spiritual values' or only 'values', which we also adopted across the study. Scholars of family business literature use either 'spiritual values' or 'values' referring to religious values (Barbera *et al.* 2019; Astrachan *et al.* 2020; Yao, 1999; Ilter, 2017; Wisker *et al.* 2019), personal values (Camfield and Franco, 2019), ethical values (Driscoll *et al.* 2019), moral and social values (Sorenson, 2013; Neal and Vallejo, 2008) and cultural values (Zwack *et al.* 2016; Anggadwita *et al.* 2019), all indicating the universal dimension (Karakas, 2008) of what it means to be a value-driven organization.

Neal and Vallejo (2008) suggest that family businesses can be incubators that promote conscience-based moral and social values in family firms. To explore how values prevail in the context of complexity found in family firms, Simon *et al.* (2012) refer to past researches such as that of Hall, Melin, and Nordqvist (2001), who identified values as implicit or explicit conceptions of what is desirable for both the family and the family business. Family firms are much more likely to be values-driven and therefore are a better cradle for developing explicit spiritual values in the workplace (Neal and Vallejo, 2008). What could be precarious, according to Bruck *et al.* (2018), as a result, the family aims to secure its interests through the firm. These desires may not necessarily be financial, but they are also articulated in emotional terms. Thus, the decisions of families can be inaccurate or selfish. To give a foundation on what is desirable both for the family and the family business, Simon *et al.* (2012) draw attention from the statement given by Parada and Viladás (2010), who placed the importance that having firm values is one of the sources of growth and survival for a family business. The presence of values is a central factor in its governance. In families, values given priority produce long-term relationships, individual growth, and positive human relationships (Morris *et al.* 1997).

Neal and Vallejo (2008) regard spiritual values as the most crucial variable in defining firms that embrace the transcendental dimension giving the same weight as economic values. Values might be considered emotional and spiritual resources in any social organization, especially when they appeal to morality and aspirations (Sorenson, 2013). However, where do the values of founding family members, as visible guardians of the family business reputation who care about multiple goals, come from? This is the question posed and investigated by Dieleman and Koning (2019). Using an 'identity work' approach, they posit that the values overarching identity work derive from different sources such as faith, community, and sustainability. They further argue that values mature in parallel with the context and that their specificity is relational and aspirational rather than merely historical (Basque and Langley, 2018), opposing prior researches that claim family values as rooted in the past.

Proposition 2: The presence of firm values as a central factor of a family firm's governance determines its growth, survival, and continuity as a legacy that passes from generation to generation.

Third thematic group: Spiritual Motivation Theme

Why is there such a growing interest in the spiritual element in the workplace? One answer to this question could be that as society has advanced in terms of leisure time, technology, and communication of ideas, people increasingly desire to experience spirituality not only in their personal lives but also in their work, where they spend a large amount of their time (Klenke, 2013). Another answer to this question arguably could involve the benefits to an organization for encouraging workplace spirituality. In short, some evidence exists that suggests a link between workplace spirituality and enhance individual creativity, increase honesty and trust within the organization, and increase commitment to organizational goals.

The seemingly emerging needs to understand the characteristics and dimensions of spirituality at work are timely for many reasons. Karakas (2008) describes this trend, such as corporate layoffs and downsizing, increasing vulnerability of employees, searching for meaning at work, interest in a new age and Eastern philosophies, and the decline of traditional support networks and groups and ethical scandals.

Regarding succession in family firms, the perpetuation of values and the intention for a family to remain in business are among the paramount aims of business founders to be passed on to the next generation of leaders (Cruz, 2013). Traditionally, the succession process aims to build knowledge about how things are done and for potential successors to understand founders' values and principles (Steier, 2001). Family business founders or owner-managers may concentrate on lengthy and often informal socialization or interaction processes to pass down in-depth firm-related tacit knowledge and values (Cabrera-Suárez *et al.*, 2001; Discua Cruz *et al.*, 2012). The intention is to allow commonly held values to establish a sense of identity, guide decisions, and facilitate commitment to the organization (Duh *et al.*, 2010). Hence founders have a crucial impact on the values that a business, and those involved in its operation, will uphold over time.

While a value-driven owner could be generative (Zacher *et al.* 2012) and a leader's spiritual orientation might be productive (Klenke, 2013), this spirituality adopted by the leader, if not well managed, could lead to friction. Cavanagh (1999) argues that some CEOs are so fascinated by their spiritual convictions that could result in coercion when they tend to insist that others follow the same religious faith while favouritism surges for those with similar views.

Proposition 3: Defining what motivates both the predecessor and the successor in terms of which deeply held values and align those values on the firm's current priorities would strengthen traditions and innovations.

Fourth thematic group: Spirituality Development Theme

Although conceptual growth was significant, the editors and contributors claim that the study of spirituality in business dynamics still needs to demonstrate its influence in order to be seen as a valid discipline in the field of organizational science. Hand in hand with the initial efforts to consider spirituality through theoretical espousal, as evidenced by journal issues mentioned above, is the need to discuss corporate life through empirical study. The systematic scientific study of spiritual components started to flourish as demonstrated on account of Hill, Jurkiewicz, Giacalone, and Fry (2013) "*From concept to science: Continuing steps in workplace spirituality research*". Albeit Case and Gosling (2010: pp.260) posit that "*there is a general lack of acknowledgment of the continuing epistemological dispute in organization and management studies concerning paradigm incommensurability*". Legitimizing spirituality in the workplace then demanded an actual positive effect of the spiritual variables on business operations. Without these facts, the issue of spirituality present in the workplace will be marginalized as a philosophical and unrealistic endeavour.

Another development in the field, although moderated, refers to the business practices that foster the integration of spirituality into organizations (Pfeffer, 2003), in other words, the recognition of the co-existence of spirituality and business. To capture what people think about

organizational spirituality, Freshman (1999: pp.319) quotes a phrase of an entrepreneur saying, “*The only thing spiritual about my work is the bottom line*”. Traditional capitalism subscribes to the “separation thesis” (Kavas, 2020) between the business’s primary economic roles and the larger interests of social justice, environmental protection, and moral change. Alternatively, a socially responsible company (Izzo and Ciaburri, 2018) transcends this dichotomy by integrating uneconomic values into “one bottom-line” where “profits” concurrently represent and support “principles”. Cavanagh (1999) underlines what the past studies claim that the separation of science and spirituality leaves people separate from one another, separate from nature, and separate from the divine. Spiritual integration became a strategic paradigm that articulates the complexity and transformative potential of consolidating “profits” and “principles” or “economic logic” and “spiritual logic”.

Given the emphasis of history on agency and rich contextualization, it is not surprising that some studies have touched on the emotional lives of family firm leaders (Wong, N. D., Smith, A., & Popp, A. 2018). Another eye-catching quantity of research in the family firm spirituality literature is the Socioemotional Wealth (SEW), a term defined by Gomez-Mejia and colleagues (2007: pp.106) and refers to “non-financial aspects of the firm that meet the family’s affective needs, such as identity, the ability to exercise family influence, and the perpetuation of the family dynasty”. Rafaeli (2008) argues that the ‘affective revolution’ in organizational studies should be extended to the family business’s research domain. Detailed studies of the emotional context and dynamics of family firms are rare in business history. Business history has a long history of studying family firms and has focused, for example, on the role of the family in providing critical resources. Another important theme is the relationship between family structure and business development, and longevity, particularly with regard to the critical issue of intergenerational succession.

Proposition 4: The family firm’s spiritual integration comes from the leader, and it can spread to successors.

Fifth thematic group: Spiritual Diversity Theme

Articles in this group investigate how and why spirituality and values are different across various types of family firms and their resonance to the succession process. According to Simon *et al.* (2012), describing the complexity of family firm, the differences in values are affected either by the current characteristics of the family members, the peculiarity of the family business or by historical factors such as succession (Schneider, 2017; Bizri, 2016), socialization (Bika *et al.* 2019) or other processes of value transmission (Cabrera-Suarez, 2005; Zwack *et al.* 2016; Barbera *et al.* 2019; Flory *et al.* 2010).

Family firm spirituality literature and succession are significantly enriched by the dominating values and traditions observed with respect to gender (Collins *et al.* 2014; Gherardi and Perrotta, 2016; Balaine, 2019) and different transgenerational landscapes (Shen, 2018; Bika *et al.* 2019; Eze *et al.* 2020; Zellweger *et al.* 2012). This work begins to create conflict between specific family values such as fairness principles for children regardless of sex, as they are considered to be in contrast with corporate reality and gearing towards socially gender-based stereotypes (Nelson and Constantinidis, 2017). An example of this is the feasibility of primogeniture (Eze *et al.* 2020) (the normative assumption of the eldest son assuming family business control in the next generation) which for Nelson and Constantinidis (2017) is a monolithic expectation being challenged and questioned. The latter researchers support the egalitarian view of gender over the patriarchal, favouring the equality of sexes (Ramadani *et al.*, 2017; Ferrari, 2019). They suggest practices for successor choice and ascendancy through teams of mixed-sex successors who, for example, share ownership, power, and influence.

Proposition 5: Succession planning and management pervaded by spirituality reduce or eradicate biases such as gender stereotyping, primogeniture, nepotism, and successor conflicts.

Critical Reflections on Spirituality as Management Tool

Spirituality in the workplace also evokes numerous public perceptions, with positive and negative associations (Freshman, 1999). In this section, we present three articles that demonstrate the critical reflection on the 1. instrumentality of workplace spirituality (Case and Gosling, 2010) 2. organizational spirituality as a form of “symbolic violence” (Kamoche and Pinnington, 2012), and 3. limitations of business spirituality (Cavanagh, 1999).

Case and Gosling (2010) contest vigorously any social technologies that treat the human as a mere resource (bodily, emotional, mental, or spiritual) to be deployed within a nexus of economic profit-making activity. This is in accordance with Hicks (2002), who argues that employees should not be treated as merely another input to the production process. Case and Gosling (2010) further state that studies on workplace spirituality are showing that companies embrace the spiritual dimension to secure competitive advantage (Neal and Vallejo, 2008; Madison and Kellermanns, 2013) through what might be understood from a critical standpoint as the appropriation of employee spirituality for primarily economic ends. Gull and Doh (2004) are in perfect accord with this position that to use spirituality as a strategy for the sole purpose of realizing greater competitive advantage is irrational and exploitative. In other words, they are treating workplace spirituality as a resource or means to be manipulated instrumentally and appropriated for economic goals. They also mention the ‘reverse instrumentalism’ in which employees use the workplace as a site for pursuing their spiritualities.

Drawing from Pierre Bourdieu’s critical sociology, Kamoche and Pinnington (2012) examine how organizational spirituality is being framed as a new way to manage people. Their article takes a critical look at the way much of the literature prescribes spiritual values with the subtext that human resource practices infused with spiritual values, *inter alia*, improve organizational performance. This article demonstrates how ‘symbolic violence’ provides an analytical tool to unravel organisational spirituality’s theoretical make-up. This critique posits that the ‘top-down’ approach to organizational spirituality relies on a Bourdieusian ‘cultural arbitrary’ and ‘power of pedagogy’ to seek organisational members’ active consent.

Cavanagh (1999), affirming that spirituality enables a businessperson to gain a more integrated perspective on their firm, family, neighbours, community, and self, emphasizes the limitations of business spirituality. There has been a dramatic upsurge in spirituality among those who study, teach and write about business management. This new interest is also apparent among practising managers. Spirituality in the workplace helps many. However, the trend is disturbing to others. To name one is the lack of connection between two supposedly parallel fields having common goals and inspirations- business ethics and business spirituality. He reported that one reason for this might be that religion, a stimulus and source for traditional spirituality, has historically not been a significant resource for business ethics.

6. Discussion and conclusion

SLR findings underline that family firms are known to exhibit value-based behaviour (Barbara *et al.* 2019) and play an important role in unleashing the universal values embedded in every person, which in turn can lead to improving decision-making quality by enabling consistent and goal-congruent decision support and performance measurement (Bruck *et al.* 2018). In family business literature, there is a strong consensus on how values play an essential role in shaping an individual’s personal and professional ethos (Treviño *et al.* 2006) and his decision-making skills and behaviour in the business context (Wang and Hackett 2016). Although not all family firms have the potential to be supportive of spirituality in the workplace, Neal and Vallejo (2008) propose that family firms typically possess specific cultural characteristics that stimulate the development of spirituality in the workplace, and Astrachan *et al.* (2020) acknowledge family firm as an especially value-driven form of organization. Literature shows that the theme on how values impact family, business, and

individual decisions continue to emerge (Koiranen, 2002; Simon *et al.* 2012; Zwack *et al.* 2016; Bruck *et al.*, 2018; Camfield and Franco, 2019) in relation to the pursuit of diverse family firm's goals while succession issues remain to be regarded as the most critical stage in the family-owned enterprises (Morris *et al.* 1997; Cabrera-Suarez, 2005; Janjuha-Jivraj and Spence, 2009; Maciel *et al.* 2015; Mathews and Blumentritt, 2015; Costa, 2015; Bizri, 2016; Merchant *et al.* 2017; Bozer *et al.* 2017).

This SLR offers a panoramic view of the spiritual element in a family firm taken from a polyhedral perspective in the light of succession- such a comprehensive overview is missing in the family firm literature. Our main objective was to capture its impact on business dynamics, particularly on succession. The five themes deepened above examine the underlying rationale behind the critical developments in the spirit at work, address its strengths and weaknesses and lead us to where we should go. This process allows us to identify potential research questions worthy of investigation (see Table 8).

The introductory part led us to understand the “what”, “why”, and “how” (Krishnakumar and Neck, 2002) of spirituality in the workplace, perceived in decade-long studies after it was first introduced to the research community as a management variable (Neal and Vallejo, 2008). We increasingly find it opportune to offer a key to answering the same questions focusing on family firms, which Neal and Vallejo (2008) defined as “*incubators of spirituality*” in view of succession. Therefore, the following section provides a road map to pursuing a spiritually enlightened succession process and management through the overlapping correlations of the five main themes.

Tab. 8: A Research Agenda Towards a Spirituality Based Succession

Theme	Suggested Research Questions and Theoretical Perspectives
Spirituality and Context	
a. Spirituality and Religion	<i>Perspectives: Spiritual Leadership Theory, Stewardship Theory, Relational Leadership Theory</i> 1. How does a principle-based approach to management affect succession? (Christian Values) 2. What are the management tools that would support a rule-based perspective to succession? (Islamic Code of Behavior) 3. Do more religious parents have more cohesive family relationships? 4. What religious values are necessary to effective transition? 5. Do successors have resistance to a spirituality espoused by the predecessor?
b. Spirituality, Cultural and Geographical Context	<i>Perspectives: Grounded Theory, Resilience Theory, Social Identity Theory</i> 1. Is effective succession a culturally influenced process? 2. What cultural attributes significantly influence the passage of leadership? 3. Do the political ideologies of the family owners in a particular location affect the succession process? 4. How do the unique cultural characteristics of a specific group maintain/destroy the business continuity? 5. Is the process of succession that ethnic family business adapts reflect their cultural heritage?
Spirituality and Values	
	<i>Perspectives: System Theory, Strategy-as-Practice Theory, Authentic Leadership Theory</i> 1. In which part of the succession process is family values highly manifested? 2. How to assure that family values / spiritual orientation are passed on from generation to generation? 3. During the transgenerational passage, are the spiritual family values considered having the same weight as economic values? 4. Is the selection of a successor linked to his or her values? 5. When do spiritual values a hindrance to succession?
Spirituality Motivation	
	<i>Perspectives: Theory of Planned Behavior, Prospect Theory, Resource-Based Approaches</i> 1. What stimulates the predecessor to accept the responsibilities and stay in the family firm? 2. In the incoming leaders' training process, what spiritual dimension must be instilled in him/ her? 3. What are the determinants of a spiritually motivated predecessor? 4. How are the assumptions and aspirations of future generations of successors that shape their intention to join the company? 5. How does the working environment influence the motivation of the predecessor to propel succession?
Spirituality Development	
	<i>Perspectives: Unification Theory of Succession, Spiritual Leadership Theory, Leader-Member Exchange Theory</i> 1. What are the contributing factors that render the succession process challenging in finding the equilibrium between family firms' economic and spiritual and values dimension? 2. How does the incoming leader reconcile his / her spiritual orientation in the workplace concerning what is found or left behind by the outgoing leader? 3. How does a spiritually oriented leader effectively manage the organizational change brought about by transition by remaining faithful to the tradition while being open to innovation?
Spiritual Diversity	
	<i>Perspectives: Theory of Matriarchy, Succession Theory, System Theory</i> 1. Is the principle of primogeniture a reflection of a self-declared spiritually rooted family firm? 2. What method could be used to effectively transmit the values and legacy from one generation to another without taking for granted the complexity of a leader as a person and his/ her relation to the bigger community? 3. Is the transgenerational passage the same across enterprises' sizes?

Source: Authors' elaboration

The New 'What' of Spirituality in Family Firms (The Meaning)

Following the different mentioned perspectives, literature shows that spirituality in the workplace is a construct that has been widely debated over the last few decades (Schutte, 2016). The controversial nature of the construct (Gotsis and Kortezi 2008) is a much-disputed area of study that is attracting practitioners and academics' attention. Scholars argue that family firms as complex organizational structures offer a fertile ground (Astrachan *et al.* 2020) to define the spiritual dimension because they cross the boundaries of logical, linear business organizations with emotional, inclusive family groups (Janjuha-Jivraj and Spence, 2009). As mentioned earlier, family firms are known to exhibit value-based behaviour (Barbera *et al.* 2019) that is transmitted across successive generations (Flory *et al.* 2010). Grundström and colleagues (2012), in their study of within-family succession, identifies its various aspects, which tend to indicate that values unique to family-owned enterprises influence its efficiency and succession. These influences subsequently shaped how transgenerational entrepreneurship is fostered or disrupted by introducing a particular firm's practices (Eze and colleagues, 2020). To name a few of these succession dimensions, we have marriage arrangement (Eze *et al.* 2020), the role of women (Collins *et al.* 2014; Gherardi and Perrotta, 2016; Nelson and Constantinidis, 2017; Ramadani, 2017 and Ferrari, 2019), the risk-taking orientation, and the feasibility of primogeniture (Eze *et al.* 2020) and situations in which children may be unwilling to take over the firm (Grundström *et al.* 2012). What we accentuate up to this point is the threefold role values play in family firm succession as evidenced in the study: 1. values as the subject of transmission along with the ownership (Cruz, 2014; Barbera *et al.* 2019), 2. values as a tool for succession management (Oudah *et al.* 2018) and 3. values as an after-succession indicator to social legacy (Németh *et al.* 2017; Barbera *et al.* 2019; Cruz, 2014; Astrachan *et al.* 2020). These roles demonstrate how the spiritual values of the family form, on the one hand, the degree of solidarity within the family, and on the other, a value-driven leadership throughout the generation that goes beyond the workplace, reaching the more significant social community.

The New 'Why' of Spirituality in the Family Firms (The Benefits)

The critical reflections on the approach of 'using' spirituality give us the key to addressing it through a person-centred perspective (Morris *et al.* 1997). According to Gupta *et al.* (2011), this method is done through an encounter that brings about cultural change in company decision-making and behaviour, rather than using it as a tool to resolve motivation and productivity problems. The growing interest in organizational spirituality is characterized, as cited earlier, by people looking for a way to connect their professional life (Treviño *et al.* 2006) with their spiritual life, persons searching for greater meaning (Giacalone and Jurkiewicz 2003; Dunchon and Plowman 2005; Gotsis and Kortezi, 2008) that goes far beyond making money (Miller, 1998). The leaders of family firms are also those persons (Wisker *et al.* 2019) who found themselves in the organizations having their varied motives on why they do what they do.

Spirituality fostered by leader's acts both as a means of improving employees' workplace engagement and alleviating the detrimental impact of work-family conflict. (Tabor *et al.* 2019). Enterprises such as Tata Group (Indian enterprise) (Mohapatra and Verma, 2018) and Dudit Hotels Ltd. (Hungary) (Németh *et al.* 2017) as examples of causal spirituality mechanisms, guided sustainable business under the influence of innovation and family values-based leadership. As Tabor and colleagues observed (2019), it is worth mentioning that even when spiritual leadership has positive effects on family workers, it could negatively affect non-family employees facing a high work-family tension.

The correlate of success in business transitions, as identified by Morris *et al.* (1997) occurs to be the family relationships, nurtured by the family's ethical and spiritual values (Németh *et al.* 2017). Despite the focus on succession planning and preparing heirs (Bizri, 2016) both in practice and in literature, it appears that the primary goal of the family business owner (Németh *et al.* 2017) should be to establish trust (Cater *et al.* 2014; Dede and Ayranci, 2014), bridge intergenerational

communication barriers (Zehrer and Leiß, 2014), and foster shared values among family members (Bizri, 2016). These benefits that come from recognizing the spiritual elements, without reducing to any form of “symbolic violence” (Kamoche and Pinnington, 2012) or in the way of instrumentalizing it (Case and Gosling, 2010) for the sole economic ends, lies on emphasizing the person (Morris *et al.* 1997), as a spiritual being in the workplace, contradictory to the studies that commenced with spirituality itself and its reverberation in the business environment as evidenced by Western and pro-capitalist orientation (Wong *et al.* 2018).

The New ‘How’ of Spirituality in the Family Firms (The Way to Implement)

Compared to non-family businesses, Nemeth and colleagues (2017) sustain that family-owned enterprises are more complex entities due to the interplay between family and business system (Bertrand and Schoar, 2006). Our study identifies three main ways that business spirituality literature offers on how to address this inevitable phenomenon unique to family firms. The first method of managing complexity is through the empowerment of *stewardship* (Simon *et al.* 2012) among the leaders because of the presence of pro-organizational and collectivistic, rather than merely individualistic or “self-serving” behaviours (Del Giudice, 2013). Paterson and colleagues’ report (2013), using the respondent’s phrase “*we do not push it on people*”, summarizes what does governance means in a family business dynamics where spirituality is recognized, that is a kind of steward role (Paterson *et al.* 2013).

Among the many attributes of values, there are two which, according to Morris *et al.* (1997) are the most critical issues in relationships between the predecessor and the successor- trust and affability. Family relationships have several facets, including relationships between the descendants, the heirs and the head of the family firm, the heirs and the spouse of the head of the family business, and so on. Trust is characterized by transparency and fairness among family members, as well as trust in the reliability and dignity of the family member. It may be correlated with consistency, integrity, justice, accountability, helpfulness, and benevolence. On the one hand, affability is concerned with shared loyalty between the head of the family firm and the heirs, and, on the other hand, with the minimization of competition, feuding, conflict, and tension. As a consequence, competition is replaced by the hospitality and team approaches to responsibilities and challenges. The other one is based on the framework proposed by Douglas Hicks the *Respectful Pluralism* underlines that the task of effective organizational leadership is not to promote a single spiritual framework but, rather, to create a structure and culture in which leaders and followers can respectfully negotiate religious and spiritual diversity (Hicks, 2002). Although the approach of respectful pluralism allows a high degree of one’s expression at work, it must also create limits on personal expression (whether religious, spiritual or otherwise), based on whether or not other employees experience coercion or degradation from an employee’s expression (Gotsis and Kortezi, 2008). As a family business grows and becomes more highly complex, a clearly defined set of procedures become imperative. To respond to the call for a multi-perspectives examination of leadership succession and embrace the dynamic and complex nature of succession in a family business, this paper offers these three approaches through the lens of spiritually oriented leaders.

Implications and Limitations of the Study

This study shows interesting implications for scholars and practitioners.

Scholarly contributions are twofold. First, findings contribute to family business studies by deepening the role of spirituality and values in family firm succession, ordering the fragmented literature of the last 30 years through the identified five thematic groups and consequent propositions. Moreover, the rich research agenda, underlining gaps in the literature, contains several future studies suggestions. In detail, the rigorous SLR carried out offered propositions that depend heavily on well-grounded assumptions and available interdependent evidence shown, particularly in the discussion of its five main themes. Therefore, it has implications for theory as it has added a

new paradigm that can be used for future research. Pursuant to previous family business studies, it has shown the pressing and ever-challenging phase of succession every family firm needs to deal in a multidimensional perspective. The series of questions and theoretical perspectives under every theme presented in the research agenda opens a multiplicity of research opportunities. Future research can use the salient constructs identified (integrality of the human person, family and business reciprocity, and the coexistence between economic and spiritual logic) to study the significance and interconnections of these determinants in individual countries and determine the elements that are of the highest importance to family business continuity in their country. Second, results contribute to general management literature by extending previous studies on spirituality and values, focusing on a specific niche: family firm succession, offering new insights from which to orient scholars' attention. Family firms serve as fertile ground for spirituality, hence nourishing a family's legacy through the bond of mutual respect. This change of paradigm, beginning with an integral perspective of a leader as a person, regard his leadership as part of one's human development. The reciprocity between family and business through spiritual values continues when each generation of the predecessor and the successor enter into a formal collaboration and co-create business policies, praxis and vision-update that express family values in the business. Without ignoring the generational differences in terms of how they put preferences on different values, its continuity across generations happens when the owning family holds occasions to celebrate values. The economic and spiritual logic is reflected when owners' synergy enables them to generate business policies and practices coherent with family values.

For practitioners, findings showed the relevance that spirituality and values have on management and governance. The spirituality that is argued to be innate in every person intersects with succession process, a process being identified as one of the most important family business dynamics, through the variables of the analysis's main findings. The results showed that a value-and spiritual-based approach to management ensures *the integrality of human person (spirituality as an integral part of human experience)*, *reciprocity (relationship between family and business in family business)*, and *the coexistence between economic and spiritual logic*. This study consolidates the "wholeness" (Hicks, 2002) of a human person through the lens of the leader and suggests that "strategizing" the transmission of values and knowledge as a cornerstone in the family firm and leadership succession facilitates the predecessor-successor transition an encounter connecting tradition and innovation.

The study's main drawback is related to the dataset, which included only articles, intentionally excluding books, chapters, proceedings, and other sources that, in further studies, could be included. Moreover, this study focused on spirituality in family firms and its possible repercussion on succession. Although this is our main goal, focusing only on the predecessor-successor relationship limits us to look at the bigger picture of the organization that involves the different stakeholders. The study also fails to identify family spiritual values' attributes and how the predecessor and the successor bring them in business activities. Future studies can contribute to filling the mentioned limitation, that however, do not reduce the relevance of the study that offers several potential ways to understand what, why and how 'spirituality' nestled in the family firms.

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Appendix 1. Data Set

#	Year of publication	Author(s) and title	Journal
1	1991	Chau, T. T. Approaches to succession in East Asian business organizations.	Family Business Review
2	1996	Kaye, K. When the family business is a sickness.	Family Business Review
3	1997	Morris, M. H., Williams, R. O., Allen, J. A., & Avila, R. A. Correlates of success in family business transitions.	Journal of business venturing
4	1999	Yao, X. Confucianism and its modern values: Confucian moral, educational and spiritual heritages revisited.	Journal of Beliefs and Values
5	1999	Cavanagh, G. F. . Spirituality for managers: Context and critique.	Journal of organizational change management
6	1999	Freshman, B. An exploratory analysis of definitions and applications of spirituality in the workplace.	Journal of organizational change management
7	2000	Barnett, C. K., Krell, T. C., & Sendry, J. Learning to learn about spirituality: A categorical approach to introducing the topic into management courses.	Journal of Management Education
8	2002	Koironen, M. Over 100 years of age but still entrepreneurially active in business: Exploring the values and family characteristics of old Finnish family firms.	Family Business Review
9	2002	Krishnakumar, S., & Neck, C. P. The “what”, “why” and “how” of spirituality in the workplace.	Journal of managerial psychology
10	2002	Hicks, D. A. Spiritual and religious diversity in the workplace: Implications for leadership.	The leadership quarterly
11	2005	Reave, L. Spiritual values and practices related to leadership effectiveness.	The leadership quarterly
12	2005	Dent, E. B., Higgins, M. E., & Wharff, D. M. Spirituality and leadership: An empirical review of definitions, distinctions, and embedded assumptions.	The leadership quarterly
13	2005	Cabrera-Suarez, K. Leadership transfer and the successor’s development in the family firm.	The Leadership Quarterly
14	2006	Bertrand, M., & Schoar, A. The role of family in family firms.	Journal of economic perspectives
15	2006	Fernando, M., & Jackson, B. The influence of religion-based workplace spirituality on business leaders’ decision-making: An inter-faith study.	Journal of Management & Organization
16	2008	Gotsis, G., & Kortezi, Z. Philosophical foundations of workplace spirituality: A critical approach.	Journal of Business Ethics
17	2008	Neal, J., & Vallejo, M. C. Family firms as incubators for spirituality in the workplace: Factors that nurture spiritual businesses.	Journal of Management, Spirituality & Religion
18	2008	Karakas, F. A holistic view of spirituality and values: the case of global Gulen	Journal of Management, Spirituality

		networks.	& Religion
19	2009	Janjuha-Jivraj, S., & Spence, L. J. The nature of reciprocity in family firm succession.	International Small Business Journal
20	2009	Marschke, E., Preziosi, R., & Harrington, W. Professionals and executives support a relationship between organizational commitment and spirituality in the workplace.	Journal of Business & Economics Research
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22	2010	Case, P., & Gosling, J. The spiritual organization: Critical reflections on the instrumentality of workplace spirituality.	Journal of Management, spirituality and Religion
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Gender diversity on corporate boards: when raising the voice is not enough

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Abstract

Objectives. To understand the “black box” of boardroom behavior, we test the impact of the critical mass of female directors on a set of board processes. Using the two thresholds indicated by the gender quota law, we distinguish between two possible situations that women face: (1) raising the women voice and (2) having the women voice heard.

Methodology. For a sample all of the 40 Italian companies listed in the FTSE MIB over the years 2008 - 2015, we employ an econometric model to test our research question

Findings. We provide evidence that when women raise the voice (i.e. reaching at least 20% of board seats), boards devote more time on their activities and the cognitive conflicts among members is enhanced. But when the women’s voice is heard (i.e. reached the threshold of 33% of women), boards increase the directors’ attentiveness and women become particularly effective in boosting the cognitive conflicts.

Research limits. In our analysis we use proxies of board behavior that are built from secondary data.

Practical implications. Our findings give insights for the implication of gender quota regulation, offering new understanding of the contribution of women at decision-making position levels.

Originality of the study. We further develop the critical mass theory in the context of women on boards, focusing between two different situations that women might face. We analyze the channel variables between women on boards and corporate governance, investigating board behavior and board dynamics.

Key words: corporate governance; women on boards; gender diversity; board processes; critical mass; gender quota.

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Introduction

In recent years, a number of countries have started to discuss regulations, policies and practices to increase the number of women on corporate boards (Casey, Skibnes, Pringle, 2011; Cook and Glass, 2014; Labelle et al., 2015; Cullen and Murphy, 2018). The promotion of gender diversity is based on the reasoning that women contribute to better corporate governance and hence, firm performance (Wiley and Monllor-Tormos, 2018). A major assumption underlying this relationship is that women bring different resources, qualities, and managerial practices to the board that potentially enhance board performance. The value that women add and bring to the boardroom remains puzzled, and the empirical evidence calls for additional verification (Huse et al., 2009; Nielsen and Huse, 2010a; Nielsen and Huse, 2010b; Wiley and Monllor-Tormos, 2018).

Prior corporate governance studies capture gender diversity as the following measures: the ratio of women on the board, the presence of women (dummy) and the number of women (Gabaldon et al., 2016; Post and Byron, 2015; Terjesen et al., 2009). The effects of gender diversity on board outcomes are not conclusive. Drawing on the theory of critical mass, we explore when female directors, as the minority, influence the group work in the boardroom and bring pronounced improvement in the engagement of the directors in the board activities. We argue in line with the emerging literature (Konrad et al. 2008; Torchia et al. 2011) that female directors are more effective when the critical mass of women on boards is reached. When women reach a critical mass they are more likely to raise the voice. However, raising the voice may be not enough to influence certain board processes. In our study, we focus on two distinct sets of board processes: (1) effort norms and (2) cognitive conflicts. The effort norms are expressed as (a) the time that board members devote to the board activities and (b) the degree of attentiveness and participation of board directors. Cognitive conflicts refer to the presence of multiple viewpoints that create task-content related disagreement among board members.

Considering the thresholds imposed by the gender quota law in Italy, our study shows that the critical mass of women impacts board processes through improving board effort norms, as well as by boosting the board's cognitive conflict. We demonstrate that when women reach the threshold of 20%, boards devote more time to the board activities and the cognitive conflict is enhanced. Moreover, we provide evidence that the threshold of 33% of women on boards is necessary to have an impact on the degree of attentiveness of the directors and to boost the cognitive conflict among members. Our results suggest that raising the voice of women (which is likely to occur when the women reach the threshold of 20%) is required to impact the time that boards employ in its activities. But to impact the director's attentiveness and to enhance the cognitive conflict among members, the women's voice should be heard (which is likely to occur when the women reach the threshold of 33%).

The paper contributes to the research literature in three ways. First, we validate the critical mass theory in the context of women on boards that has drawn limited attention from empirical studies (Joerck et al., 2013; Torchia et al., 2011; Konrad et al., 2008). We show not only if but also how the critical mass of female directors matters for board activities. For this type of analysis, the country selection is crucial. Italy gives a particularly interesting context as reaching the critical mass of women is seen as the main political argument in favour of introducing quota regulations on boards (Torchia et al., 2017). Prior to the law, in 2008, the average percentage of women who held a corporate board position was less than 5% (European Commission, 2018). The law mandated a gender quota for the Italian-listed companies and for state-owned enterprises that was binding as of 2012. In the first board term after the enforcement of the law, the board must have reached the intermediate threshold of 20% of female directors. In the subsequent board term, 33% of the board seats must have been held by women. The law is well enforced (Desana 2017), as there is a wide range of sanctions such as a warning, a fine and the dismissal of all board members¹. In 2015, the

¹ Specifically, if a company does not comply with the new regulation, it will receive a warning asking for compliance within a period of four months. If the company does not comply with the term assigned, the authority that regulates the Italian Stock Exchange (called CONSOB) has the power to impose a monetary penalty between one hundred

percentage of women on boards in Italy was one of the highest in the European Union (EU Commission). Thus, in this setting of the quasi-natural experiments, we test the critical mass theory applied to women on boards. Second, we also contribute to the stream of research on the gender diversity and corporate governance. Our study expands on Wiley and Monllor-Tormos (2018) by focusing on the channel variables between women on boards and corporate governance. Our study is placed in this research stream as we add to the literature about the potential sets of board processes, investigating board behaviour and board dynamics (Machold and Farquhard 2013; Nielsen and Huse, 2010a; Nielsen and Huse, 2010b; Gabaldon et al., 2019). Moreover, we contribute to the discussion how increasing the percentage of women on boards affects board activities.

The rest of the article is organized as follows. The theoretical framework of the critical mass of women on boards is reviewed in the next section. After formulating the hypotheses, the dataset, the variables and the methods used are presented. In the subsequent section, the results of our study are discussed. Finally, conclusions and implications for policy makers and regulators are drawn.

1. Theory and Hypothesis

1.1. Critical mass of women on boards: from raising the voice to having the voice heard

We built our research on the seminal work of Kanter (1977) that pioneered the critical mass theory. In her analysis, she focuses on the challenges faced by a minority, such as women in a male-dominated environment. When women are underrepresented, they may be seen as a symbol - a token. Kanter identifies three behavioural challenges of being a token: visibility, polarization and assimilation. First, visibility relates to the situation when the minority group finds itself being constantly watched. They are afraid to make any mistakes that can be perceived as fatal, and thus they tend to work much harder than men to receive recognition. Simultaneously, they are subject to increased performance pressures. Second, polarization takes place when men may exclude the minority group from informal networks as they feel uncomfortable around women. Thus, men will exaggerate their similarities and emphasize the differences between men and women to isolate women from networking. Third, assimilation pushes women through the process of accepting the gendered stereotypes defined by men. Hence, only limited roles and work are assigned to women. This only perpetuates stereotypes and continues to set women apart from the position of men within the group. The contribution of the token to the group can be hindered by stereotyping and categorization. Individuals tend to categorize others according to easily observed categories such as gender (Carli and Eagly, 2002; Tajfel and Turner, 1986). When no other information is available, people rely on gender stereotypes, which are the women's values, attitudes and behaviour (Bird, 2003). Individuals favour those who are similar to them (Goodreau, Kitts and Morris, 2009). However, stereotyping and categorization create isolation, discomfort and a lack of confidence among minority members (Ely, 1994; Heikes, 1992; Kanter, 1977; Simpson, 1997, 2000; Simpson and Lewis 2005). Thus, they hinder the exertion of the minority's influence on the group and on its decision.

Negative stereotyping and the social categorization are even stronger in the upper echelons of the company, due to the need for trust (Stafsdudd, 2006). The board work largely depends on each member; thus, the effect of the critical mass of female directors on group performance would be more pronounced in the boardroom than in other contexts. On boards, one may assume actions, values, commitment and loyalty are based on easily observable demographic characteristics, such as gender. When there is little personal knowledge and no time for communication, board directors rely on shared understating. These challenges that women face may be changed when the numerical representation of women increases. According to critical mass theory (Kanter, 1977), women will

thousand euro to one million euro. In the event of repeated non-compliance, CONSOB could also terminate the appointment of the board members (see Law 120/2011 and Law Decree 58/1998 art 147).

not behave like a token, when the numerical representation of women in a group is between 20% - 40%. Joecks et al. (2013) prove that the critical mass of female directors lies in the range of 20% to 40% female directors. When women reach a critical mass, they are not treated as tokens and they can influence the decision-making culture of the board. Gender is no longer a barrier to acceptance and communication. Women are free to raise questions but they are more likely to be heard once their numerical representation increases (Konrad et al., 2008).

There is a limited number of empirical studies that verify the critical mass theory in the context of women on boards (Konrad et al., 2008; Torchia et al. 2011; Joerck et al., 2013; Wiley and Monllor-Tormos, 2018). The first empirical study that identifies the behavioural consequences of being a token on a board is Konrad et al. (2008). The authors document the following behaviour towards tokens: hypervisibility or invisibility, isolation, being stereotyped and viewed as representing all women, and needing to work hard to have an impact on the group. Women, being the minority on the boards, choose to be socially invisible and maintain a low profile within the board. Empirical research shows that powerful men who are sitting on boards tend to connect and socialize with men who are similar to them (Nielsen, 2009; Stafsudd, 2006). Nielsen and Huse (2010b) confirm that gender stereotypes may limit the potential influence of women on boards working as a group. They demonstrate that the perception of women as unequal board members may limit their potential contribution to board decision-making. Being tokens, women tend to perform caricatural roles more as symbols than as substance on the boards. Torchia et al. (2011), testing critical mass theory in the board context based on the primary data from Norwegian boards, confirm the previous research outcomes. Specifically, they show that as being tokens, female directors are unable to positively impact strategic board tasks and organizational innovation. The empirical evidence confirms the critical mass theory that gender diversity cannot matter if women are only tokens. Focusing on the relationship between board gender diversity and firm performance, Wiley and Monllor-Tormos (2018) suggest that below the critical mass threshold, women may represent a disadvantage to the board as it may facilitate the formation of subgroups, dysfunctional conflicts, and distrust. However, at or above the critical mass threshold, women facilitates better monitoring of management, greater resource provisions, and divergent thinking. Building on that, we look inside the boardroom, focusing on the relationship between the critical mass of women and board processes.

1.2. Gender diversity and board processes

Drawing from the critical mass theory, we look at the relationship between certain thresholds of women on boards, indicated by the gender quota law, and a set of board processes. We built on the conceptual framework from Forbes and Milliken (1999) that consider board processes as an intermediate step between board characteristics and board performance. In this section, we discuss two board processes: (1) effort norms and (2) cognitive conflicts.

The first board process captures the effort of individual board members (Steiner, 1972; Wageman, 1995). Hence, effort norms ensure a high level of preparation, participation and analysis of the board contributing to its activities. There are two important manifestations of the board effort norms: (1) the time that directors devote to their tasks and (2) the degree of attentiveness and participation of directors to their tasks. The manifestations of effort may be more pronounced by female directors. Previous studies show that the presence of women on boards improves firm monitoring as they are perceived as not part of the "old boys network". According to the critical mass theory, women as a minority have harder jobs to establish credibility and influence other board members. They are not perceived as not part of the "old boys network" (Ibarra, 1993; Holgersson, 2020). All these make women more vigilant than men about preparing for board meetings (Singh et al., 2002; Huse and Solberg, 2006). Konrad et al. (2008), analysing the impact of the critical mass of female directors on their behaviour on the board, shows that women who are part of the minority feel free to raise issues. We expect that the change of women's status in

boardrooms from tokens to fully fledged board members should occur when certain thresholds of female directors are reached. Hence, we hypothesize as follows:

Hypothesis 1: At the thresholds of 20% of female directors, women raise their voice and they improve the board effort norms expressed as the time devoted to their tasks.

The degree of attentiveness and participation in board meetings refers to carefully scrutinizing information provided by management before meetings, finding information regarding issues relevant to the company and actively participating during meetings. Compared to men, women experience more difficulty establishing credibility and influencing others. This means that they tend to put more effort into preparing and participating in board meetings (Carli, 1999; Foschi, 2000; Singh et al., 2002). Izraeli (2000) and Huse and Solberg (2006) argue that women prepare conscientiously for board meetings. Thus, women directors frequently ask questions, so they tend not to quickly acknowledge information circulated by executives. Women are likely to question business practices that are unethical (Franke, et al., 1997) and tend to apply stricter ethical standards (Pan and Sparks, 2012). While women are likely to raise their voice when they reach a critical mass, they may encounter difficulties being heard (Belenky et al., 1997; West and Zimmerman, 2002). We argue that the numerical representation of the minority shifts the board behaviour: the board members accept women and perceive them as equal colleagues. Thus, we hypothesize as follows:

Hypothesis 2a: At the thresholds of 20% of female directors, women raise their voice and the board members' attentiveness is improved.

Hypothesis 2b: At the thresholds of 33% of female directors, women's voice is heard and the board members' attentiveness is improved.

The second board process is cognitive conflicts. It refers to the presence of task-content related disagreement among board members (Jehn, 1995). Hambrick et al., (2008) and Huse and Gabrielsson (2019) define boards as interdependent groups which may face difficulties with interactions among them and their capacity to work as a team. The board effectiveness as a group depends on the utilization of the knowledge, skills, multiple viewpoints available on the boards. Gabrielsson et al. (2007) argue that individual board members do not possess all of the relevant knowledge and information needed on the board. Using the collective knowledge tapped from each individual board member, assembled within the board, determines the effectiveness of the board as a group. Therefore, working as a group has a higher impact on the outcome than the efforts of individual board members.

Female directors bring diversity in terms of knowledge and skills (Ross-Smith and Huppatz, 2010). Studies demonstrate that female directors differentiate themselves from male board members in terms of education, e.g., they more frequently hold MBA and PhD degrees and professional experience (Hillman et al., 2002). Prior studies show that they are more likely than men to have a managerial position in areas related to human resources, corporate social responsibility, marketing and advertising (Zelechowski and Bilimoria, 2004). Women have more international experiences, but they are less likely to work in the position of CEO or COO (Terjesen et al. 2009).

As women bring different perspectives and experiences compared to male directors, they may stimulate discussions and engage in the debates (Pearce and Zahra, 1991; Burke, 1997). Thus, they positively affect cognitive conflict (Torchia et al., 2017). However, too diverse a group may result in interactions based on formal communication and bureaucratic procedures (Millikin and Martin 1996). Thus, the decisions are made with a slower pace. Homogenous groups use the same language; hence, consensus is reached faster.

On one hand, Bart and McQueen (2013) and Adams and Funk (2012) indicate that female board members are more likely to use cooperative decision-making and value interdependence and tolerance. Additionally, women are more empathetic than men and thus are more likely to accept others' standpoints (Eagly and Johannesen-Schmidt, 2001). Thus, women provide different work

styles (Daily and Dalton, 2003) and create a good working atmosphere in the boardroom, standing up for different values than male directors (Huse and Solberg, 2006).

On the other hand, women are more likely to question conventional thinking (Huse and Solberg, 2006; Bilimoria and Wheeler, 2000). This opens debates and cognitive conflicts that facilitate the exchange of information among board members (Amason and Sapienza, 1997). The nature of the interactions between board members depends upon the size of the minority within the group, e.g., female directors. Based on the above arguments, we posit the following hypotheses:

Hypothesis 3a: At the thresholds of 20% of female directors, women raise their voice and they improve the cognitive conflicts

Hypothesis 3b: At the thresholds of 33% of female directors, women's voice is heard and women become particularly effective in boosting the cognitive conflicts

2. Method

2.1. Sample and data

Our sample consists of all of the 35 Italian companies listed in the FTSE MIB index and includes observations from 2008 to 2015. The choice of the sample and the research period are in line with the aim of the study to examine the effect of the critical mass of female directors on a certain set of board processes. Italy introduced a law in 2012 on the required quota of female board directors for public companies and state-owned companies. Specifically, in 2012, every listed company had to comply with the regulation and reach the intermediate threshold of 20% of female directors on the board for the first post-law board term and then 33% for the subsequent board terms. Since the thresholds are enforced by the quota law, it is considered to be an exogenous shock to understand the effect of the critical mass of female directors on board processes.

To test out hypotheses, we used data from Thomson Reuters - Datastream ASSET4 ESG database. This database provides detailed information on some of the board processes, such as certain corporate governance policies for guiding the behaviour of board members, descriptions on board routines and the time dedicated to the board activities. The original data source are the company's annual reports on corporate governance, financial statements or any other publicly available documents that were related to the company's corporate governance. Measures of board processes are based on scores calculated by equally weighting and z-scoring all underlying data points and comparing them against all of the companies in the ASSET4 ESG database. A higher score indicates a better board process and a better performed board task.

2.2. Variables

The dependent variables are related to the board processes discussed in the theory and the hypotheses development sections. Based on the research (Forbes and Milliken 1999; Huse 2005; 2007; van Ees et al., 2009), we distinguish a set of board processes: 1) the effort norms related to the time that the board member devotes to their activities; 2) the effort norms expressed as the board members' attentiveness and participation; and 3) the cognitive conflict.

The first board process is proxied by board attendance and board meetings. The board attendance and board meetings capture the time that directors devote to board activities. These two proxies also measure the flow of information between board members. The more intense the flow is, the better the understanding of the company activities. Thus, board members are more prepared for the decision-making process.

Being present and well prepared for board meetings, is necessary, but not sufficient, to getting involved in board activities and participating in the boardroom discussions. Hence, we introduce the second board process as the effort expressed as the board members' attentiveness. This includes a set of norms and codified rules that guide board members' behaviour (Van Ees et al. 2009; Nielsen

and Huse, 2010b). These codified rules are policies related to different areas of board activities, board induction programmes, systematic board evaluations and board work instructions. This board process is proxied by the following comprehensive score item assessing internal improvement and information tools to develop appropriate and effective board member behaviour.

The third board process is cognitive conflicts. We proxy the level of cognitive conflict in the boardroom by the presence of a well-balanced board composition in terms of experience, knowledge, skills and qualities. We use the following score item assessing the company's rule to maintain a well-balanced board.

We use two dummy variables that indicate the two thresholds of women on the board introduced by the gender quota law: 20% and 33%. The coefficient of the dummy variables measures, respectively, the effect of raising the voice and the effect of having the voice heard on board processes.

We include control variables related to the board characteristics that affect board processes. Board size and board independence have been considered two of the most important variables in explaining board activities (Dalton et al., 1998). The former is measured as the total number of directors sitting on board. The latter is measured as the percentage of independent directors on board. The busy directors' variable is measured as the average number of other corporate affiliations of the board member, and the CEO duality is a dummy variable that is equal to 1 if the CEO is also the Chairman. As a proxy of firm size, we use Total Assets. All variables are defined in table 1. Table 2 reports the descriptive statistics.

Tab. 1: Variables description

Variable	Description
<i>Time devoted by the board member to board activities</i>	The average number of attendances of the individual board members at board meetings (score) Number of board meetings per year (score).
<i>Attentiveness and participation</i>	Score item assessing the presence of necessary internal improvement and information tools to develop appropriate and effective board functions and committees
<i>Cognitive conflict</i>	Score item assessing the company's rule to maintain a well-balanced board in terms of experience, knowledge, skills and qualities.
<i>Women 20%</i>	It is a dummy equal to 1 if the percentage of women in the board is equal or greater than 20%. Zero otherwise
<i>Women 33%</i>	It is a dummy equal to 1 if the percentage of women in the board is equal or greater than 33%. Zero otherwise
<i>Independent directors %</i>	Percentage of independent board members as reported by the company.
<i>CEO duality</i>	It is a dummy equal to 1 if the CEO is also Chairman. Zero otherwise
<i>Busy directors</i>	The average number of other corporate affiliations for the board member
<i>Board size</i>	The total number of board members at the end of the fiscal year.

The Scores are calculated by equally weighting and z-scoring all underlying data points and comparing them against all companies in Datastream. The resulting percentage is therefore a relative measure of performance, z-scored and normalized to better distinguish values and position the score between 0 and 100%. A Z Score, or "standard score" expresses the value in units of standard deviation of that value from the mean value of all companies.

Source: Own elaboration

Tab. 2: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Time devoted by the board member to board activities (Board Meetings Score)</i>	225	57.12	26.55	1	100
<i>Time devoted by the board member to board activities (Board Attendance Score)</i>	256	41.20	29.82	0	95.90
<i>Attentiveness and participation</i>	256	64.34	26.36	5.47	81.89
<i>Cognitive conflict</i>	256	61.25	2.79	54.51	63.65
<i>Female directors %</i>	256	13.48	11.75	0	50
<i>Independent directors %</i>	238	55.09	22.58	0	100
<i>Board Size</i>	256	15.77	5.77	8	38
<i>Busy directors score</i>	250	54.51	29.27	0	90.71
<i>Firm size (total assets)</i>	307	9.45*10 ⁰⁷	1.81*10 ⁰⁸	63404	1.04*10 ⁰⁹

For the definition of the variables, see table 1.

Source: Own elaboration

2.3 Method of analysis

To investigate the effect of the critical mass of female directors on board processes, we estimate the multiply regression analysis using two distinct sets of board processes. The two thresholds of the critical mass of female directors identified by the gender quota law, 20% and 33%, are regressed on : 1) the effort norms expressed as (a) the time that the board member devotes to the board activities and (b) the degree of attentiveness and participation of the directors, and 2) the cognitive conflicts expressed as the presence of multiple viewpoints that create task-content related disagreement among board members. We use fixed effect estimations controlling for industry effects. Results are clustered for the firms.

Table 2 presents descriptive statistics. The mean value of the scores for the variables representing the time devoted to the board activities is respectively 57.12. (board meeting score) and 41.20 (Board attendance score). The average value of the variable “attentiveness” is 64.34. The score that proxies the cognitive conflict is 61.25. All these three measures are valued by scores that goes from 0 to 100 (Datastream, 2017). A high score indicates a high level of board engagement in its activities.

Regarding the control variables, the average board size is about 15.77 members and the board independence is over 55%, showing that in most of the largest listed companies, the majority of the directors is independent. CEO duality occurs in 19% of companies.

The average representation of women on boards in our sample is 13%. The investigated period includes 2012, the year that introduce the gender quota law. The introduction of this new requirement about the gender balance in the boardroom has changed the board composition, increasing the proportion of women on boards. For this reason, we also provide descriptive statistics by year (Table 3). In 2005, the average percentage of women on boards is 3.25% and in 2017 it is 26.50%. In 2005, 25% of the companies reach the first threshold required by the law (20% of women on boards) and 22% of the companies - the threshold of 33%. After the introduction of the board gender quota law, the average percentage of companies that have at least 20% of women on boards increases moving from 38% in 2012 to 92% in 2015. Whereas the average percentage of companies that have at least 33% of women on board equals 23% in 2012 and 38% in 2015.

Tab. 3: Percentage of women by year (average values)

Variable	Women on Boards %	20%	33%
2008	3.25	0.25	0.22
2009	3.65	0.25	0.22
2010	7.74	0.25	0.20
2011	8.47	0.26	0.20
2012	13.45	0.38	0.23
2013	19.31	0.58	0.30
2014	24.34	0.75	0.38
2015	26.50	0.92	0.38

Source: Own elaboration

3. Results and discussion

The regression results show the different effects of the thresholds of critical mass of women on board processes (Table 4). Specifically, we find that the effort norms (models 1 to 6) measured as the time devoted by directors to the board activities and the board directors’ attentiveness are affected by the threshold of 20% of women. At this threshold, women raise their voice. When the board has at least 20% of women, board attendance rises by 2.77. The critical mass of 20% also has a positive and significant effect on the number of board meetings (score). When the percentage of

women on boards is at least 20%, the number of board meetings score increases by 3.64. Board meetings are a fundamental source of inside firm information for directors. Hence, the higher the number, the more relevant the information the board members can acquire, and the better quality of decisions boards can make. Boards with higher female representation are also more likely to engage in constant professionalization on the job by organizing extra meetings such as orientation programmes or deep dives (Huse and Solberg, 2006). The difference in the board member's behaviours in terms of time devoted to the board activities is visible at the threshold of 20%. Raising the women's voice makes the board more engaged in its activities. At the critical mass of 33%, board members do not change their behaviour. Thus, at the threshold of 33% of women, boards may just carry on with this new attitude. Our results suggest raising the women's voice matters to increase the directors' time spent in board activities.

The critical mass of women also improves the effort norms measured as board members' attentiveness. Meeting the threshold of 20% of women on boards significantly and positively affects the attentiveness of the board members. When the percentage of women reaches 20%, the attentiveness score rises by 4.46. This effect more than doubles when the percentage of women is equal to or higher than 33%. Our results suggest that boards benefit from women who raise the voice. But at the threshold of 33% of women, the women's voice is heard and the board members change their behaviour, increasing their attentiveness towards the board activities.

Gender diverse boards are more often engaged in board activities, such as a regular board assessment and a review of the balance of board skills, knowledge and experience, as well as CEO succession planning (Singh and Vinnicombe, 2004). Huse and Solberg (2006) state that women directors, being less experienced board members, may devote time to board evaluation and identify areas for improvement. They also indicate that boards with higher women representation are also more likely to engage in constant professionalization, as female directors are devoted to improving their visibility. They are diligent, and they work hard as a board member to avoid having stereotyped women's roles assigned to them within a team of board members. These benefits are particularly present when women's voice is heard and the board is able to exploit the advantages of a more balanced board.

The second board process is cognitive conflict. The thresholds required by the law also have a positive effect on the level of cognitive conflict. A 20% and 33% percentage of women on the board improved the wellness balance of the board score by 0.87 and 0.78, respectively. It seems that at the thresholds of 20% and 33%, boards have just the right amount of diversity in terms of skills, experience and competences, and the level of cognitive conflict increases. Raising the voice and being heard improve the cognitive conflict among board's members.

Regarding the control variables, the CEO duality has a positive and significant effect on the time that the board members devote to the board activities (i.e. board meetings score) and on the cognitive conflict. On the contrary it has a negative and statistically significant effect on the attentiveness of the directors to the board activities. The variable board size has a negative effect on the board meeting score, showing that higher the number of board members is, lower is the time devoted to the board activities. However, the board size has a positive effect on the cognitive conflict. This means that the number of board members stimulate disagreements useful to discuss board decisions.

4. Conclusion

In recent debates on gender equality, there is a growing emphasis on the benefits of increasing the number of women on corporate boards. Our study moves the discussion further, focusing on the relationship between the critical mass of women on boards and boards activities, focusing on two status of women: raising the voice and having the voice heard. Building on the critical mass theory, this article contributes both to theory and practice by studying the effect of the two measures of the critical mass of female directors introduced by the gender quota law on board processes.

The major novelty of the research is to provide evidence that different thresholds of critical mass bring different effects on board outcomes depending on the type of board processes. Our findings show that boards that reach the threshold of 20% of female directors identified by the quota, devote more time to the board activities. Boards that reach the threshold of 33% of female directors have a higher attentiveness. The threshold 20% makes women more likely to ask for additional information and raise their voices. This pushes the board members towards greater diligence and stronger engagement in the board activities. With the threshold 33% women are perceived as an equal colleague and the board becomes more attentive to its activities.

We also document that when women raise the voice (reaching 20% of the board seats) and their voice is heard (reaching the threshold of 33%), they improve the level of cognitive conflict in the boardroom, setting the scene for better board decision-making processes. One explanation could be that when the critical mass reaches 20%, the minority feel more comfortable to raise their voice. When they reach the threshold of 33% they become more accepted by the majority in the group. This means that their different knowledge and information are more likely to be utilized.

The paper makes several contributions to the academic and professional debate on women on boards. First, we test the validity of the critical mass in the context of women on boards. Our result shifts the debate about gender diversity in the boardroom from the ratio/presence of female directors to the critical mass of raising the voice and having the voice heard.

Second, in contrast to previous research, we demonstrate that certain board processes may require different dynamics of the board as a working group, and thus, raising thresholds of the critical mass of female directors brings different effects.

Third, our study contributes to corporate governance research by offering a new understanding of how gender diversity influences corporate governance. We explore what is happening in the “black box” of the boardroom. The focus on board processes provides a better understanding of how boards operate and how the critical mass of women affects board activities. Our study fits in with the trend of research opening “the black box of board behaviour” (Machold and Farquare, 2013, Zattoni et al. 2015, Zona and Zattoni 2007; Brown and Kelan 2020).

Fourth, this study has important implications for corporate boards and policy makers. In preparation for implementing the Directive of the European Parliament and of the Council on improving the gender balance on boards of companies listed on stock exchanges, several governments across Europe have adopted quotas to increase gender diversity on corporate boards, including Italy. The requirements of the critical mass of female directors on corporate boards of Italian companies will not be mandatory after 2030. Our research demonstrates that different threshold of critical mass of women on board have improved a certain set of board processes. It advocates quota regulation as an effective and the only enforceable affirmative measure of reaching the critical mass of female directors. Reaching the critical mass of women brings added value to the boardroom. This is a way to show male leaders that the essential gender beliefs are a myth. Changing the underlying belief is crucial to motivate men to become change agents for gender equality. It may be especially crucial in countries that traditionally have very low institutional support for women in their careers, unlike in the Nordic countries, predominately Norway, which most research has referred to.

We also acknowledge some limitations of the study and directions for future research. First, the research demonstrating how women contribute to better decision-making processes is unexplored. Understanding which board decisions are impacted by the changes to decision-making processes enforced by women’s presence on boards is key to understanding the contributions made by gender diversity. More qualitative studies are needed to reveal the extent to which decisions change when more women were nominated to the board.

Second, we do not test the interrelation between different board processes. More research is needed on the relationship between the critical mass of women and board processes, as it may be critical to understand the value added when women are on boards.

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Explaining the relationship between product authenticity and consumers' willingness to pay: what is the role of product traceability?¹

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Abstract

Objectives. *This study aims to explore the role assumed by product traceability on the relationship between product authenticity and consumer's willingness to pay (WTP) for agri-food products, specifically for organic olive oil. Traceability is observed as a crucial factor in the agri-food sector, by preventing deliberate or accidental mislabeling (i.e., adulterations, frauds, scandals).*

Methodology. *Quantitative data were collected from a convenience sample of consumers with an online survey built on the Qualtrics software platform. The study was conducted in Spain, considered as the first most important producer of organic olive oil in the world.*

Findings. *The findings provide preliminary evidence that product traceability plays a mediating role in the relationship between product authenticity and consumer's willingness to pay for organic olive oil.*

Research limits. *This study adopts an exploratory approach and was developed only in the Spanish context. It would be useful to perform the analysis in other relevant olive oil producing countries, such as Italy or Greece. Additionally, the study focused on a specific type of foodstuff product (i.e., the organic olive oil product), then to corroborate the validity and generalizability of the findings further research will focus on different foodstuff products.*

Practical implications. *Findings contribute to the literature on the authenticity construct and allow to draw implications for the marketing of agri-food products.*

Originality of the study. *Through empirical evidence, this study sheds some light on the under-investigated nature of the role of product traceability in the relationship between product authenticity and consumers' willingness to pay in the literature.*

Key words: *Product Authenticity; Willingness to Pay; Product Traceability; Organic olive oil product; Spain.*

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1. Introduction

Currently, the number of consumers interested in food safety (Röhr *et al.*, 2005; Grunert, 2005) and health products (Maddock *et al.*, 1999; Olsen, 2003) has continuously increased. However, the effects of the globalization of agricultural markets imply that consumers come into contact with a boundless variety of foods. Nevertheless, if, on the one side, food market globalization allows the consumer to have non-native products accessible, on the other side, it has increased the perception of inauthentic products (Smiechowska and Klobukowski, 2015). Therefore, consumers more and more begin to search for “something real from someone genuine” (Gilmore and Pine, 2007, p. 1) by demanding information and reassurances of the origin and content of food products (Carcea *et al.*, 2009). Specifically, recent trends are showing a greater sensitivity towards the origin of food products and their authenticity, considered as criteria of evaluation and decision-making that guide consumer choices (Liao and Ma, 2009). Previous research underlines that authenticity attributes have a positive and statistically significant impact on consumer’s interpretations, behavioral responses, and dispositions, such as their willingness to pay (Lehman *et al.*, 2019). In fact, it has shown that consumers tend to be willing to pay more for products and services that they consider to be authentic (e.g., Fuchs *et al.*, 2015; Smith *et al.*, 2016). O’Connor *et al.* (2017) found that authenticity cues increase purchase intentions and willingness to pay. By exploring a set of four distinct meanings of authenticity (i.e., moral, type, craft, and idiosyncratic), their study has underlined that most consumers express willingness to pay more for each authenticity type.

In terms of reassurances on the origin and content of food products, traceability is observed as a crucial factor for the agri-food sector (Papetti *et al.*, 2012; Costa *et al.*, 2013). Food traceability implies the control of the whole chain of food production and marketing, by allowing the food tracking through each step of its production back to its origin (Ampatzidis and Vougioukas, 2009). Indeed, with the objective to assure public health, it represents a tool necessary to the prevention of deliberate or accidental mislabeling, such as food adulteration, fraud, and scandals (Charlebois and Haratifar, 2015). In this respect, very emblematic cases might be the Melamine milk powder scandal in China in 2008 (Xiu and Klein, 2010), the dioxin contamination of chicken feed in Belgium in 1999 (Bernard *et al.*, 2002), and the bovine spongiform encephalopathy. To face these problems, numerous regulations, at national and international level, are defined with the objectives to provide the basis for the assurance of high-level protection of human health, and safety and quality of food products (i.e., Charlebois *et al.*, 2014). Additionally, these incidents draw the consumer attention towards food safety and integrity which increased the awareness among consumers about a food product, by pressure on the public/private organizations to introduce and implement traceability in their food supply chain (Haleem *et al.*, 2019) in order to have easily the history of the products (Olsen and Borit, 2013) including a large set of information about the source of raw material, process, application, and location of products along the supply chain. Effectively, this increases consumer confidence (Kher *et al.*, 2010) and creates necessary connections between producers and consumers (Regattieri *et al.*, 2007). Concerning the case of organic olive oil products, the increasing demand for high-quality olive oil, which might be adulterated with other low-quality oil, and the safety within the food chain, has led to greater attention for the traceability regarding product characteristics (i.e., nutritional), production and transformation methods, to effectively improve the food safety and quality and to limit the risk of adulterations and frauds (Zhang *et al.*, 2012).

Although previous scientific contributions have investigated the relationship between food product authenticity and consumer’s willingness to pay (WTP) (Sidali and Hemmerling, 2014; O’Connor *et al.*, 2017; Kendall *et al.*, 2019), scarce analysis has been conducted to examine the role of product traceability on this above-mentioned relationship. Therefore, with the aim to fill this gap, the focus of this paper is to investigate the role of product traceability in the relationship between product authenticity and consumers’ willingness to pay, shedding some light, through empirical evidence, on the under-investigated nature of the traceability.

To achieve this research objective, an explorative approach is adopted, and the organic olive oil product is selected because the question linked to the authenticity and traceability of this product represents a challenging task due to the complexity of deliberate fraudulent adulterations and practices (Meenu *et al.*, 2019). The study is conducted in Spain by considering that this country is the first most important producer of organic olive oil in the world².

The research contributes to the previous studies on food authenticity, highlighting insights on the relationships between this construct and consumer's willingness to pay. Specifically, by theoretically positioning and empirically substantiating, this study underlines that traceability assumes a mediating role on the relationship between product authenticity and consumer's willingness to pay for organic olive oil, and advances the existing literature focused mainly on the authenticity construct, its characteristics, and its relationships.

This paper is organized as follows. The following section reviews the existing research contributions on the authenticity construct, with a particular focus on the effects of authenticity in the domain of food products and its connections with traceability and willingness to pay. Then, it is followed by a description of the research design and methodology used. Findings and discussions are presented. Finally, the theoretical and managerial implications, limitations, and future research proposals are highlighted.

2. Theoretical background

Authenticity is an important topic within the marketing literature, even if it is a very elusive concept that has multiple meanings with both demand and supply side connotations. The term 'authenticity' remains problematic because what is often seen as authentic is professed arbitrarily (Boyle, 2003). Numerous studies are focused on authenticity in several consumption contexts, including tourist sites (Chronis and Hampton, 2008), green products (Miniero *et al.*, 2014), beverages (Del Chiappa *et al.*, 2019), agri-foodstuff (Chousou and Mattas, 2019). These previous studies have provided evidence that perceived authenticity influences consumer evaluations and dispositions (e.g., Beverland and Farrelly, 2010; Sidali and Hemmerling, 2014; Fuchs *et al.*, 2015), by highlighting how consumers may use authenticity cues as risk-relieving strategies in their evaluation processes. In addition, the signals of authenticity could increase consumer awareness of the product and provide reassurance during the selection and purchase processes.

The next sections review existing research on authenticity, assuming a specific focus on the effects of authenticity in the domain of food products and its linkage with traceability and willingness to pay, which lead us to the definition of our research question.

2.1 Authenticity research

The quest for authenticity is a characteristic of postmodern consumption (Firat and Venkatesh, 1995). In the previous studies of authenticity examination within the field of marketing, authenticity is defined as something original, or a realistic copy of the original one (Lunardo and Guerinet, 2007). According to Boyle (2003), alternative expressions of authenticity include terms such as ethical, natural, honest, simple, sustainable, and rooted. Moreover, words such as original, genuine, unique, traditional, and real are used by modern consumers to define authenticity (Muñoz *et al.*, 2006; Beverland and Farrelly, 2010). In their qualitative study, Beverland and Farrelly (2010) have identified a shared meaning of authenticity that is a consumers' desire for the genuineness, reality, and truth driven by control, connection, and virtue benefits. By underlining the multiplicity of meaning, explanations, and interpretations associated with authenticity, their findings have proposed a synthetic interpretation of authenticity which can be observed as a connection between previous and future research on the consumption of authenticity.

² Spain is the biggest producer of olive oil in the European Union: from 2015/16 to 2017/18, on average, it accounted for 63% of the whole EU production (*source*: European Commission, 2020).

From the consumers' viewpoint, perceived authenticity refers to consumers' beliefs or expectations about a product to be genuine, real, and/or true (e.g., Grayson and Martinec, 2004; Beverland and Farrelly, 2010). Grayson (2002) have suggested that consumers interpret authenticity in several and different ways, depending on what is being evaluated and under what circumstances. Grayson and Martinec (2004) have explained authenticity as iconic (e.g., when an object is an accurate reproduction of the original), indexical (e.g., when an object has a factual, spatiotemporal connection to history), and hypothetical (e.g., when an object has a hypothetic, spatiotemporal connection to history) typologies in marketing offerings. These types of authenticity are not necessarily mutually exclusive, that the authenticity is not an attribute inherent in an object, and that it is filtered by consumers' personal experiences, emphasizing the subjective cue of the construct. According to Grayson and Martinec (2004), indexical and iconic cues are thus predicted to influence consumer processing of apparent product meaning. Moreover, Fejes and Wilson (2013), have suggested that consumers use both extrinsic and intrinsic cues to evaluate authenticity that is serving as a substantial evaluation and decision-making criterion which can guide consumer choices (Liao and Ma, 2009).

2.2 Authenticity, traceability, and willingness to pay in the domain of food products

As mentioned, in the marketing literature product authenticity has been investigated in several contexts, such as fast food (Beverland and Farrelly, 2010), green or environmentally conscious consumption (Ewing *et al.*, 2012), traditional food specialties (Sidali and Hemmerling, 2014), and handmade products (Fuchs *et al.*, 2015), stressing that perceived authenticity influences consumer evaluations and dispositions. Several attributes of authenticity, indeed, have been identified in the existing literature able to influence consumer perceptions of products' authenticity. Gilmore and Pine II (2007) define *natural authenticity* as the people's tendency "to perceive as authentic that which exists in its natural state in or of the earth, remaining untouched by human hands; not artificial or synthetic" (p. 49). They refer to growers of organic foods, in forsaking pesticides and fertilizers, as commodities that belongs to this kind of authenticity.

Authenticity construct is wide and involves several meanings and dimensions, for instance, the product's genuineness, origin, or naturalness (van Giesena and de Hoogeb, 2019). Camus (2004) identifies three dimensions, that are origin, projection of the consumer in the product, and uniqueness, capable to encapsulate the concept of product authenticity concerning an agri-foodstuff. Authentic products are often considered as local, regional and/or traditional (Kadirov, 2015), real, sincere, and genuine (Beverland and Farrelly, 2010; Morhart *et al.*, 2015). For specific products, such as fruits and vegetables, the naturalness dimension of authenticity is crucial underlying environment respect, healthiness, and freshness (Binnering, 2017). Uniqueness is another relevant feature of authentic products, opposite to industrial products sold in massive quantities (Groves, 2001). Additionally, foodstuff's' authenticity regards genuineness, related to the place of production (Sims, 2009), country of origin (Chousou and Mattas, 2019), product ethnicity (Park *et al.*, 2016), and handmade production process (Fuchs *et al.*, 2015). According to Groves (2001) and Sims (2009) authentic product is associated with nutritional value and high-quality assurances. Sidali and Hemmerling (2014) investigated the object-based authenticity of traditional food finding a positive impact of quality claims, concerned with the temporal, spatial, and product-specific attributes of food specialties, on the intention to consume a food product. Food product authenticity can be communicated through certifications concerning geographical indications and organic production (Spielmann and Charters, 2013), brand name (Groves, 2001), color packaging (Marozzo *et al.*, 2020), and selling price (Fejes and Wilson, 2013).

Previous studies emphasize that food products' authenticity can affect consumers' willingness to pay, by finding a positive impact of authenticity claims on the intention to consume traditional food products (Sidali and Hemmerling, 2014). Authenticity, increasing appeal and value, can influence positively purchase intentions and greater consumers' willingness to pay for food products perceived as authentic (O'Connor *et al.*, 2017). In this respect, consumers express willingness to

pay a premium price for food products that better meet authenticity requirements (Kendall *et al.*, 2019). Consumers acknowledge the price premiums associated with the purchase of authentic food products and they are willing to accept this expense to ensure the authenticity of products carrying health risks and to limit the problems linked to adulteration and fraud.

Regarding the food system, olive oil is one of the main foodstuffs of the Mediterranean area, with a high selling price and a great level of adulteration. Then, authenticity becomes an evaluation and decision-making criterion that guides specific purchasing choices for olive oil (Chousou *et al.*, 2018). Especially for organic olive oil, consumers are willing to pay an extra price premium; besides, they are aware of the alteration risk and use authenticity cues, as signals during the purchase process, for assessing food products (Yangui *et al.*, 2016). By the research on Italian consumer preferences for extra virgin olive oil emerges a very high willingness to pay a premium price for this kind of food product (Piccolo *et al.*, 2013).

The purchasing behavior of organic olive oil is affected by the fact that consumers are typically concerned about healthy food and food safety (Tsakiridou *et al.*, 2006) and oriented increasingly to consider the adoption of traceability systems in the food supply chain (Haleem *et al.*, 2019) in order to have information transparency, to guarantee high-quality, and to limit the possible food frauds (Papetti *et al.*, 2012). In particular, consumers demand verifiable evidence of traceability as an important criterion of food quality and safety, by underlining the need for a traceability system that render information on the origin of foods, characteristics, process method, retailing and final destination (Bertolini *et al.*, 2006; Aung and Chang, 2014). Therefore, in this perspective traceability can potentially represent an important “*tool to assist in the assurance of food safety and quality*” (Aung and Chang, 2014, p. 172) when consumers make food-related purchasing decisions, thus preferring food products characterizing by information traceability, quality assurance and certification information (Verbeke and Ward, 2006; Hou *et al.*, 2019). Evidence highlight that consumers prefer and are willing to pay a premium for food with traceability information (Zhang *et al.*, 2012; Bai *et al.*, 2013) because traceability increases the consumer's security and confidence (Costa *et al.*, 2013) by ensuring certain processing elements and procedures.

Despite significant attention to the above-mentioned constructs, to the author's knowledge, there is a lack of empirical evidence on the role of product traceability in the relationship between product authenticity and consumers' willingness to pay. Thus, understanding the main role of product traceability is proposed the following research question:

RQ: *What role (moderator or mediator) does product traceability play in the relationship between product authenticity and consumer's willingness to pay?*

3. Methodology: research design

Quantitative data were collected from a sample of the Spanish population with an online survey built on the Qualtrics software platform. The survey was advertised through a convenience sample of numerous websites, blogs, social networks, and emails to reach the broadest public. Convenience sampling is a kind of nonrandom sampling in which members of the target population are selected for the purpose of the study if they meet certain practical criteria, such as geographical proximity, availability at a certain time, easy accessibility, or the willingness to volunteer (Dörnyei, 2007). Therefore, considering the investigation's context (i.e., Spanish organic olive oil consumers), Spanish websites, blogs, online forums, and pages on social networks related to the organic olive oil sector were identified, and thanks to word of mouth it was possible to reach the broadest public. Although this survey method was selected for its time advantages and cost over traditional systems, it is opportune to consider that it carries some limitations such as self-selection bias (e.g., Thompson *et al.*, 2003), respondents misrepresenting their age, gender, level of education or other socio-demographic variables (e.g., Dillman, 2011), representativeness (e.g., Couper, 2011), and the possible risk of including multiple responses by the same person (e.g., Konstan *et al.*, 2005).

The Covariance-Based SEM (CB-SEM) requires sufficient sample size and, given the asymptotic property of the maximum-likelihood (ML) estimation, a minimum sample size is necessary to generate results of sufficient accuracy (Jannoo *et al.*, 2014). According to Hair *et al.*, (2009), a minimum sample size of 100-150 is sufficient for a model with five or less constructs. Out of 292 questionnaires, even if only 191 (65.41% response rate) questionnaires were found correct and valid for the analysis, the sample of the study is much higher than 150 and, therefore, it's possible to conclude that it meets the criteria. Participants' age ranged from under 18 to over 65, with the median category falling into the 35-49 years range. About 51% of the respondents were female, 86.1% of the sample had at least a bachelor's degree, and 53.9% were employed. About 67% of respondents had household monthly incomes of less than € 3.000.

The questionnaire was constructed using established, and adapted scales by 7-points Likert scale items asking to indicate the extent to which participants agree or disagree (1 = strongly disagree, 7 = strongly agree) with the proposed statements. The concept of product authenticity was captured by eight items scale selected from established previous scales (e.g., Beverland and Farrelly, 2010; Fuchs *et al.*, 2015; Park *et al.*, 2016). The dependent variable of the model, that is the willingness to pay for the organic olive oil (WTP), was measured using three items scale adopted from Ghali (2020). Finally, the concept of product traceability was captured by two semantic differential items adopted from Verbeke and Ward (2006) by asking "To what extent do you pay attention to the traceability of the product when buying organic olive oil?" (ranging from 1 = Very low attention, to 7 = A lot of attention); and "To what extent is the traceability of the product important to you when you buy organic olive oil?" (ranging from 1 = Totally unimportant, to 7 = Extremely important).

Quantitative methodology was based on a Confirmatory Factor Analysis (CFA) to test the measurement model to ensure the reliability and validity of the constructs. Moreover, to explore the role of product traceability on the relationship between product authenticity and consumer's willingness to pay were conducted a moderation and a mediation analysis (Hayes, 2018).

4. Findings

Data were entered into SPSS, and data accuracy was checked throughout the process. To address the research question, a Confirmatory Factor Analysis (CFA) of the measurement model was conducted to ensure reliability and validity of the constructs. The overall measurement model with three constructs and 13 observed indicators was estimated through CFA. Estimation methods in Covariance-Based structure analysis are typically developed under an assumption of multivariate normality (e.g., Browne, 1974; Jöreskog, 1969). However, the assumption of normality is usually violated because it cannot be met in most empirical research (Hu *et al.*, 1992; Jannoo *et al.*, 2014), that this is the situation in this research. Some recent simulation studies (e.g., Goodhue *et al.*, 2012; Reinartz *et al.*, 2009) have investigated that given non-normality conditions, the Covariance-Based SEM were quite robust. In particular, in the simulation study of Hu *et al.* (1992), the authors have shown that, even in the condition of assumption of multivariate normality's violation, the maximum-likelihood (ML) is a robust estimation method. Then, a completely standardized solution produced by the LISREL 8 maximum-likelihood method (Jöreskog and Sörbom, 1993) was conducted by showing that the model-fit indices of the CFA resulted in a good fit: $\chi^2(62) = 123.617$, $p < .001$; $\chi^2/df = 1.994$; GFI = .909; NFI = .961; NNFI = .975; CFI = .980; Standardized RMR = .0482; RMSEA = .0722. Moreover, all estimated factor loadings in the measurement model showed high factor loading coefficients (all loadings $\geq .60$) and significant t-values (all $p < .001$ - see Table 1). Construct validity was examined by assessing convergent and discriminant validity (Fornell and Bookstein, 1982; Ping, 2004). Specifically, the standardized factor loading of all items exceeded all thresholds (all significant at $p < .001$, and the average variance extracted - AVE - was greater than the .50 cut-off) which supports the convergent validity of the measurement scales. According to Ping (2004), to ensure discriminant validity the squared correlation coefficients between any pair of constructs should be lower than the AVE for each construct. The results have

demonstrated that all of the squared correlations between pairs of constructs were lower than the AVE for each construct, therefore, all constructs were considered to be distinctively different, confirming discriminant validity.

Moreover, the three items used to measure the dependent variable (i.e., *willingness to pay*) showed a Cronbach alpha of .90, and item-to-total correlations were larger than .75 for all the items. Therefore, an average score of *willingness to pay* was created. The eight items used to measure the independent variable (i.e., *product authenticity*) showed a Cronbach alpha of .90, and item-to-total correlations were larger than .60 for all the items. Therefore, an average score of *product authenticity* was created. Finally, the two items used to measure the intended mediating variable (i.e., *product traceability*) showed a Cronbach alpha of .79, and item-to-total correlations were larger than .66 for all the items. Then, the average score of *product traceability* was created.

Tab. 1: Results of confirmatory factor analysis (CFA)

Construct and item	Standardized Loadings	t-values*	CR ^a	AVE ^b
<i>Willingness to pay</i>			.909	.771
I am willing to spend extra money in order to buy organic olive oil	.857	Fixed		
It is acceptable to pay a premium price to purchase organic olive oil	.806	14.009		
Compared to conventional olive oil, I am willing to pay more for organic olive oil	.963	17.630		
<i>Product Authenticity</i> (The organic olive oil):			.906	.548
is a genuine product	.812	Fixed		
is an original product	.795	12.347		
is a true product (not altered)	.775	11.932		
is a typical product	.695	10.345		
is made with the traditional method	.660	9.709		
is unique in its kind	.813	12.720		
reflects its place of origin	.742	11.269		
is a typical Spanish product	.601	8.660		
<i>Product Traceability</i>			.803	.674
To what extent do you pay attention to the traceability of the product when buying organic olive oil?	.909	Fixed		
To what extent is the traceability of the product important to you when you buy organic olive oil?	.723	6.964		
Notes: Goodness-of-fit indexes: $\chi^2(62) = 123.617$, $p < .001$; $\chi^2/df = 1.994$; GFI = .909; NFI = .961; NNFI = .975; CFI = .980; Standardized RMR = .0482; RMSEA = .0722. All items were measured on a seven-point Likert scale. a Construct reliability $\geq .70$ (Nunnally, 1978); b Average Variance Extracted $\geq .50$ (Fornell and Larcker, 1981). * all $p < .001$				

Source: Authors' elaboration

In line with the exploratory purpose of this study, a moderation and a mediation analysis were effectively performed (Aguinis *et al.*, 2017; Memon *et al.*, 2018; Memon *et al.*, 2019). A moderation analysis (Hayes, 2018) was conducted to test the product traceability as a potential boundary condition on the relationship between product authenticity and consumers' willingness to pay. The model was tested by applying bootstrapping (PROCESS macro - model 1) and the interaction was probed by testing the conditional effects at three levels of product traceability, one standard deviation below the mean, at the mean, and one standard deviation above the mean. As shown in Table 2, the interaction between product traceability and product authenticity was non-significant ($\beta = -.035$, $p = .281$). These results provide preliminary evidence that product traceability is not a moderator of the relationship between product authenticity and consumer's willingness to pay the organic olive oil.

Tab. 2: Results of the moderation analysis

Predictor	β	p	95% CI	
PdtTrace	.195	.005	[.059	.329]
PdtAuth*	.514	.000	[.326	.701]
PdtTrace x PdtAuth*	-.035	.281	[-.098	.029]

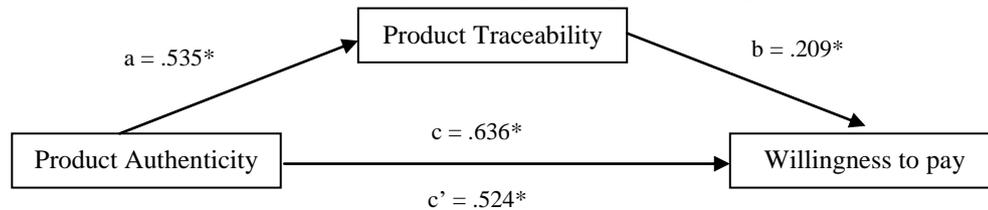
* $p \leq .05$

Source: Authors' elaboration

A mediation analysis (Hayes, 2018) was conducted to test the product traceability as the underlying mechanism of the relationship between product authenticity and consumers' willingness to pay (product authenticity \rightarrow product traceability \rightarrow willingness to pay). The model was tested by

applying bootstrapping (PROCESS macro - model 4) to the test of the indirect effect to determine if it is different from zero at the conditional effect at 95 per cent confidence intervals (CI). The analysis is then run on 5000 bootstrap samples to obtain the desired statistic for every one of them, there will be 5000 computed indirect effects. These effects are then placed in ascending order to determine the lower and upper bounds of the CI (Hayes, 2018). The results of a mediation analysis revealed a significant total effect of product authenticity on WTP ($c = .636$; $SE = .073$; $t = 8.706$; $p = .000$); a significant effect of product authenticity on product traceability ($a = .535$, $SE = .082$; $t = 6.496$; $p = .000$); a significant effect of product traceability on WTP ($b = .209$; $SE = .063$; $t = 3.326$; $p = .001$); and a significant direct effect of product authenticity on WTP ($c' = .524$; $SE = .079$; $t = 6.657$; $p = .000$), when controlling for product traceability. The direct effect of product authenticity on WTP was found to be positive and statistically significant (Effect = .52, $p < .000$), as well as the indirect effect of product authenticity on WTP was found to be positive and statistically significant (Effect = .11, 95% C.I. [.04; .20]). Findings have shown that the indirect effect with 95% bias-corrected bootstrap confidence interval based on 5000 resamples does not straddle zero, which allows us to conclude that the indirect effect is different from zero. This result indicates a significant indirect effect and provides preliminary evidence that product traceability partially mediates the effect of product authenticity on consumers' willingness to pay. Figure 2 illustrates the results of the mediation analysis.

Fig. 2: The effect of product authenticity on willingness to pay through product traceability.



Indirect effect = .11, Bootstrap 95% CI = [.04, .20], * $p < .01$

Source: Authors' elaboration

5. Discussion and conclusion

Product authenticity is becoming increasingly relevant in the agri-food context since it influences consumer evaluations, dispositions, and purchase processes (e.g., Beverland and Farrell, 2010; Sidali and Hemmerling, 2014). Products' authenticity can affect consumers' willingness to pay for food products that consumers perceive as authentic (O'Connor *et al.*, 2017); in particular, they are oriented to pay a premium price for food products that are coherent with authenticity requirements reducing the health risks. Additionally, consumers rely on traceability in the food supply chain as an important tool in ensuring food quality and safety of the products and improve their confidence (Bertolini *et al.*, 2006; Aung and Chang, 2014). In this perspective, this study elucidates the role of product traceability on the relationship between product authenticity and consumer's willingness to pay for a food product, specifically for the organic olive oil. In particular, by conducting an exploratory analysis based on a quantitative methodology focused on a Confirmatory Factor Analysis (CFA) to test the measurement model to ensure the reliability and validity of the constructs, and a moderation and a mediation analysis (Hayes, 2018), the study has effectively investigated the role assumed by product traceability. The findings shedding some light on the under-investigated nature of the role of product traceability in the relationship between product authenticity and consumers' willingness to pay, by providing preliminary evidence that product traceability served as a mediator in the relationship between product authenticity and consumer's willingness to pay for organic olive oil.

This study is the first one that explores the role of product traceability in the relationship between product authenticity and consumers' willingness to pay, in general, and in the organic olive

oil sector, in particular. Statistically, the results indicate that food product traceability is considering a significant mediator in the relationship between product authenticity and consumers' willingness to pay since product authenticity had a weak direct effect on consumers' willingness to pay. These results revealed that product authenticity is significantly and positively correlated with product traceability and consumers' willingness to pay. Hence, consumers who are exposed to product authenticity signals tend to be more aware of the importance of product traceability that, in turn, produces a higher willingness to pay. Moreover, the results showed that product traceability has a significant and positive effect on consumers' willingness to pay. In other words, the importance of the traceability of the product (e.g., its ability to elicits food safety) enhances the willingness to pay for the organic olive oil. In effect, in the agricultural and food supply chain, the traceability system of the product is oriented to identify actors and operations involved in the cultivation, production, and distribution processes in order to increase food safety since traceability can be seen as a subsystem whose presence is indispensable to the management of food quality (Peri, 2002). Therefore, product traceability is an essential tool for guaranteeing both production and product quality (Becker, 2000). In this context, the signals of product authenticity such as the origin of the product and the genuineness of the product could increase consumer awareness of the importance of product traceability that provides reassurance during the selection and purchase process. Based on this product traceability-based mechanism, consumers who are exposed to product authenticity signals tend to be more aware of the importance of product traceability and, consequently, tend to be more willing to pay more for the product.

The present study provides a number of theoretical contributions. First, it contributes to the existing literature on the authenticity of agri-food products (Groves, 2001; Camus, 2004; Verbeke and Ward, 2006; Lunardo and Guerinet, 2007; Kendall *et al.*, 2019) by investigating the relationships between product authenticity and willingness to pay for the organic olive oil that consumers consider at high risk of non-compliances, frauds, and scandals (Casadei *et al.*, 2021). Second, the study further increases our understanding of the role assumed by traceability, by underlining its mediation role on the relationships between authenticity and willingness to pay. In this respect, the study considers in the analysis the construct of traceability, which despite its underlined importance in the agri-food supply chain (e.g., Olsen and Borit, 2013; Papetti *et al.*, 2012; Engelseth *et al.*, 2014), has received so far limited attention.

From a managerial point of view, this study points to a few implications both for firms and for policy makers. Firstly, a better understanding of the consumer's perceptions towards the authenticity of agri-food products assumes a particular relevance for the product development processes. Indeed, the aspects linked to authenticity, quality and safety of agri-food products influence more and more the consumer decision-making processes. Secondly, by showing the findings from the perspective of traceability, observed as a new tool of safety and quality, the study underlines that firms have to develop and implement well-structured traceability systems to guarantee useful transparency and to meet the consumer requirements, even if traceability in the supply chain involves several changes both in work processes and software systems. The costs associated with putting traceability systems into place are seen as more expensive, requiring investments in hardware and software, skilled human resources, training, and certification. However, customers' demand for real-time information about the products they buy will grow and it will be one of the competitive advantages of agri-food industry marketing. Additionally, the benefits gained from traceability for high-risk and high-valued food far outweigh the cost of traceability (Aung and Chang, 2014).

Notwithstanding its contribution to the marketing literature, this study presents some limitations, mainly related to the methodology, by stimulating further research directions. Firstly, this study adopted an exploratory approach, requiring the translation of this preliminary research question into more specific hypotheses and propositions. Secondly, this research was developed only in the Spanish context. It would be useful to corroborate the investigation by expanding the geographical boundaries of the analysis to other relevant olive oil producing countries, such as Italy and Greece. Thirdly, the study doesn't analyze the type of influence that certain variables such as demographic

ones or variables related to consumer motivations may have on food product authenticity. Finally, consumer ethnocentrism represents an interesting element for future directions of research. By considering the measures used for the authenticity of the product (example, typical Spanish product, reflects the country of origin, typical product), the effect of product authenticity on the willingness to pay could be greater for consumers with a high level of ethnocentrism than those with a low level of ethnocentrism.

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Students' perception of virtual classrooms: looking for the missing factors

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Abstract

Objectives. *This work aims to understand the factors that influence students' perceptions of online teaching and learning during the global pandemic.*

Methodology. *We submitted the Constructivist On-Line Learning Environment Survey (COLLES) to management students. Then, we conducted an exploratory factor analysis using the XLStat software to identify the nature of the latent factors underlying students' perception of online classroom environment.*

Findings. *Three main factors explain most of the variability; according to previous studies, we labelled them as (i) Course design and development, (ii) Instructor's characteristics and role, and (iii) Learners' characteristics. Moreover, we found that some differences occur between latent factors patterns between undergraduate and postgraduate classes.*

Research limits. *Although results are statistically significant, they cannot be generalized, due to the relatively small convenience sample utilized. Future research should include larger and more variegated sample.*

Practical implications. *This study provides a useful insight to improve support for online students who are forced to take distance learning and to provide guidelines for effective online teaching.*

Originality of the study. *Although the existing literature acknowledges that learner characteristics, course design, and instructor role may influence students' perception of the online teaching/learning experience (e.g., the six constructs listed above), there are no studies linking them to one or more of these specific factors. Furthermore, there is limited research on the similarities and differences in perceptions of the online teaching/learning experience between undergraduate and graduate students.*

Key words: *Online learning; Online teaching; COLLES; Students' perspective; Factor analysis*

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1. Introduction

COVID-19 has forced schools and universities to learn from novel circumstances and adapt quickly to changes by moving from face-to-face (F2F) to online teaching. It has accelerated the digitalization and transformed teaching practices in higher education.

Online teaching is not a new issue in higher education (Martin *et al.*, 2020), but before COVID - 19 the use of digital technologies for educational purposes was occasionally limited to traditional universities, offering only a few courses and some specific activities (e.g. seminars), to specific online education providers (e.g. online universities), and/or to specific geographical areas - emerging countries among others (Caridà *et al.* 2019).

The physical closing of universities and schools worldwide (UNESCO, 2020) and the consequent digitalization of teaching framed a new system of higher education in which rules, practices and institutional arrangements suddenly seem inadequate to ensure the creation and dissemination of value.

In an F2F classroom, the teacher can rely on a series of verbal and nonverbal cues to orchestrate knowledge construction (Zhu *et al.*, 2021) by encouraging student interaction and engagement and diagnosing their understanding (Daumiller *et al.*, 2021). By moving online, teachers are forced to adapt their teaching strategies to the new educational scenario to deliver educational content through the use of social connection platforms (such as Zoom, Meet, Teams, etc.) along with the university-specific e-learning platforms (such as Moodle, Ilias, Olat). In the current global pandemic, teachers, with a narrow preparation and on a self-organized basis, have adopted new and flexible teaching approaches (e.g., virtual learning, e-learning, online learning, mobile learning, synchronous-asynchronous learning) to ensure continuous education and training processes. In few words they have been forced to redesign their courses to ensure the motivation and rhythm of teaching and to prevent the lack of concentration and interaction with and among students in the classroom (Gonçalves *et al.*, 2021).

Social connection platforms and the Internet ecosystem enable the convergence of many elements of learning (e.g., text, audio, and video) into the same communication channel (Zhu *et al.*, 2021), therefore, they can facilitate the online learning process by making teaching more dynamic, interactive, and effective (Mukhtar *et al.*, 2021).

Of course, the success of online teaching and distance learning is influenced by several factors that shape the new educational context, such as the role of the professor as a facilitator of learning (e.g., moderator, participant, and observer), the degree of student autonomy (Çebi and Gueyer, T. 2020), which affects the level of interaction with the professor and peers, and the new classes format, which must address the new and specific needs of students in this difficult and challenging time.

Distance teaching and online learning are no longer an option for a small number of universities and students, as the COVID-19 pandemic has made online teaching the most common method for delivering educational content around the world. Due to the recent and emerging nature of the phenomenon, few studies have been conducted on online teaching as a new educational strategy imposed by contingent situations, thus transcending the intrinsic motivation, skills, and attitudes of professors and students in using digital platforms for educational purposes.

Digital education is the lynchpin of the learning process of the next new generations as it permeates all levels of formal education worldwide becoming a relevant area of research that requires more than ever the attention of researchers, educators, and policy makers.

For the above reasons, this work aims to understand the factors that influence students' perceptions of online teaching and learning during the global pandemic. Specifically, this work addresses two main questions: i) are there significant factors that influence students' perceptions of the virtual classroom environment during the pandemic, and ii) are there significant differences in students' perceptions across grade levels?

To this end, we used the Constructivist Online Learning Environment Survey (COLLES survey students; Taylor and Maor, 2000) to analyze the perceptions of online teaching/learning of a sample

of Italian undergraduate and graduate students who had their first experience with the virtual classroom from March 2020 to June 2020. This work contributes to the existing literature on online education, which needs more research on evaluation and quality in online courses (Martin *et al.*, 2020; Taylor and Maor, 2000), especially in the current period when both instructors and students, many of whom have never experienced the virtual classroom, have not chosen but are forced to practice online learning/teaching.

The rest of the paper is organized as follows: The second section focuses on the literature background. Then, we present the research methodology and discuss the main findings.

2. Literature

There is ample evidence of the explosive growth of online teaching/learning during the pandemic COVID -19 and of its key role in higher education in the immediate future as well.

As briefly indicated in the introduction, online teaching is not a new topic neither in the higher education context nor in the educational literature (Martin *et al.*, 2020; Tallent-Runnels *et al.*, 2006). Since the 1990s, research in distance education has focused primarily on the characteristics of learners and their interaction in courses, and on course design and the characteristics of instructors. These two topics define elements that influence strategies to increase interaction with others, especially peers and instructors (Cho and Kim, 2013), as well as active learning (Berge and Mrozowski 2001; Martin *et al.*, 2020).

According to Martin *et al.* (2020), learner characteristics refer to demographic, academic, cognitive, affective, self-regulatory, and motivational characteristics of online students. For example, studies of online learning found a strong and positive relationship between learner self-regulation and autonomy with communication and collaboration (Barnard *et al.*, 2009) and active interaction with others (Cho and Jonassen, 2009).

Self-regulation (or self-regulated learning) refers to students who are able to self-generate thoughts and learning by creating productive social relationships and work environments (Schunk, 1995) rather than being passive recipients of information (Schunk and Zimmerman, 2012).

Artino and Stephens (2009) found that graduate students were more likely to use critical thinking skills than undergraduate students and showed that grade level was related to students' self-regulation for interacting with others (Cho and Kim, 2013).

Therefore, understanding learners' characteristics is critical to the success and quality of the course as it is closely related to course design issues and different ways of engaging learners to better meet their needs.

Course design and development depends on the availability and use of digital learning technologies (e.g., social connection platforms, chat - chat room, videos, discussion forums, etc.). The characteristics and roles of the instructor in the online classroom, are critical to promote learners' interaction with others (Mullen and Tallent-Runnels, 2006; Ryan and Patrick, 2001), and the pedagogical techniques (group and individual work, small and large group discussions, role-playing, case study analysis and discussion, etc.) (Gonçalves *et al.*, 2021) to engage online learners and build a sense of community (Jiang, 2017), are the main factors that characterize the course design and development.

In the virtual classroom, the teacher's role shifts from instructive to supportive and facilitative (Patak *et al.*, 2016); the teacher acts as a connector to build relationships between learners and help them collaborate despite the physical distance. Different roles the teachers play, and the different course designs allow for different types of engagement which are crucial to communicate and interact with learners (learner-teacher interaction: Kuo *et al.*, 2014), to stimulate their participation/involvement and collaboration (learner-learner interactions: Phirangee, 2016; Tawfik *et al.*, 2018), and to incentive students presence in online courses (Phirangee and Malec, 2017).

Interaction, collaboration, and students' continuous presence in online courses are some predictors of successful online course experiences. Researchers have developed specific evaluation

models to measure the factors that influence online learning environments (Clayton 2011; Pearson and Trinidad, 2005; Walker and Fraser, 2005; Taylor and Maor, 2000). Among these, the COLLES survey developed by Taylor and Maor (2000) is the most popular survey (Patak *et al.*, 2016) to assess students' perceptions of the online learning environment (Taylor and Maor, 2000). The COLLES survey assesses students' perception using six constructs (e.g., relevance of course, reflective thinking, interactivity, cognitive demands, affective support, and interpretation of meaning) and fits with the notion that students' perceptions of online courses are a multidimensional concept influenced by many factors (Roberts *et al.*, 2005).

Although the existing literature acknowledges that learner characteristics, course design, and instructor role may influence students' perception of the online teaching/learning experience (e.g., the six constructs listed above), there are no studies linking them to one or more of these specific factors. Furthermore, there is limited research on the similarities and differences in perceptions of the online teaching/learning experience between undergraduate and graduate students. Therefore, understanding the factors that explain how undergraduate and graduate students perceive online courses, especially during the pandemic, is critical to improving support for online students who are forced to take distance learning experiences and to providing guidelines for effective online teaching.

3. Tools and methods

3.1 Participants

The participants for this study included a sample of 267 students from a public university in the southern Italy (the University Magna Graecia of Catanzaro). Of these students, 88% were undergraduates and 12% were graduate students.

Participants attended management courses offered by the departments of Law, Economics and Sociology (Diges); all courses were offered entirely online through Google Meet and the Moodle Platforms from March 2020 to June 2020 and from September 2020 to December 2020. All students had experience with face-to-face lectures, as the first semester courses of AY2019/2020 were taught in the face-to-face modality.

3.2 Management courses: differences and similarities

The management courses involved in the survey are: Business Management (Beginners), Marketing, Innovation Management (intermediate), Business management and strategy (master). Courses have different focus, different level of analysis and different instructors. There are 3 tutors, which are indicated with progressive numbers: #1, #2, and #3. Courses present some differences in terms of design, as some of them include laboratories and applied projects to real cases, other courses are mainly theoretical courses.

The table 1 synthesizes the characteristics of each course.

Tab. 1: Management courses

		Business management	Marketing	Innovation management	Business management and strategy
Learner Characteristics	Age	18-22	19-21	19-21	23-25
	Degree of Autonomy	Low	Low/Medium	Low/Medium	Medium
	Sense of community	Low	Low-Medium	Low-Medium	Medium
	Previous online course experiences	None	None	None	None
	Previous knowledge on business management	No	Yes	Yes	Yes
Course Characteristics	Academic program	Undergraduate	Undergraduate	Undergraduate	Master
	Year	1 st year	2 nd year	2 nd year	2 nd year
	Level	Beginners	Intermediate	Intermediate	Intermediate
	Objectives	To provide basic knowledge of business management processes and the skills necessary to define strategic policies and apply management methods and tools.	To provide basic knowledge of marketing strategies and the skills necessary to define marketing plan	To provide basic knowledge of innovation management processes and the skills necessary to define and apply innovation strategy to create value	To provide learners with cognitive and analytical tools to approach business survival and development with a strategic and managerial approach.
	Language	Italian	Italian	Italian	Italian and English
	Teaching Method	Theoretical lectures and practical exercises in synchronous mode.	Theoretical lectures, creative labs and team working, case study analysis and discussion in synchronous mode.	Theoretical lectures, videos, case study analysis and discussion in synchronous mode.	Theoretical lectures, creative labs and team working, case study analysis and discussion in synchronous mode.
Teacher Characteristics	Teacher	#1 and #2	#3	#2	#1 and #2
	Role	Instructive: expert, knowledge major deliverer	Instructive/ Supportive and facilitative: expert, knowledge, moderator	Instructive/ Supportive and facilitative: expert, knowledge, moderator	Supportive and facilitative: moderator, observer
	Previous online course experiences	Yes	Yes	Yes	Yes

Source: our elaboration

3.3 Data Collection

The Constructivist On-Line Learning Environment Survey (COLLES) developed by Taylor and Maor (2000) was submitted online through the Moodle Platform, it was active between June and August 2020. The COLLES is an analytical tool of analysis focused on online courses, and in particular on students' perception of the online classroom environment (Taylor and Maor, 2000).

The COLLES aims at investigating aspects that support students in developing themselves as collaborative and reflective learners in an online classroom. To this end COLLES includes 48 questions divided in six thematic areas:

1. **Professional Relevance.** Whether the virtual classroom environment and course content are relevant to professional practice.
2. **Reflective Thinking.** These questions assess whether the online class stimulate the development of reflective thinking.
3. **Interactivity.** Whether the virtual environment offers opportunities for interaction.
4. **Cognitive Demand.** Whether the instructor communicates effectively and offers stimuli to the students.
5. **Affective Support.** Whether peers' support occurs in the virtual classroom environment.
6. **Interpretation of Meaning.** Whether students and tutor communicate and co-construct a good reflection and analysis of the topics.

Within each thematic area there are four questions. Each question is asked twice (for a total of 48 questions): one time to assess the expected experience (Preferred) and one time to assess the actual experience. Responses are given on a Likert scale with five gradations from 1 ("Almost Never") to 5 ("Almost Always").

3.3 Exploratory factor analysis

Exploratory factor analysis (or EFA) is a statistical technique that examines the possible existence of underlying factors influencing a set of measures, and the relationship between each latent factor and observed variables. The structure linking the factors to the variables is initially unknown and only the number of factors can be assumed (DeCoster, 1998).

We conducted an EFA using the XLStat software to identify the nature of the constructs underlying responses in the questionnaire. The latent factors were extracted using the principal factor extraction method. This is an iterative method that allows a stepwise convergence of the communalities. The calculations are stopped when the maximum change in communalities is below a given threshold or when a maximum number of iterations is reached.

Since we were interested in understanding the existence of three latent factors, we also conducted an EFA and selected the varimax option for the rotation that was applied to the first three factors (Kline, 2011; Bollen, 1989). Rotation makes the interpretation of latent factors more obvious. By selecting three factors in the rotation, we are saying we want to characterize students' perceptions of the virtual classroom environment with the three principal traits: course design and development, instructor's characteristics, and learners' characteristics.

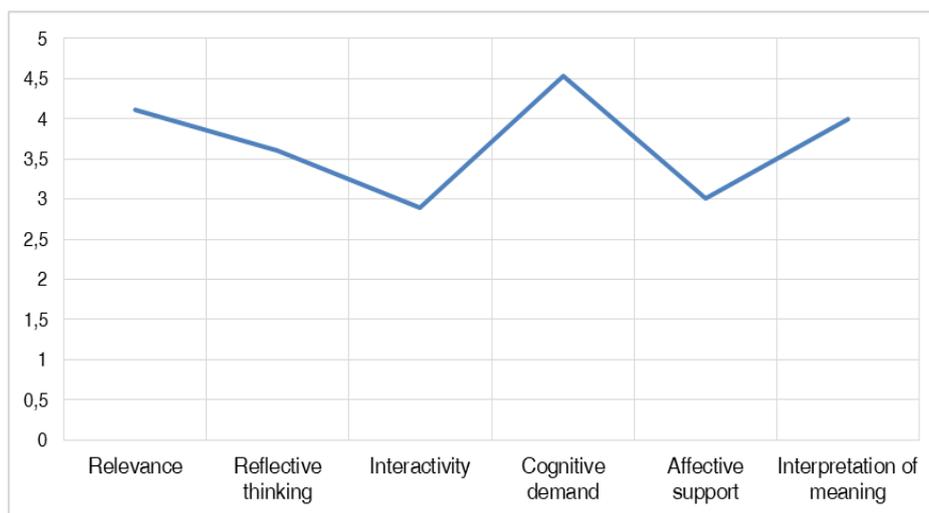
4. Preliminary results

4.1 Descriptive statistics

Our dataset contains 24 variables and 267 observations. The general actual perception of the online classroom environment was positive, as the aggregate mean values by area are always higher than 3, but in the Interactivity area. The distribution of responses shows a negative skewness in 16 questions over 24.

Figure 1 shows the aggregate means by area.

Fig. 1: Aggregate means by area



Source: our elaboration

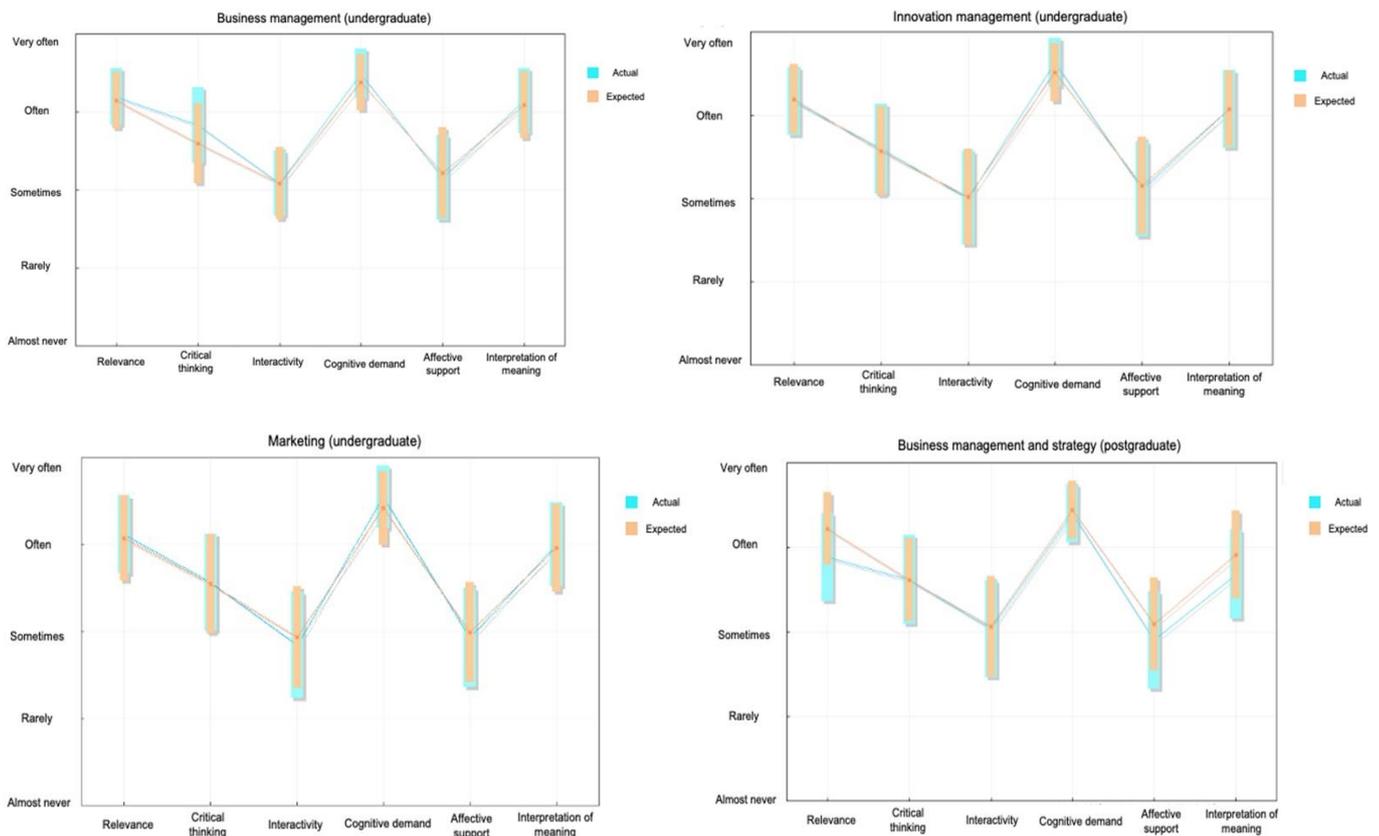
Cognitive demand area shows the highest mean score. Instead, Interactivity and Affective support, both focusing on the relationship with peers, show the two lowest scores. Responses vary from 1 to 5 in all areas except in Cognitive demand, where the minimum value was 2 - meaning that nobody selected the option 1 ("Almost never") in the answers.

4.2 Students' perceptions of preferred and actual virtual classroom environment

In this paragraph we describe the pattern of the mean scores on the six areas for both actual and preferred experience - in each management class. The following graphs (figure 2) show the means by area and by class for both actual and preferred forms of the COLLES.

The dark grey line and dots show the scores of the preferred (“*ideale*”) form of the COLLES. Light grey line and dots show the scores of the actual form of the COLLES. The bars show the variability.

Fig. 2: Expected vs actual experience by thematic area and course



Source: COLLES elaboration

All classes have in common the general pattern in which Interactivity and Affective Support show mean scores lower than the other areas.

Marketing and Innovation management show optimum degrees of all six areas, meaning that actual perception meets expectations.

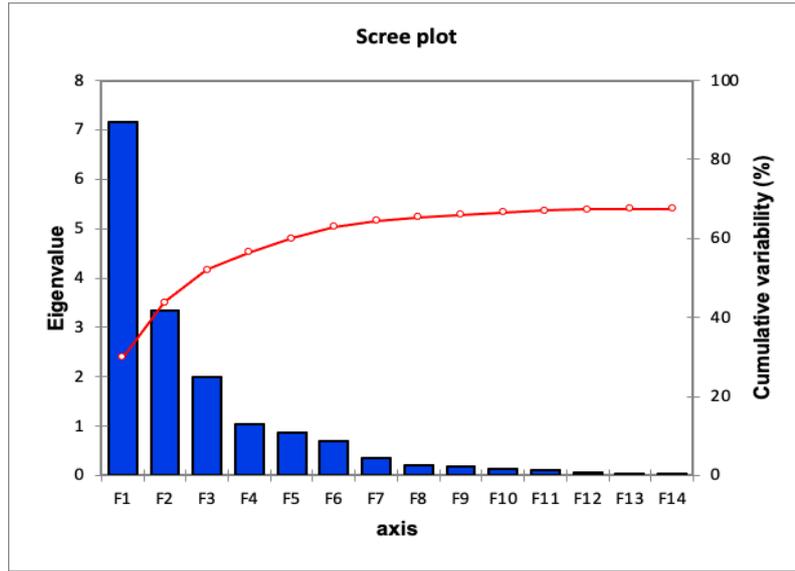
Business management shows differences in the mean scores of Reflective thinking, where actual scores are higher than preferred scores.

Business management and strategy show different scores in the Professional Relevance; preferred perception is higher than actual perception. A similar result occurs in the Affective support and Interpretation of meaning, where mean scores of preferred perceptions exceed mean scores of actual perceptions.

4.3 Exploratory factor analysis

We first conducted an EFA to verify how many latent factors can be identified. The EFA identified 14 factors, that explain a the 67.504% of variability (cumulative value), as shown in figure 3.

Fig. 3: Eigenvalues and cumulative variability



Source: our elaboration

The factor pattern suggests that the highest correlation, for each variable, occurs at one of the first 3 factors. Table 2 shows the factor pattern, communality and specific variance.

Tab. 2: Factor pattern

			F1	F2	F3	F4	F5	F6	Initial communality	Final communality	Specific variance
Professional Relevance	V1	My learning focuses on issues that interest me	0.311	-0.214	-0.048	0.231	0.037	0.068	0.288	0.204	0.796
	V2	What I learn is important for my professional practice	0.444	-0.403	0.142	0.263	-0.127	0.048	0.468	0.467	0.533
	V3	I learn how to improve my professional practice	0.517	-0.331	0.119	0.374	-0.272	0.123	0.582	0.620	0.380
	V4	What I learn connects well with my professional practice	0.542	-0.303	0.110	0.466	-0.322	0.014	0.580	0.718	0.282
Reflective Thinking	V5	I think critically about how I learn	0.331	-0.346	-0.576	0.028	0.191	0.132	0.539	0.616	0.384
	V6	I think critically about my own ideas	0.383	-0.366	-0.519	0.026	0.169	0.053	0.560	0.582	0.418
	V7	I think critically about other students' ideas	0.274	-0.147	-0.602	0.117	0.061	0.071	0.473	0.482	0.518
	V8	I think critically about ideas in the readings	0.343	-0.343	-0.590	-0.001	0.192	-0.017	0.555	0.621	0.379
Interactivity	V9	I explain my ideas to other students	0.618	0.350	-0.247	-0.008	-0.288	-0.066	0.638	0.653	0.347
	V10	I ask other students to explain their ideas	0.610	0.376	-0.252	-0.088	-0.321	-0.155	0.656	0.711	0.289
	V11	Other students ask me to explain my ideas	0.612	0.431	-0.262	-0.248	-0.274	-0.103	0.730	0.775	0.225
	V12	Other students respond to my ideas	0.692	0.357	-0.233	-0.254	-0.125	-0.078	0.738	0.748	0.252
Cognitive Demand	V13	The tutor stimulates my thinking	0.511	-0.503	0.147	-0.254	-0.038	0.092	0.583	0.610	0.390
	V14	The tutor encourages me to participate	0.524	-0.537	0.211	-0.253	-0.129	0.095	0.641	0.698	0.302
	V15	The tutor models good discourse	0.524	-0.529	0.259	-0.295	-0.051	0.120	0.663	0.726	0.274
	V16	The tutor models good critical self-reflection	0.506	-0.387	0.172	-0.271	0.004	0.019	0.524	0.509	0.491
Affective Support	V17	Other students encourage my participation	0.622	0.453	0.130	0.108	0.019	0.101	0.625	0.631	0.369
	V18	Other students praise my contribution	0.705	0.483	0.159	0.029	0.197	0.209	0.810	0.839	0.161
	V19	Other students value my contribution	0.703	0.447	0.169	-0.009	0.233	0.257	0.809	0.843	0.157
	V20	Other students empathise with my struggle to learn	0.688	0.424	0.173	0.019	0.189	0.260	0.752	0.787	0.213
Interpretation of Meaning	V21	I make good sense of other students' messages	0.576	0.020	0.119	0.183	0.233	-0.433	0.569	0.622	0.378
	V22	Other students make good sense of my messages	0.640	0.164	0.154	0.257	0.212	-0.226	0.620	0.621	0.379
	V23	I make good sense of the tutor's messages	0.531	-0.324	0.191	-0.082	0.131	-0.278	0.559	0.524	0.476
	V24	The tutor makes good senso of my messages	0.556	-0.221	0.193	-0.119	0.189	-0.244	0.507	0.504	0.496

Values in bold correspond for each variable to the factor for which the squared cosine is the largest

Source: our elaboration

The first three factors explain the 52.062% of cumulative variability. Since the software suggested the existence of the same number of latent factors that we expected, we ran a second EFA selecting a varimax rotation applied to the first three factors.

Table 3 shows the factor pattern after varimax rotation.

Tab. 3: Factor pattern after varimax rotation

			D1	D2	D3
Professional Relevance	V1	My learning focuses on issues that interest me	0.099	0.308	0.201
	V2	What I learn is important for my professional practice	0.082	0.597	0.129
	V3	I learn how to improve my professional practice	0.183	0.580	0.147
	V4	What I learn connects well with my professional practice	0.220	0.571	0.153
Reflective Thinking	V5	I think critically about how I learn	0.021	0.184	0.726
	V6	I think critically about my own ideas	0.049	0.252	0.696
	V7	I think critically about other students' ideas	0.106	0.001	0.670
	V8	I think critically about ideas in the readings	0.032	0.183	0.741
Interactivity	V9	I explain my ideas to other students	0.695	0.008	0.289
	V10	I ask other students to explain their ideas	0.705	-0.017	0.282
	V11	Other students ask me to explain my ideas	0.741	-0.059	0.274
	V12	Other students respond to my ideas	0.756	0.052	0.295
Cognitive Demand	V13	The tutor stimulates my thinking	0.068	0.707	0.175
	V14	The tutor encourages me to participate	0.057	0.767	0.132
	V15	The tutor models good discourse	0.063	0.781	0.086
	V16	The tutor models good critical self-reflection	0.140	0.635	0.114
Affective Support	V17	Other students encourage my participation	0.769	0.100	-0.083
	V18	Other students praise my contribution	0.853	0.140	-0.095
	V19	Other students value my contribution	0.828	0.169	-0.093
	V20	Other students empathise with my struggle to learn	0.802	0.177	-0.094
Interpretation of Meaning	V21	I make good sense of other students' messages	0.455	0.370	0.052
	V22	Other students make good sense of my messages	0.597	0.322	-0.008
	V23	I make good sense of the tutor's messages	0.199	0.613	0.084
	V24	The tutor makes good sense of my messages	0.285	0.557	0.056

Values in bold correspond for each variable to the factor for which the squared cosine is the largest

Source: our elaboration

Tab. 4: Cronbach's alpha of factors after varimax rotation

	Cronbach's alpha
D1	0.916
D2	0.868
D3	0.831

Source: our elaboration

A high Cronbach's alpha suggests that the items have relatively high internal consistency.

The first factor groups variables related to the Interactivity, to the Affective support, and two of the variables belonging to the Interpretation of meaning (specifically the two variables related to other students).

The second factor groups variables from the Relevance, from the Cognitive demand area, and the two variables of the Interpretation of meaning related to the instructor.

The third factor corresponds to the Reflective thinking.

The three factors' pattern is likely to be affected by some specific features of the students. The differences between undergraduate and postgraduate students are likely to exist, but they are poorly studied. Is there a difference in the factors affecting the perception of online classroom environment between undergraduate and postgraduate students?

In order to test the existence of a different path in the factors, between undergraduate and postgraduate students, we selected two subsets of our sample. The first subset groups all students attending the master class in Business management and strategy; the second subset groups students of the undergraduate class in Business management (beginners). The two classes share topic and

tutor and differentiate in the level and the course design.

By comparing the results from the two classes, we can focus on the effect of class design and student characteristics (in terms of experience, background knowledge, team building, and communication) and hold constant the effects of instructor facilitation and topic.

We ran an EFA and selected the varimax option for the rotation that was applied to the first three factors.

Tab. 5: Factor pattern after varimax rotation by class

	Undergraduate			Postgraduate		
	D1	D2	D3	D1	D2	D3
My learning focuses on issues that interest me	-0.088	0.060	-0.236	0.043	0.705	0.004
What I learn is important for my professional practice	-0.050	0.667	0.219	0.009	0.783	0.048
I learn how to improve my professional practice	0.128	0.503	0.288	0.340	0.801	0.171
What I learn connects well with my professional practice	0.164	0.549	0.319	0.095	0.669	0.357
I think critically about how I learn	0.341	0.433	-0.227	0.134	0.195	0.745
I think critically about my own ideas	0.112	0.365	-0.201	-0.078	0.380	0.440
I think critically about other students' ideas	0.556	0.449	-0.190	-0.050	-0.050	0.593
I think critically about ideas in the readings	0.405	0.549	-0.158	0.204	0.089	0.705
I explain my ideas to other students	0.540	0.120	0.628	0.468	0.142	0.436
I ask other students to explain their ideas	0.346	0.043	0.876	0.535	0.126	0.520
Other students ask me to explain my ideas	0.566	0.054	0.607	0.808	-0.112	0.331
Other students respond to my ideas	0.756	-0.086	0.423	0.769	-0.025	0.500
The tutor stimulates my thinking	0.168	0.830	-0.294	0.439	0.475	0.211
The tutor encourages me to participate	0.157	0.821	0.073	0.272	0.791	-0.043
The tutor models good discourse	0.185	0.755	-0.047	0.521	0.609	0.059
The tutor models good critical self-reflection	0.305	0.682	0.079	0.447	0.532	0.135
Other students encourage my participation	0.705	0.078	0.283	0.739	0.324	0.176
Other students praise my contribution	0.802	0.183	0.231	0.852	0.274	-0.058
Other students value my contribution	0.905	0.083	0.095	0.832	0.217	-0.092
Other students empathise with my struggle to learn	0.886	0.063	0.045	0.688	0.451	-0.002
I make good sense of other students' messages	0.136	0.209	0.100	0.420	0.371	0.470
Other students make good sense of my messages	0.770	0.405	0.237	0.448	0.418	0.316
I make good sense of the tutor's messages	-0.020	0.789	0.200	0.059	0.618	0.265
The tutor makes good sense of my messages	0.017	0.802	0.156	0.247	0.523	0.039

Values in bold correspond for each variable to the factor for which the squared cosine is the largest

Source: our elaboration

As we can see in table 5, the factor pattern in the postgraduate class is in line with the factor pattern in the full sample. Nevertheless, the factor patterns in the postgraduate sub-sample and in the undergraduate sub-sample are different. In the undergraduate sub-sample, the first three factors explain the 57.478% of variability. In the postgraduate sub-sample, the first three factors explain the 58.284% of variability.

Two are the main differences in the factor patterns between undergraduate and postgraduate classes. More specifically, as already pointed out, factor pattern in the postgraduate class is in line with factor pattern in the full sample, instead, the EFA on the undergraduate class shows a different pattern in the Interactivity, Relevance and Reflective thinking areas.

5. Discussion

The current study examined the perceptions of the online classroom environment of undergraduate and graduate students enrolled in online management courses during the Covid 19 pandemic.

Although students were forced to quickly adapt to the online classroom and despite their lack of experience with online technologies and learning, they demonstrated generally positive perceptions of online teaching/learning. The Cognitive Demand theme, which relates to the role of the instructor and specifically whether he/she communicates effectively and provides incentives to students,

showed the highest mean score. This result is not surprising and is consistent with the fact that the instructors involved in the online courses we considered already had experience with online courses. They adopted a variety of roles, tools, and instructional practices (e.g., creative lab, video and audio content, online survey, etc.) to adapt traditional instructional formats and interactive group discussions to the new online environment. As previous studies have shown (Artino and Stephens, 2009; Gonçalves *et al.*, 2021), teachers played both an instructional and a supportive/promotional role in enabling students to easily use technology for learning purposes and in engaging their classmates in meaningful interactions, i.e., encouraging, acknowledging, and reinforcing their contributions. In contrast to students' attitudes toward using online technologies to interact and build relationships with peers, we were surprised to find that interactivity and affective support, which reflect opportunities to interact and build relationships with peers in the virtual environment, had the two lowest scores.

Not surprisingly, our results show some interesting differences between grade levels; for example, Marketing and Innovation Management show optimal scores in all six domains, both of which relate to intermediate level courses that use teaching methods and tools from Business Management (1st year undergraduate programme) and Business Management and Strategy (2nd year postgraduate programme). Learners taking these courses already have experience with business topics and know peers who are part of their learning community.

In Business Management differences in Reflective Thinking mean scores are evident, with actual scores higher than preferred scores. This is consistent with studies that refer to undergraduate as students being less self-regulated and autonomous, and therefore unable to master the area of critical thinking to generate and learn thoughts on their own (Artino and Stephens, 2009). Finally, Business Management and Strategy show different values in the Professional Relevance; preferred perception is higher than actual perception. This is probably due to learners' career expectations and experiences, as most master's students have been doing accounting internships for at least two years and therefore expect their learning to be directly related to accounting careers rather than management careers.

To explore and better understand the latent factors that influence the six thematic domains that deepen students' perceptions of the virtual classroom environment (Taylor and Maor, 2000), we conducted an EFA. The results of the EFA reveal the existence of three main characteristics, which we code as course design, instructor characteristics, and learner characteristics, following the existing literature (Martin *et al.* 2020; Patak *et al.*, 2016; Phirangee, 2016; Tawfik *et al.*, 2018; Kuo *et al.*, 2014).

Table 3 shows that the first factor (D1) groups variables related to Interactivity (V9, V10, V11, V12), to Affective Support (V17, V18, V19, V20), and two of the variables belonging to Interpretation of Meaning (specifically the two variables related to other students, V21 and V22). All these variables can refer to the process of co-construction of new knowledge (Taylor and Maor, 2000), which implies reflective collaboration between learners. We code the latent factor influencing them as course design and development. This is consistent with Cho and Kim (2013) who relate interaction with other students to course activities, including group projects, online discussions, and individual projects with peer feedback. This is confirmed by students attending Marketing, Innovation Management and Business Management, and strategy courses. Because these courses combine theoretical lectures with creative labs and teamwork, case study analysis, and group discussions, students tend to interact more actively with other students than with the instructor.

The second factor (D2) groups variables related to the Professional Relevance (V1, V2, V3, V4), the Cognitive Demand area (V13, V14, V15, V16), and the two variables of the Interpretation of Meaning (V23, V24) related to the instructor. All these variables can relate to the instructor's role, which ranges from imparting expert knowledge to being a facilitator and observer. Instructors act to enable learners to better regulate their own learning in online contexts (McLoughlin, 2002) as well as connect it to their scope and actual professional practice. We code as instructor characteristics the latent factor that influences them.

Finally, the third factor (D3) corresponds to Reflective Thinking (V5, V6, V7, V8), we code it as learner characteristics. This is consistent with other studies (Artino and Stephens, 2009; Cho and Kim, 2013) that refer to critical thinking strategies as the inherent and individual ability of students to apply prior knowledge to new situations or to make critical evaluations of ideas. Very interestingly, the results from our general sample indicate that Reflective Thinking has no correlations with other factors.

This finding is consistent with previous studies of distance and online education, which have focused primarily on learner characteristics and course interaction, as well as course design and instructor characteristics. However, when we turn to the comparison between undergraduate and postgraduate courses, only the factor pattern in the postgraduate subsample confirms the general results we found in the whole sample (Table 3). The EFA we conducted in the undergraduate subsample shows a different factor pattern: D1 groups Affective Support (V17, V18, V19, V20), one item of Interactivity (V12), and one item from Interpretation of Meaning (V22).

Group D2 is the most miscellaneous as it explains three items on the Professional Relevance (V2, V3, V4) and on Reflective Thinking (V5, V6, V7, V8), on Cognitive Demand (V13, V14, V15), and three items on Interpretation of Meaning (V21, V23, V24). Finally, D 3 groups one item of Professional Relevance (V1) and three items covering Interactivity (V9, V10, V11). Since D2 links the same variables we found in the general results with (as additional variables) the Reflective Thinking variables, we can assume that in undergraduate studies the role of instructor is crucial for the development of some personal characteristics of the learner (e.g. critical thinking about ideas and learning). Students in the first year of undergraduate program usually lack self-regulation and autonomy, which are the basis of Reflective Thinking and of interaction: The more autonomous students are in their learning process, the more they interact with the professor and peers. Therefore, they need more explicit support and structure from the instructor.

In contrast to the results in the total sample, the variables belonging to interactivity load to a different factor in relation to the affective support variables. This difference could be due to the lack of prior academic experience of the learners and thus the lack of social presence and sense of community in the virtual classroom.

In general, this result is quite controversial, it does not allow us to clearly codify the factors that influence students' perception of the online environment. Further research is needed to better understand the reasons behind these findings. Identifying the factors that explain how undergraduate and graduate students perceive online courses, especially during the pandemic, is significant for improving support for online students who are forced to take distance learning experiences and for providing guidelines for effective online teaching.

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Know what you eat: exploring food purchase decisions through TAM model on Blockchain. An Italian case study[♦]

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Abstract

Objectives. *This research aims to verify the validity of the Technology Acceptance Model when Blockchain technology is applied in Italian food purchases. Moreover, it studies the importance Italian consumers give to information, their level of knowledge on the topic, as well as the product characteristics they value the most during food purchases.*

Methodology. *Data was collected through the dissemination of an online questionnaire, reaching a sample of 550 respondents. Both Exploratory and Confirmatory Factor Analysis as well as an OLS regression analysis were performed to test the hypotheses.*

Findings. *The results confirmed the factors influencing the adoption of Blockchain technology. Both independent variables exert a positive and significant influence on the dependent one, thus verifying the hypotheses.*

Research limits. *As for limitations, it deals only with Italian consumers, and it focused only on testing the validity of TAM in food purchases. Future research should include cross-cultural differences and consider the effect of COVID-19 on consumer purchases, investigating whether elements that certify the safety and traceability of products are appreciated.*

Practical implications. *From a managerial point of view, results open up various business opportunities to large companies and SMEs. As for the academic point of view, this study confirms the validity of the model in the Italian context and proposes changes to keep the framework up with technology development and adoption.*

Originality of the study. *This study deepens the knowledge of TAM applications, by focusing on the Italian food context. It contributes to the literature and opens for future investigations.*

Key words: TAM application; blockchain technology; information; Italian consumers; food purchases.

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1. Introduction

In the last decade, sustainable consumption has risen in concern among people, especially in the food industry. Many consumers are nowadays, more aware of consuming products which are the result of sustainable production systems. Firms, on the other hand, observing this growing interest toward green products, started to adopt sustainable behaviours in the glance of obtaining competitive advantages coming from a better reputation among the public (Mancini *et al.*, 2017; Govindan, 2018; Feng *et al.*, 2020; Kouhizadeh *et al.*, 2021).

A critical aspect regarding the sustainable behaviour disclosure arose. Information has a fundamental role in the purchase decision-making process. Firms started to look at new communication strategies to promote their sustainable behaviour to consumers. Moreover, a demand for information traceability by firms, governments and consumers has soared significantly due to food safety and quality issues.

Technology provided new powerful tools to make complete information immediately available for consumers to ease their purchasing experience process. In this framework, the debut of Blockchain Technology in everyday life has enhanced the process of information disclosure about production and supply chain, supporting both firms and consumers in reducing asymmetric information in the value proposition created. It is believed that blockchain technology can build trust mechanisms for information transparency and security and realize the exchange of value information in the traceability management process.

Extant literature on blockchain-based traceability identifies the important impact on the agri-food supply chain, including transparency and accountability (Tama *et al.*, 2017; Kshetri, 2018), traceability and fraud prevention (Jin *et al.*, 2017), security and authentication cybersecurity and protection etc. (Galvez *et al.*, 2018; Kshetri, 2018; Banerjee *et al.*, 2018).

Blockchain Technology is extending its presence on the firm side, helping entrepreneurs and manager in enforcing elements of trust in inter-firm relationships, and also gaining more efficiency in the supply chain management processes. Points of strength such as traceability, transparency and disintermediation are responsible for reducing phenomena of corruption and crime, i.e., the deterrence towards food fraud and adulteration (Wee and Cheok, 1995; Galvez *et al.*, 2018; Kamath, 2018; Yiannas, 2018).

However, on the consumer side, there is barely a debate around the employment of Blockchain technology to intervene in the purchasing decision process.

The aim of this paper is to analyse the factors determining the consumer behaviour in the light of the introduction of the Blockchain technology as an instrument of information disclosure to support the consumer eager to buy sustainable food products. Through the application of the Technology Acceptance Model (TAM) theorised by Davis (1985), we collected data via a questionnaire submitted to a sample of Italian consumers. We operated an Exploratory Factor Analysis (EFA) and a Confirmatory Factor Analysis (CFA) to establish the factors of major interest. We then built an econometric model to assess the relationship between the perceived usefulness (U) - and, indirectly, the perceived ease of use (E) -, the attitude towards use (A) and the behavioural intention to use (BI). Results provided a positive, direct impact of both the predictors on the dependent variable, confirming the necessity to enhance the diffusion of such a technology among the majority of consumers. Important managerial implications derived from the study, confirming the necessity by firms to exploit much more the opportunity to enhance information disclosure about traceability and transparency in the production and supply chain processes, as the demands for healthier and safe food increases. On an academic point of view, the paper contributes to the extant literature on a twofold perspective: first, the confirmation of a part of the TAM theory in the Italian context; second, we suggest that the changing heritage of application of the theory makes it necessary to reconsider some aspects of the model, especially in the revision of indirectly impacting variables such as the perceived ease of use (E) and switching the debate towards new rising and urgent security issues, which are suggested to be followed up in future research.

The paper is organized as follows: Section 2 focuses on the analysis of the extant literature and the hypotheses development; Section 3 introduces the methodology adopted while Section 4 brings in the results of the analysis. Finally, the last section includes discussion and conclusions, suggesting also future developments.

2. Literature review and hypotheses development

2.1 *The role of information for food consumers*

The food market has registered in the last decades deep changes, above all in consumers' preferences and buying behaviours (Cicia *et al.*, 2021). Actually, consumers pay more attention than past to certain aspects relating to the content of the offer. A specific interest is directed, for example, to the moral and health characteristics (Caswell, 1997) or to food safety and risk information (Verbeke *et al.*, 2007). Moreover, there is a growing acceptance of proposals coming from a sustainable production, such as the case of organic farming (Hughner *et al.*, 2007), and a particular focus is addressed to the nutritional aspects too (Visschers, 2010). Generally, it is possible to affirm that there is a more conscious buying behaviour, affected by the complex set of interlinked personal and environmental factors as well as by information (Verbeke, 2008).

As for the information point of view, there is the necessity to provide the right elements, avoiding too many details or too little features, since it could cause, respectively, confusion or uncertainty (Andrews *et al.*, 1998; Wansink, 2003). The information sources could be different, from producers advertising to independent organizations. Previous research expressed the consumers' need to obtain information regarding three cognitive-affective dimensions, precisely the agri-food system, enjoyment and wellness, placing more trust in the news or data disseminated by public bodies than media (Nocella *et al.* 2014), above all in the case of a food scare (Böcker and Hanf, 2000; Pennings *et al.*, 2002; Savolainen, 2007). This last result shows the tendency to consider more truthful the voice of a subject not directly involved in the selling activity, as an element of guarantee in the relationship between producer and customer.

In this sector, one of the most important communication instruments is surely the label since it could be a strategic source to clarify production systems or the food features, assisting consumers in their choices (Kriflik and Yeatman, 2005). A label is a valid option to provide nutrition information (Miller and Cassidy, 2015) or to underline a more responsible approach in the supply chain, as represented by many eco-labels. The latter, just to name a few, are organic, fair trade, local, etc. (Engels *et al.*, 2010). The label has a relevant role when the product needs to be evaluated by consumers with allergies (Turner *et al.*, 2011), chronic disease (Lewis *et al.* 2009) or customers that follow a healthy (Baltas, 2001) as well as low-fat diet (Shine *et al.*, 1997). Definitely the effects of label information on consumers are present and can influence their orientation (Gao and Schroeder, 2009). In the past, some researchers tried to study how was concrete the use of the label to build a better knowledge about product (Marietta *et al.*, 1999; Macanda, 2005; Van Der Merwe *et al.*, 2010) and sometimes it represents the first source of information too (Morrone and Schena, 2018). Therefore, food labelling is an important factor in consumer purchasing decisions and the further goal is to provide essential information which should be quickly and clearly seen and understood (Moreira *et al.*, 2019), avoiding incomplete or misleading messages.

In this framework research is now oriented towards the new evolution of labelling made by blockchain technology, considered an instrument to improve food authenticity, traceability and information transparency (Duan *et al.*, 2020). Blockchain represents a new way to simplify the information process since consumers are overwhelmed by the amount and complexity of certification labels (Sander *et al.*, 2018). However, its introduction, and above all its acceptance, need to be deeply evaluated. This innovation is generating particular attention by scholars, being not a stand-alone technology but one element in a system of technologies (Köhler and Pizzol, 2020), where consumers could obtain the traceability data through a scannable QR code on product

packages (Bumblauskas *et al.*, 2020). Therefore, it requires a technical improvement not only for companies involved in the supply chain but also for customers, where the latter have to use the package or the label as a “key” to open a complete and truthful source of information. It is a sort of “certification” where the third body is the technology itself. Anyway, the research in this complex panorama is still at the beginning and an increased number of analyses could confirm if this invention will mark the future dialogue among companies and all stakeholders, in a renewed and reinforced trust relationship.

2.2 Blockchain and sustainable business models

Blockchain technology is rapidly increasing its popularity among experts and public opinion. The growing dissemination of various practical experiences on the field are enhancing the academic debate about food traceability and supply chain digitalization (Saber *et al.*, 2019; Qian *et al.*, 2020; Saurabh and Dey, 2021; Tiscini *et al.*, 2020).

Blockchain technology is a distributed database of records or shared public/private ledgers of all digital events that have been executed and shared among blockchain participating agents (Crosby *et al.* 2016). It is characterized by different essential features like decentralization (Saber *et al.*, 2019), trust (Saber *et al.*, 2019; Qian *et al.*, 2020; Saurabh and Dey, 2021; Tiscini *et al.*, 2020), traceability (Caro *et al.*, 2018; Zhao *et al.*, 2019; Shahid *et al.*, 2020; Tiscini *et al.*, 2020) and transparency (Baralla *et al.*, 2018; Caro *et al.*, 2018; Zhao *et al.*, 2019; Tiscini *et al.*, 2020). Decentralization is an important property of blockchain technology and is a check on any adulteration of information, thus increasing information validity. Removing collectively maintained records are impractical and verified records of every single transaction are accessible to the participants through distributed public or private ledgers (Crosby *et al.* 2016; Saber *et al.*, 2019). A centralized database is more susceptible to hacking, corruption, or crashing (Tian, 2016). Trust is a main consequence of decentralization since there is no need to assess the trustworthiness of the intermediary or other participants in the network (Nofer *et al.*, 2017) and information is easily viewed and compared (Saber *et al.*, 2019).

The blockchain technology has the potential to improve the effectiveness of sustainability certification and strengthen trust in related claims (Tiscini *et al.*, 2020). Consumers and, more in general, public trust are enhanced by the introduction of blockchain through data traceability, accountability, and verifiability (Ge *et al.*, 2017; Tiscini *et al.*, 2020). Moreover, food safety and quality are significantly improved by the blockchain introduction, thanks to data transparency and visibility (Trienekens *et al.*, 2012; Tripoli and Schmidhuber, 2018). Thus, blockchain is essential for improving the traceability of products and ensuring product authenticity and legitimacy. Supply chain disintermediation, which implies the absence of intermediaries because data integrity is guaranteed by the whole system, results in a reduction in error risks, delays and inefficiencies of transactions and leads to greater financial inclusion and rural business development (Tripoli and Schmidhuber, 2018). In addition, smart contracts simplify partners' relations through the supply chain (Wong *et al.*, 2020).

Of course, being a disruptive innovation especially on the producer side, recognizing the positive effects inducted by the introduction of blockchain technology to implement safer processes in supply chain management, it is interesting to switch the debate on the consumer side, where opportunities to receive this technology are influenced by the consumer behaviour and preferences. According to Qian *et al.* (2020) consumers from different countries expressed different needs related to the kind of information they want to get through Blockchain Technology: Belgians, for instance, are more aware of information about food safety than traceability, as well as Spanish and Portuguese argued that they are not likely to pay a premium price for food traceability.

Therefore, it is important to test the acceptance of different groups of people, based on their national culture and provenience, to understand whether or not they are likely to adapt their consumption decisions based on the opportunity to introduce such a technology to trace food and its supply chain.

A proper tool to conduct this analysis is the application of the Technology Acceptance Model (TAM), of which we tested some of the central knots.

2.3 The Technology Acceptance Model (TAM)

Among all the theories, the Technology Acceptance Model (TAM) is considered to be one of the most spread and effective to describe the adaptation of users to the spread of new technologies (Lee *et al.*, 2003). It was first published by Davis (1985), and many scholars inquired about its implementation and discussed several limitations. Basic principles underneath the application of the TAM model are the perceived usefulness and the perceived ease of use. It is self-evident, as of today, that a technology is not worth the success if it is not received and used by the majority of population, according to the Innovation Diffusion Theory (IDT), proposed by Rogers in 1962.

Some of the points of strength of the TAM theory are its parsimony, i.e., intentions to use a technology influence usage behaviour, and Perceived Usefulness (U) and Perceived Ease of Use (E) determine intentions to use (Bagozzi, 2007). According to the main framework adopted in the model, both the mentioned variables act on the Attitude Towards Use, which positively, directly affect the Behavioural Intention to use technologies (Venkatesh and Davis, 2000; Bagozzi, Davis, and Warshaw, 1992; Davis, Bagozzi and Warshaw, 1989, 1992). It is, according to many scholars, a powerful theory (Lucas and Spitler, 1999; Venkatesh and Davis, 2000), making it spread its applications in many fields and for different tools, like word processors, e-mail, WWW, GSS, Hospital Information Systems) under different situations (e.g., time and culture) with different control factors (e.g., gender, organizational type and size) and different subjects (e.g. undergraduate students, MBAs, and knowledge workers), leading its proponents to believe in its robustness (Lee *et al.*, 2003).

Several scholars argue that, according to the extant literature, the way a technology can result in its full acceptance is mostly due to its perceived usefulness and its attitude towards use. Taherdoost (2018) considers the success of a blockchain technology the result of the exploitation of those three variables above-mentioned. Grover *et al.* (2019) also state the considerable impact of perceived usefulness and the perceived ease of use on the acceptance of such technology.

What is evident from the literature, then, is that two knots of the framework are directly related to the final stage of the model, i.e., the Perceived Usefulness (U) and the Attitude Towards Use (A) directly influence the Behavioural Intention (BI) to use the technology, while the Perceived Ease of Use (E) has only an indirect effect of the Behavioural intention (BI) (Davis, Bagozzi and Warshaw, 1989, 1992; Bagozzi, Davis, and Warshaw, 1992; Lucas and Spitler, 1999; Venkatesh and Davis, 2000).

In this framework (Fig. 1), the opportunity to evaluate the success of Blockchain Technology among Italian consumers is based on the testing of a main hypothesis divided into two branches.

According to the aims of our research, we decided to better focus on the core variables of the TAM model, so that external variables are not here taken into account to run the analysis and verify the hypotheses as follows:

H1a: *Attitude Towards Use (A) has a positive relationship with Behavioural Intention (BI)*

H1b: *Perceived Usefulness (U) has a positive relationship with Behavioural Intention (BI)*

The second branch of the hypothesis is directly suggested by the model itself, while the first one is thought, on a second step, to capture the effect of the E on BI, since it has a direct, but lower, impact on the A.

Blockchain technology has had a wider perspective in its adoption, being evaluated through the TAM model and other different theories assessing its impact in business management.

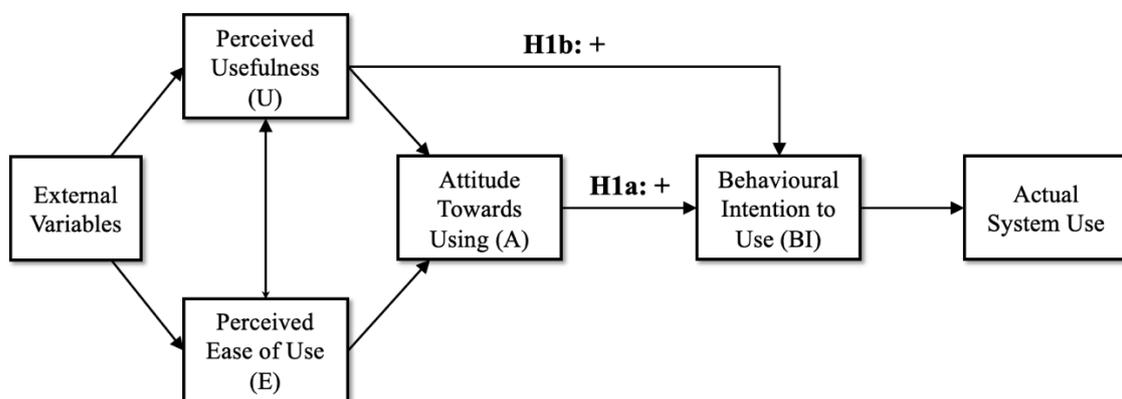
During the last years, the TAM theory has been frequently applied to study the consumer behaviour on the consumption of relatively new goods and services, such as Bitcoin and other cryptocurrencies (Folkinshteyn and Lennon, 2016; Arias-Oliva *et al.*, 2019), but it also started to

gain much more attention on supply chain management aspects. This enhanced the opportunity to evaluate the employment of Blockchain technology for social and environmental sustainability purposes, beyond the economic advantages obtained by the opportunity to trace all the processes of value creation of the supply chain (Szajna, 1996; Venkantesh and Davis, 2000; Venkantesh, 2000; Saberi *et al.*, 2019; Kamble *et al.*, 2019).

Many scholars perceived the objective to apply the TAM theory to Blockchain to assess the impact of the new technology on the agri-food industry, focusing their attention on the firm perspective, due to a growing interest in easing and improving processes of the supply chain (Kamilaris *et al.*, 2019; Lou and Li, 2017; Francisco and Swanson, 2018; Baralla *et al.*, 2018; Caro *et al.*, 2018; Zhao *et al.*, 2019; Tiscini *et al.*, 2020).

In the next paragraphs the methodology and results are showcased in order to test the hypothesis formulated.

Fig. 1: Conceptual framework



Source: own elaboration.

3. Methodology and data

3.1 Research objectives

As abovementioned, this study focused on the investigation of two research hypotheses aimed at understanding the validity of Technology Acceptance Model when it comes to Blockchain in Italian agri-food purchases. In particular, it studied the approach of Italian consumers towards this new technology by using data collected through the dissemination of an online questionnaire, which highlighted the level of information of the sample towards this topic, the characteristic they value the most when it comes to food purchases, their level of awareness relating to TAM components and Blockchain technology, and their attitude towards new technologies. Results will be able to explain how consumers' approach to this kind of product can be enhanced, by underlying the aspects they appreciate, but also those that may hinder its adoption.

3.2 Questionnaire development and variables description

In particular, to perform the analysis, the Google Form platform was used to disseminate the questionnaire and collect data from Italian consumers. It lasted around three months (from November 2020 to January 2021) and included 21 questions divided into five sections. Some question provided a five-point Likert scale evaluation (where '1' and '5' identified a poor or high match), while others included open or multiple-choice answers (Tab. 1).

The first section aimed to understand if and to what extent information represents a relevant component in respondents' food purchasing choices. As one of the main purposes of adopting

Blockchain technology in the supply chain is to increase the level of information available to end consumers, its importance among respondents was investigated.

Tab. 1: Variable description table

Name	Description	Measure
<i>Variables related to the level of information</i>		
info_1	Refers to the respondents' importance of being informed before making a food purchase.	closed, Likert scale
info_2	Refers to the influence such information can have during the food purchase process.	closed, Likert scale
info_channels	Refers to the communication channel used by respondents to gain information about Blockchain technology.	closed, single choice
lable_trust	Refers to the perceived degree of truthfulness and reliability of the information on food product labels.	closed, Likert scale
<i>Variables related to food characteristics</i>		
features_quality	Refers to the importance respondents place on organoleptic qualities (such as appearance, taste, smell) when it comes to food purchases.	closed, Likert scale
features_origin	Refers to the importance respondents place on origin information when it comes to food purchases.	closed, Likert scale
features_freshness	Refers to the importance respondents place on the freshness of food products when it comes to purchase.	closed, Likert scale
features_price	Refers to the importance respondents place on price when it comes to purchasing food products.	closed, Likert scale
features_certification	Refers to the importance respondents place on the presence of certifications (e.g., organic ones) when it comes to purchasing food products.	closed, Likert scale
features_trust	Refers to the importance respondents place on trust in a brand or producer when it comes to food purchases.	closed, Likert scale
feature_sustainability	Refers to the importance respondents place on environmental sustainability characteristics when it comes to food purchases.	closed, Likert scale
features_availability	Refers to the importance respondents place on availability aspects when it comes to food purchases.	closed, Likert scale
features_advertising	Refers to the importance respondents place on advertising when it comes to food purchases.	closed, Likert scale
features_promo	Refers to the importance respondents place on promotional activities (such as discounts) when it comes to food purchases.	closed, Likert scale
<i>Variables related to the TAM</i>		
U_1	Refers to the perceived usefulness of respondents when a certain technology allows them to verify information on food labels.	closed, Likert scale
U_2	Refers to the perceived usefulness of respondents when a certain technology provides them with clear and safe traceability of food products and, consequently, more information than food traditional labels.	closed, Likert scale
U_3	Refers to the extent to which respondents believe that this technology can improve and facilitate the purchase of food products.	closed, Likert scale
E_1	Refers to respondents' ease of use of a technology that requires scanning a code (barcode or QR code) on food labels	closed, Likert scale
E_2	Refers to respondents' ease of use of a technology that requires the use of a smartphone or optical reader to gain more information about a food product.	closed, Likert scale
A_1	Refers to respondents' belief that the use of such technology could be a good idea.	closed, Likert scale
A_2	Refers to respondents' belief that using such technology can result in a pleasant experience.	closed, Likert scale
BI	Refers to the extent to which respondents would be likely to purchase food products equipped with this technology.	closed, Likert scale
<i>Variables related to the level of awareness on Blockchain technology</i>		
spend_more	Refers to respondents' willingness to spend more (in percentage terms) when it comes to purchasing a product equipped with this technology.	closed, single choice
knowledge_1	Refers to respondents' knowledge of Blockchain technology applied to the agri-food chain.	closed, Likert scale
knowledge_2	Refers to respondents' level of knowledge on what Blockchain technology would entail if applied in the agri-food chain.	closed, Likert scale
<i>Demographic variables</i>		
gender	Refers to gender.	closed, binary choice
age	Refers to age.	open, numerical
education	Refers to the level of education of respondents.	closed, single choice
income	Refers to respondents' monthly net income bracket.	closed, single choice
innovation_attitude	Refers to respondents' behaviour when a new product or service is placed on the market.	closed, single choice

Source: our elaboration

The second section, on the other hand, was oriented to the identification of consumer preferences regarding the characteristics related to the purchase of food products (i.e., organoleptic qualities, origin, freshness, certifications, trust in the brand or producer, environmental sustainability, availability, advertising, price and promotions). The third section investigated the variables of the Davis' model (i.e., the 'Perceived Usefulness' (U), the 'Perceived Ease of Use' (E), the 'Attitude towards Use' (A), and the 'Behavioural Intention' (BI)). The fourth section questioned the respondents' level of awareness on Blockchain technology, its application in the food chain, as well as the willingness to spend more to buy products equipped with this technology. The last section explored essential demographic data, useful for evaluating the heterogeneity of the sample and the possible connections between the consumer profile and the purchase of food products equipped with Blockchain technology. Furthermore, the attitude towards new technologies was investigated to understand how the sample relates to the categories identified by Rogers (2010) in his theory. Table 1 summarises the description of the variables and their measures.

3.3 Data and Sample

The sample resulting from the online survey is made of 550 respondents. Only responses with no missing data were included. Table 2 summarizes the sample composition.

Tab. 2: Sample composition (in percentage, %)

Gender	Age (years)	Education	Monthly income (€)	Diffusion of Innovation
Female, 54	18-25, 40	High school or below, 46	< 999, 42	Innovators, 20
Male, 46	26-40, 27	College or university, 46	1.000-1.999, 39	Early adopters, 16
	41-55, 19	Postgraduate, 8	2.000-2.999, 7	Early Majority, 50
	> 56, 14		> 3.000, 12	Late Majority, 12
				Laggards, 2

Source: our elaboration

Participants were 54% female and 46% male, with an average age of 36 years old and an average monthly income of Euro 1999,00. As regards education, almost all of the sample had high school or below and college or university education (both with 46%), while the remaining 8% is characterized by postgraduate education. Considering this data, it is possible to state that the sample is well-stratified even if not balanced in terms of age, being the younger age group clearly superior. For this reason, a t-test analysis was used to assess the adequacy of the age classes, which did not identify any significant differences between them. In any case, even if the database is not balanced, the understanding of the purchasing behaviour of these consumers is fundamental for the analysis, since they are the ones who will use this technology the most. As for the five categories identified by Rogers (2010), the analysis showed that half of the sample is reflected in the early majority, followed by innovators (with 20%), early adopters (with 16%), late majority (with 12%), and, with only 2%, by laggards.

4. Results

In order to answer the research hypotheses, we performed a four-stage analysis. At first, a focus on Italian consumer characteristics was carried out by analysing the variables related to the importance of information during food purchasing process as well as those related to the level of awareness on Blockchain technology. Besides, the variables related to the second section of the questionnaire were investigated to better understand the characteristics consumers value the most during the purchasing process. An Exploratory Factor Analysis (EFA) was then performed using the

variables of the Technology Acceptance Model. Through this analysis, it was possible to identify the common latent factors that contribute to the definition of Behavioural Intention (BI), which were then validated through a Confirmatory Factor Analysis (CFA) and, finally, to linear regression analysis. IBM SPSS Statistics and IBM SPSS AMOS were used to perform the analyses. The last step, indeed, dealt with analysing the impact that the latent factors can generate in terms of propensity to use such technology during the food purchasing process. Lastly, from the analysis of these variables, some interesting conclusions were drawn.

4.1 Focus on Italian consumer characteristics

The first step was, therefore, to analyse the respondents’ characteristics on a triple front: the importance of correct and clear information, the knowledge about blockchain and its applications, and the product attributes that the sample appreciate the most. Table 3 shows that respondents consider very important to be informed before making a food purchase, whose influence results to be decisive in the purchasing decision process. Regarding the perceived truthfulness and reliability of the information on food labels, respondents showed a good degree of trust as most of the answers are concentrated on values 3 and 4. This data underlines how much consumers pay attention to product information, which is often consulted to gain knowledge about production methods, nutritional values, as well as its origin, to name a few. Internet appears to be the main source of information for respondents (32%), followed by word of mouth (22%), newspapers or scientific journals (17%), TV programs (9%) and other (10%), while 10% of the sample stated that they did not use any channels to get information. As for food products equipped with blockchain technology, although most of the respondents have shown a willingness to spend more for these products, however the percentage they are willing to sacrifice is quite low (between 10% and 20%). This data can certainly be linked to the samples’ general lack of knowledge on the blockchain technology topic. In fact, considering the two variables related to the knowledge of this topic and its applications, it turned out to be very low, being almost the entire responses (i.e., over 75% of the answers) concentrated on low values of the five-point Likert scale used.

Tab. 3: Importance of information and level of knowledge on Blockchain technology

<i>info_1</i>	<i>info_2</i>	<i>label_trust</i>	<i>info_channels</i>	<i>spend_more</i>	<i>knowledge_1</i>	<i>knowledge_2</i>
1, 0	1, 0	1, 1	Internet, 32	10%, 50	1, 58	1, 55
2, 1	2, 1	2, 9	Word of mouth, 22	20%, 32	2, 17	2, 22
3, 13	3, 12	3, 42	Newspapers or scientific journals, 17	30%, 12	3, 11	3, 10
4, 30	4, 40	4, 36	TV programs, 9	>40%, 6	4, 6	4, 7
5, 56	5, 47	5, 12	Others, 10		5, 8	5, 6
			None, 10			

Source: our elaboration

Subsequently, the analysis focused on understanding the product characteristics respondents value the most when it comes to food purchasing. Table 4 shows that the most appreciated characteristics are the quality (expressed in its organoleptic properties), the origin and freshness of food products, whose values are on scores from 3 to 5. In addition, respondents resulted to be particularly interested in the presence of certifications (such as organic) and the integration of aspects related to sustainability in the purchasing process, whereas little interest was shown in advertising. As regards trust in the brand or producers as well as product availability, these characteristics resulted to be of medium importance, with values strongly concentrated on scores from 3 to 4. This is interesting, as it demonstrates the attention towards these aspects during food purchasing decisions. Lastly, the characteristics related to price and promotion move hand in hand, demonstrating, once again, how aspects related to spending capacity influence purchasing decisions. However, even if these characteristics are important, they will never be as important as those of quality, origin, and freshness, which are essential elements when it comes to purchase food products.

Tab. 4: Importance of food characteristics

		Likert scale				
		1	2	3	4	5
Features	quality	2	8	26	23	41
	origin	1	9	29	26	35
	freshness	0	2	26	17	55
	price	2	19	33	25	21
	certification	2	14	32	27	25
	trust	2	17	32	31	18
	sustainability	4	14	28	29	25
	availability	3	19	30	29	19
	advertising	21	32	28	14	5
	promo	7	23	32	24	14

Source: our elaboration

4.2 Exploratory Factor Analysis (EFA)

Once the Italian consumer characteristics were examined, the analysis focused on detecting the latent factors influencing their Behavioural Intention (BI) when blockchain technology is applied in food purchasing process. The statistical method that best suited our research was Exploratory Factor Analysis (EFA), which was performed to examine how, and to what extent, the variances of the observed variables can be explained by the so-called ‘latent’ factors (i.e., those that cannot be directly measured) (Fabrigar *et al.*, 1999), thus reducing the number of original variables (Shek and Yu, 2014). However, before carrying out the analysis, the correlation matrix (Tab. 5) of the variables related to TAM was carried out.

Tab. 5: Correlation matrix

	U_1	U_2	E_1	E_2	A_1	A_2
U_1	1					
U_2	,662	1				
E_1	,322	,251	1			
E_2	,339	,254	,658	1		
A_1	,473	,443	,465	,561	1	
A_2	,388	,391	,462	,463	,586	1

Source: our elaboration with IBM SPSS Statistics

Table 5 shows good and medium-high correlations between all variables. The lowest correlation values are between the variable U_2 and those relating to ease of use (i.e., E_1 and E_2), probably because the ease of using a smartphone (or similar) is now a widespread skill and, therefore, does not particularly affect the Perceived Usefulness. Overall, all variables are positively correlated to each other, confirming their importance in influencing the Behavioural Intention of the Italian respondents.

In order to perform a robust analysis, two tests were carried out to understand if the sample was adequate for the development of the model: the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO Test), and the Test of Sphericity by Bartlett. Both measures resulted to be significant - as KMO Test values are above 0,7 (Tab. 6) - so we proceeded with the analysis.

Tab. 6: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,782
Bartlett's Test of Sphericity	Approx. Chi-Square	1,305,774
	df	15
	Sig.	,000

Source: our elaboration with IBM SPSS Statistics

Cronbach’s Alpha test was then performed to evaluate the internal consistency reliability of the adopted scales. Results suggested the elimination of the variable ‘U_3’, as its absence would have led to a higher Cronbach’s Alpha value (Tab. 7). As regards the Cronbach’s Alpha values, these values can be considered acceptable as Nunnally and Bernstein (1994) stated that ,70 can be an acceptable minimum for a recently developed scale such as those of the TAM.

Tab. 7: Reliability of scales

Reliability Statistics

	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
U	,794	,798	3
E	,794	,794	2
A	,737	,739	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
U_1	8,62	1,911	,667	,477	,686
U_2	8,53	2,028	,680	,486	,680
U_3	8,92	1,913	,572	,328	,796

Source: our elaboration with IBM SPSS Statistics

The next step was to study Communalities (Tab. 8) which indicate how much the variance of each variable is explained by common factors. The results show that the extracted communalities assume significant values as they are less than ‘1’ but greater than ‘,40’.

Tab. 8: Communalities

	Initial	Extraction
U_1	1,000	,837
U_2	1,000	,836
E_1	1,000	,830
E_2	1,000	,821
A_1	1,000	,737
A_2	1,000	,872

Extraction Method: Principal Component Analysis.

Source: our elaboration with IBM SPSS Statistics

Subsequently, from the analysis of the scree plot, it was arbitrarily chosen to extract three components (using an eigenvalue greater than 0,593) to explain better the latent factors and, therefore, minimize the error. The Total Variance Explained (Tab. 9) was then carried out, which demonstrated that the factors to be extracted are able to explain more than half of the total variance of the phenomenon under study (i.e., 82,21%).

Tab. 9: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,249	54,145	54,145	3,249	54,145	54,145	1,732	28,873	28,873
2	1,090	18,168	72,313	1,090	18,168	72,313	1,718	28,630	57,503
3	,594	9,899	82,212	,594	9,899	82,212	1,483	24,709	82,212
4	,432	7,204	89,415						
5	,328	5,472	94,888						
6	,307	5,112	100,000						

Extraction Method: Principal Component Analysis.

Source: our elaboration with IBM SPSS Statistics

The Rotated Component Matrix (Tab. 10) finally identified the three components: the Ease of Use (E) (i.e., E_1 and E_2 variables), the Perceived Usefulness (U) (i.e., U_1 and U_2 variables), and the Attitude Towards Using (A) (i.e., A_1 and A_2 variables).

Tab. 10: Rotated Component Matrix

	Component		
	1	2	3
U_1		,873	
U_2		,880	
E_1	,877		
E_2	,847		
A_1			,696
A_2			,886

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Source: our elaboration with IBM SPSS Statistics

As expected, it emerged that the three extracted factors are those components of the Technology Acceptance Model, thus confirming what was stated by previous literature. Exploratory Factor Analysis, therefore, confirmed the existence of these three distinct factors and allowed to verify the link between each item with the respective construct (Tab. 11).

Tab. 11: Summary of the factors

Latent factor	Description	Item
Perceived Ease of Use (E)	is the factor that identifies the respondents' perceived ease of using a technology that requires the use of a smartphone or optical reader to gain more information about a food product.	E_1 E_2
Perceived Usefulness (U)	is the factor that identifies the perceived usefulness of respondents' when a certain technology provides them clear and safe traceability of food products and, consequently, more information than traditional food labels	U_1 U_2
Attitude towards Using (A)	is the factor that identifies the respondents' belief that using such technology can result in a pleasant experience.	A_1 A_2

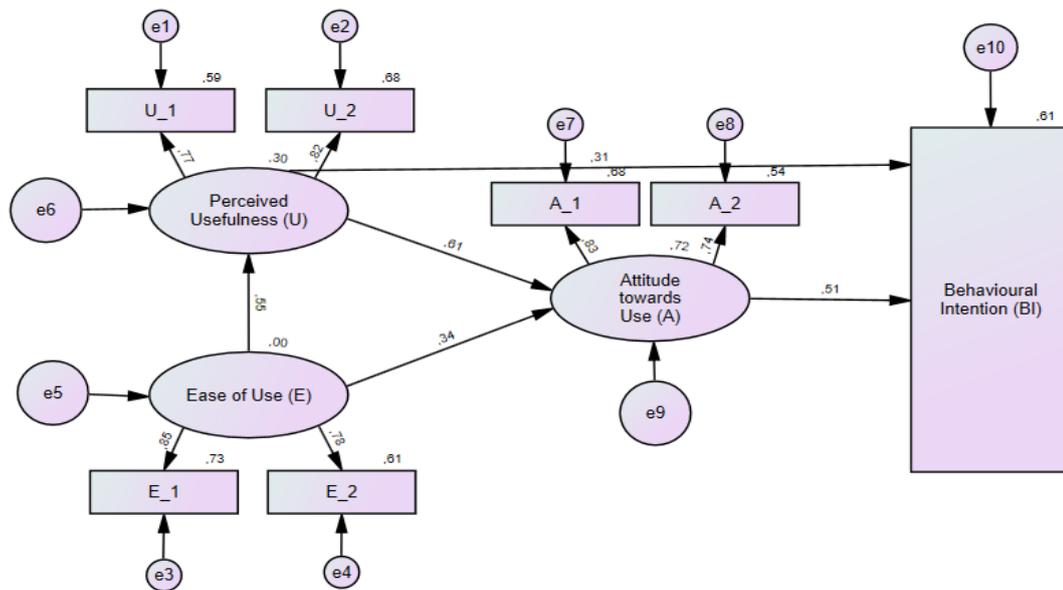
Source: our elaboration

4.3 Confirmatory Factor Analysis (CFA)

After verifying the existence of the constructs and the related links, the next step was to perform a Confirmatory Factor Analysis (CFA) with IBM SPSS AMOS software. This analysis, through the use of structural equation models (SEM), made it possible to verify the validity of frameworks by testing the hypothesized relationships between the latent factors and capturing the relative saturation. Furthermore, through a series of goodness-of-fit indices (or fit indices), it was possible to describe how the model fits the sample data.

The Path diagram (Fig. 2) shows that the CFA confirmed the validity of the theorized constructs and relationships and, at the same time, detected the standardized estimates coefficients. In particular, the standardized estimates coefficients of latent factors are characterized by high values (between 0,74 and 0,85).

Fig. 2: Confirmatory Factor Analysis - Path diagram



Notes:

Minimum was achieved
 Chi-square = 86,360
 Degrees of freedom = 12
 Probability level = ,000

Source: our elaboration with IBM SPSS AMOS

As for the fit indices, we tested the most important (i.e., GFI, AGFI, RMSEA, NFI, RFI, IFI, TLI, and CFI). As for the ‘Goodness-of-Fit Index’ (GFI) and the ‘Adjusted GFI’ (AGFI), which vary from 0 to 1 (Jöreskog and Sörbom, 1989), both indicators require values of around 0,90 to define the fit of a model as statistically acceptable. On the contrary, the Root Mean Square Error of Approximation (RMSEA) measures the average value among the standardized residuals considering the approximation error. Values around 0 indicate a perfect fit whereas those near 1 detect a poor fit. Browne and Cudeck (1992) defines optimal fits values below 0,05, acceptable fits for values between 0,05 and 0,08, and inappropriate fits for values above 0,10. Finally, as regards the comparative fit indices (i.e., NFI, RFI, IFI, TLI, and CFI), values higher than 0,90 are generally considered as acceptable. Table 12 shows a good fit of the model, as the values are in line with what the literature requires. Consequently, it is possible to confirm, once again, the validity of the framework.

Tab. 12: Model fit summary

Model	GFI	AGFI	RMSEA	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	,956	,897	,106	,951	,915	,958	,926	,958
Saturated model	1,000			1,000		1,000		1,000
Independence model	,410	,213	,390	,000	,000	,000	,000	,000

Source: our elaboration with IBM SPSS AMOS

4.4 Linear regression analysis

Once the three components had been identified and verified, the next step was to measure the influence that the variables Perceived Usefulness (U) and Attitude towards Use (A) exert on

Behavioural Intention (BI). Therefore, an ordinary least square (OLS) regression was carried out in order to explain to what extent each factor explains the variability of the dependent variable, and to gain more information about this dependency, as explained by the equation (1).

$$(1) BI_i = \beta_0 + \beta_1 U_i + \beta_2 A_i + \varepsilon_i$$

Table 13 shows the value relating to the goodness of the linear regression model adopted. This measure of goodness allows measuring the percentage of the variance of Y that is explained by the independent variables included in the model. Considering the value of the Adjusted R square, it is possible to state that the model is able to explain more than 55% of the variance, being this value equal to 0,556. Therefore, this model can be considered adequate.

Tab. 13: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,747	,557	,556	,603

Source: our elaboration with IBM SPSS Statistics

Subsequently, through the ANOVA analysis and the study of its significance (Tab. 14), it was possible to reject the null hypothesis and confirm that the variables Perceived Usefulness (U) and Attitude towards Use (A) have an effect on the dependent variable Behavioural Intention (BI).

Tab. 14: ANOVA analysis

Model	Sum of Squares	df	Mean Square	F	Sig.
1					
Regression	250,285	2	125,143	344,508	,000b
Residual	198,698	547	,363		
Total	448,984	549			

Source: our elaboration with IBM SPSS Statistics

Finally, Table 15 shows the value of the coefficients and their statistical significance. As for the significance, by considering a 99% confidence interval, all three coefficients resulted to be significant in influencing the dependent variable. Moreover, through the VIF analysis (i.e., Variance Inflation Factor), no multicollinearity issue emerged as both coefficients show values lower than 10.

Tab. 15: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		
1	B	Std. Error	Beta	t	Sig.
(Constant)	,753	,137		5,482	,000
U	,353	,044	,270	8,097	,000
A	,622	,036	,570	17,116	,000

Source: our elaboration with IBM SPSS Statistics

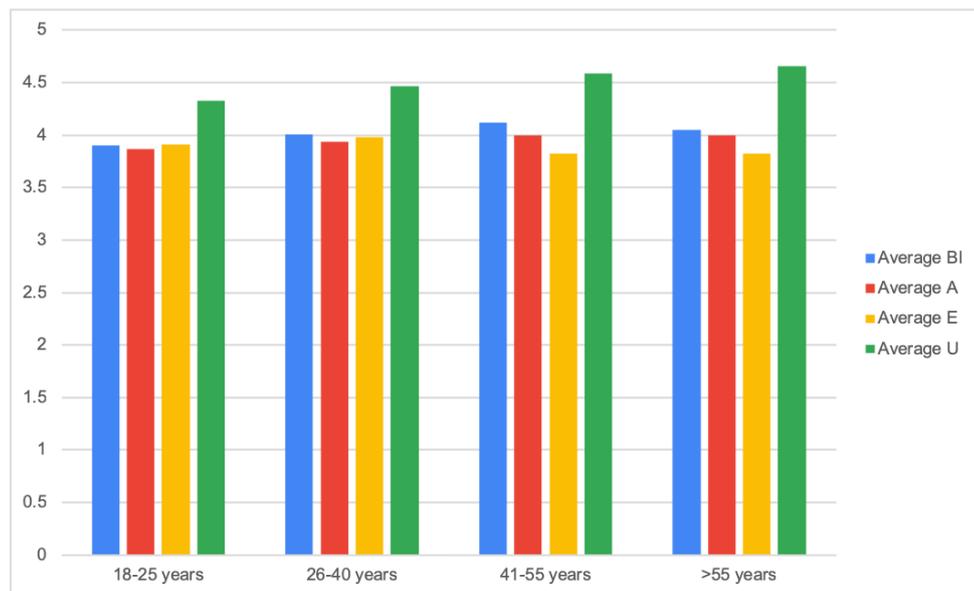
In detail, as explained by the equation (2), the Behavioural Intention (BI) to purchase food products equipped with Blockchain technology is positively influenced by the Perceived Usefulness (U) of these products ($\beta = 0,270$; Sig. 1%) and the Attitude toward Using (A) the aforementioned technology ($\beta = 0,570$; Sig. 1%).

$$(2) BI = 0,270(U) + 0,570(A)$$

On this basis, it is possible to state that both independent variables exert a positive influence on the dependent one and, consequently, on the purchase intention of Italian consumers of food products equipped with Blockchain technology. Therefore, the research hypotheses are to be considered verified.

Finally, to better understand how the attributes of the TAM are perceived by respondents, a statistical analysis was carried out by analysing the four age groups identified in the sample (Fig. 3). On average, Behavioural Intention (BI) results to be high in each group (the highest value is in the 41-55 years class). As for Attitude towards Use (A) and Perceived Usefulness (U), these values follow a growing trend as the age increases, thus confirming the greater interest in this topic by the elders of the sample. Finally, as regards Ease of Use (E), it shows interesting results as it records high values with the exception of the group >55 years. However, despite this small inflation, its value is equally high (almost 4%), thus suggesting the existence of a willingness, also for the elders, to use technological devices to gain a higher level of knowledge when it comes to buying food products.

Fig. 3: Distribution of the TAM attributes by age



Source: our elaboration

5. Discussion and Conclusions

In conclusion, the obtained results are in line with the sample analysis as well as the literature background. There are numerous transparency and efficiency issues in food supply chains mainly related to consumers' demand for more clear information on where their food comes from and how it is produced. In fact, over 80% of the sample considered very important to be informed before making a food purchase, the influence of which is decisive in the final purchasing decision. This result confirms the consumers' increased search for information on what they buy. Furthermore, this data acquires more relevance when compared with the perceived truthfulness and reliability of the information on food product labels. The respondents, indeed, have shown a good degree of trust towards these characteristics, underlining how much they pay attention to product information, especially those relating to quality, freshness, origin, and certifications.

As for Blockchain technology, even if most of the respondents showed a willingness to spend more for these products, it emerged a general lack of knowledge on this topic. Hence the need for greater communication of the potential of Blockchain technology in providing information on such product characteristics, as it is a driver for consumer purchases. Most importantly, the present study confirmed the validity of Davis' Technology Acceptance Model framework when Blockchain technology is employed to provide food products information. In fact, as technology - and particularly Blockchain - has the potential to simplify and integrate supply chain information, enhancing food safety, and generating smarter market information (Tripoli and Schmidhuber,

2018), its importance among Italian consumers was studied. The results confirmed the three components of the TAM model and allowed to verify the links between each item with the respective construct. Moreover, through the OLS regression analysis, we verified the research hypotheses as the two dependent variables (i.e., “Perceived Usefulness” and “Attitude toward Using”) positively influenced the Behavioural Intention (BI) to purchase food products equipped with Blockchain technology.

From a managerial point of view, these results open up various business opportunities. The food industry must exploit the benefits offered by Blockchain technology, aiming for a greater level of disclosure of product information through new communication features (such as the use of QR codes on the package, more detailed labels, etc.) to meet consumer needs. Moreover, the sample showed great interest towards this new technology as it positively valued its perceived usefulness as well as the attitude towards use. This suggests that Blockchain technology is a valuable tool which promises to improve business performance by reducing uncertainties between producers, markets, and consumers and bringing greater efficiency, transparency and traceability to the market. It is important to note that these considerations are not only addressed to large companies, but also to SMEs, which should use this technology to increase the awareness of consumers by highlighting the advantages deriving from the purchase of product equipped with such features.

From an academic point of view, this study confirmed the validity and adaptability of the Technology Acceptance Model in the Italian context. However, at this point, it can be questioned whether it is worthy to still include the ‘Perceived Ease of Use’ construct in the model. In fact, the TAM model was introduced at the end of 1980s, in a period when the adoption of technology was completely different from the current one. As underlined by the results, the increased exposure to new technologies has drastically reduced the time required for its adaptation. Consequently, to confirm the reliability of this theory, we propose to modify this framework by replacing the variable ‘Perceived Ease of Use’ with aspects relating to ‘Perceived Security’, as it is nowadays a very important aspect when it comes to technology.

Undoubtedly, the present study is not without limitations: firstly, it deals only with Italian consumers, and secondly, it focused only on testing the validity of Technology Acceptance Model when it comes to food purchases. Future research should include a larger and well-stratified dataset - with data from different countries - to understand whether exists any cross-cultural difference in this context. Furthermore, it could be interesting to investigate the influence that the spread of COVID-19 can have on consumer purchases, investigating whether elements that certify the safety and traceability of ‘virus-free’ products may be appreciated by consumers.

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The impact of Country of Origin in the cosmetic industry in relation to products from different countries and cultural backgrounds: a literature review

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Abstract

Objectives. *This article explores the research domain of the impact of COO in the cosmetic industry in relation to products from different countries and cultural backgrounds. This study aims to provide a relevant and comprehensive organization of the research around this topic, offering an original, reliable and practically useful resource.*

Methodology. *In this way, a systematic literature review was conducted. Twenty documents published between 1997 and 2020 were analyzed and classified into three research themes.*

Findings. *Specifically, the three themes are: COO and purchase behavior related to cosmetic products (Theme A), COO and country perception in relation to cosmetic products (Theme B), COO and marketing strategies for cosmetics companies (Theme C). For each of the themes, emerging content and the potential for future research was highlighted.*

Research limits. *The limitations of this study consist in having analyzed only English language peer-reviewed journal articles (with the exception of a single book chapter).*

Practical implications. *Findings have value not only for Cross-Cultural Management and Marketing scholars, but also for managers of cosmetics companies who plan to use the Country of Origin and the Country Image to communicate the company brand.*

Originality of the study. *The analysis is original and shows that this is an under-researched topic that offers important insights and implications for future research.*

Key words: *Country of origin; Country Image; culture; countries*

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1. Introduction

The concept of COO was studied for the first time in economic terms since the 1960s, when Schooler (1965) empirically demonstrated that identical products were perceived differently in relation to their country of origin. However, the Country of origin (COO) has its roots at the end of the First World War, with a different meaning than the one that today is part of our common imagination: the “Made in” label was in fact compulsorily placed on products coming from defeated countries, such as Germany, to mark them as products to be avoided (Munjaj, 2004). Nowadays, in an increasingly connected and globalized world where consumers can purchase products from all over the globe, the concept of COO assumes significant importance. In particular, it represents not only the image, reputation and stereotypes that businessmen and consumers attribute to the products of a given country (Nagashima, 1970), but also the set of beliefs that consumers have about the countries themselves (Strutton *et al.*, 1995; Roth and Romeo, 1992; Kotler and Gertner, 2002). In addition, the COO is considered as an extrinsic feature along with the brand and therefore can act as an additional assurance during the purchase process of a product with which one is unfamiliar (Josiassen and Harzing, 2008). This phenomenon, which is triggered by the importance of the COO, is also classified as the halo effect (Han, 1989). On the other hand, as consumers become more familiar with a country’s products, the country image may become a construct that summarizes consumers’ beliefs about product attributes, which inevitably affects their attitudes towards the brands associated with those products (Han, 1989). However, the phenomenon related to COO very often concerns certain categories of products and not all the products coming from the same country. For example, Japanese wine producers find it more difficult to acquire credibility on the market than their compatriots producers of cameras and televisions. Similarly, shoes made in Italy and perfumes made in France are perceived by consumers in a positive way (Kalicharan, 2014). In fact, the purchasing process of consumers turns out to be influenced by country-product associations that are, in turn, the result of the information that consumers have about the country of origin, as in the case of German cars, sporting goods and computers designed in the United States (Hamzaoui and Merunka, 2006). This paper aims to study the importance of the concept of COO related to cosmetic products and understand how its perception changes not only depending on the cultural context in which the study takes place, but also in relation to the COO of the products under consideration. For this reason, it was decided to conduct a review of all existing literature related to studies that have linked the concept of COO to cosmetic products and have dealt with the topic from an economic and cross-cultural point of view. Moreover, in the literature there is no review of the literature related to COO dedicated to the cosmetics sector, therefore the originality of this study goes to fill this gap by analyzing the phenomenon from a cross-cultural point of view. The literature review follows a fully systematic and replicable process involving research, inductive analysis, and organization of previous studies based on recurring findings and cultural contexts of reference. In addition, the research question posed by the study is the following:

RQ: How has the impact of COO in the cosmetic industry been studied in relation to products from different countries and cultural backgrounds?

However, from a terminological point of view, the concept of COO is often associated with that of Country Image (CI) which represents the set of descriptive, inferential and informational beliefs that people have about a given country (Martin and Eroglu, 1993). This happens in relation to mental representations of people, products, culture and national symbols (Verlegh and Steenkamp, 1999), combined with other factors such as economic and political maturity, historical event and relationship, technological virtuosity (Bannister and Saunders, 1978) and environmental issues (Allred *et al.*, 2000). Although CI and COO are different concepts, the terms were often used as synonyms (Yagci, 2001) and in this way will be considered in this review. This study inventories the entire domain of the COO referred to cosmetics to provide comprehensive, relevant, and organized support for its research. Several studies have been reviewed, inductively synthesized and classified in relation to their findings and cultural contexts of reference while also trying to identify the main research themes. Finally, this study adopts a cross cultural approach in order to open a

discussion regarding the phenomena, issues, inconsistencies and intermediate debates on which new research can be conducted, facilitating the sharing and reusing of meaningful information in relation to different cultural contexts. The next part of the study presents the research method including its scope and analytical procedures. This is followed by our findings, including observations of the literature and areas for future investigation. This leads to a more general discussion and conclusions of the work combined with a future research agenda.

2. Methodology and research process

In this part of the manuscript I explain how the review was planned and conducted, describe the analytic approach, and the way I organized and presented the results.

2.1 Planning the review

To ensure a comprehensive state of the art about the concept of country of origin in the cosmetics industry and to ensure replicability for future research, the process of systematic literature review was followed. In fact, systematic literature reviews aim to provide a reliable and scientific overview of ongoing research on a specific topic and provide guidance for future research (Petticrew and Roberts, 2008). Furthermore, the purpose of systematic literature reviews is to identify, evaluate, and synthesize all relevant studies using a transparent and replicable process to answer a particular research question (Tranfield *et al.*, 2003). To comply with principles such as transparency, clarity, focus, accessibility, and synthesis, a search protocol was followed and based on it, the criteria for searching, including, and excluding papers were established.

2.2 Conducting the review

The first step of the review was to define a search protocol compliant with the research aim to review articles dealing with the impact of COO in the cosmetics industry in relation to products from different countries and cultural contexts. Eligible studies for this review could refer to both the concept of COO and CI related to cosmetic products in different cultural contexts from both an economic and cross-cultural perspective. During the search, the terminology Country of origin image (COI) also emerged: it too was considered suitable for our review. Thus, the first inclusion criterion was to find and analyze studies in the literature that linked the concept of COO (or CI and equivalent terminologies) to cosmetic products in different cultural contexts from both an economic and cross-cultural perspective. In addition, the second inclusion criterion required that the research had been open to collect both empirical studies, conceptual studies, and reviews. In addition, a third inclusion criterion was that articles published in peer-reviewed journals were included in a priority way because these articles are considered more reliable due to the double-blind review process they undergo before being published (Podsakoff *et al.* 2005). In addition, a fourth inclusion criterion, stated that both high-impact and low-impact journals were considered, as long as the articles belonging to them met the other inclusion criteria. Finally, under the fifth inclusion criterion, books, book chapters, and working papers were considered and allowed as exceptions if they were strongly in line with the other inclusion criteria. In contrast, papers that did not deal with the concept of COO, or CI, related to cosmetic products in different cultural contexts according to perspectives other than economic and cross-cultural were excluded. In addition, papers that did not consider COO and CI as the central topic of the work were also excluded. Finally, periodicals, conference proceedings were also excluded. Inclusion and exclusion criteria are also provided in the appendix (Appendix A). Subsequently, the research took place in the second step. Specifically, the search for papers was done by first entering the keywords (see the Appendix A for a complete list of occupied keywords) into the EBSCO, Scopus and Google Scholar search engines without limiting the search to a specific time period and by searching through the titles and abstracts of the content. In addition,

a manual search for relevant articles was conducted through the reference lists of relevant articles found in previous steps. In addition, the same keywords were manually entered on the journal search engines in order to identify additional studies that might have escaped the automatic search of the previously mentioned databases. Finally, 20 papers (19 from peer-reviewed journals and one book chapter) were identified for inclusion in the final database for our analysis.

2.3 Analysis

Subsequently, a Microsoft Excel worksheet was used for coding and comparison of the work. In addition, the methodology of the studies and the samples used for the research were identified. In addition, the countries in which the studies were conducted, the Country of Origin or Country Image of reference were determined. Subsequently, the various studies were analyzed by identifying not only the value of culture in the various reference contexts in which they take place, but also the main research themes.

3. State of the art

An initial analysis of the studies shows that the scope of the research is from 1997 to 2020. With regard to the methodology adopted, eighteen of them are quantitative studies and only three are qualitative. To view details on the journals, methodologies, samples and countries of reference, see the table in the appendix. Finally, three research themes were identified and are reposted below. They are: COO and purchase behaviour related to cosmetic products, COO and country perception in relation to cosmetic products, COO and marketing strategies for cosmetics companies.

3.1 Theme A: COO and purchase behaviour related to cosmetic products

The first theme identified concerns studies that have used COO (or CI) to explain consumer purchase behavior. In particular, Zbib and colleagues (2020), with a sample of 300 Lebanese women, showed that taking into account cosmetic products from France and China, the level of involvement that female consumers have towards a given product constitutes an exogenous variable that influences the level of importance of COO in the purchase of cosmetics and in particular skin care products. They also showed that for products from France, COO information search and change in the perception after trying the product are correlated due to the presence of a halo effect related to French products. Furthermore, they found that COO information search and change in the perception are not correlated when it comes to Chinese products since Lebanese consumers did not change their perception towards the products after discovering their Chinese origin (Zbib *et al.*, 2020). However, for low involvement product categories such as shampoo, it has been shown that country of origin is not one of the key attributes influencing Lebanese consumer choice (Zbib *et al.*, 2020). This was demonstrated in Lebanon with a sample of 332 shampoo consumers from brands and countries of origin such as Pantene (KSA, France and USA), Sunsilk (Egypt, Turkey and France) and Palmolive (Lebanon, USA and France) (Zbib *et al.*, 2010). Furthermore, taking as reference companies and their countries of origin such as Chanel and France, Hugo Boss and Germany and Ralph Lauren and USA, it was shown that, for a sample of 329 Brazilian students, country of origin has little importance in the purchase of luxury branded perfumes. In this case, price and brand had been considered the factors that most influence the choice (Montanari *et al.*, 2018). In particular, the study authors showed that only for Chanel, the value of country of origin was higher, probably because the brand name communicates the country of origin (Montanari *et al.*, 2018). Furthermore, Hsu and colleagues (2017) demonstrated with a sample of 300 respondents in Taiwan, that perceptions of COO moderate the links between attitude, subjective norm, perceived behavioural control and purchase intention of green skincare products. Specifically, the relationship between the variables appears to be stronger at high levels of COO perception and weaker at low

levels of COO perception (Hsu *et al.*, 2017). In addition, Ishak and colleagues (2019), on a sample of 150 Malaysian high school women, showed that purchasing cosmetic products is part of the 'limited decision-making process' and specifically, in the purchasing process, country of origin obtained a mean value of 3.91 on a Likert scale 1-7 (Ishak *et al.*, 2019). Moreover, also in Malaysia, with a sample of 227 university students, it was shown that not only country of origin is strongly correlated with both purchase behavior and brand reputation, but also has a positive influence on brand loyalty when referring to cosmetic products (Azuzkulov, 2013). Moreover, Tjoe and Kim (2016), in their study made a distinction between Country of Origin Image and Country Image, considering the former as the country of manufacturer's products or brand is associated with its home country (Saeed, 1994) and the latter as the set of people's beliefs, images, ideas and impressions about a certain country (Kotler *et al.*, 2002). In particular, they demonstrated, with a sample of 227 respondents, that Country of Origin Image (and not Country Image) significantly influenced consumers' purchase intention towards Korean products in Indonesia. Moreover, this study also juxtaposes the concept of COO with that of ethnocentrism, as did Marcoux and colleagues (1997) who, with a sample of 265 Polish university students, showed that patriotism is a dimension of ethnocentrism that leads consumers to prefer Polish products, while preference toward Western products is related to the demonstration of social status. In addition, another study conducted in Malaysia with a sample of 196 consumers showed that patriotism has a strong influence on Malaysian consumers' intention to purchase cosmetic products made in Malaysia (Rezvani *et al.*, 2013). In addition, Moslehpour and colleagues (2017), by analyzing the key factors influencing the repurchase intention of Korean cosmetic products by 437 Taiwanese consumers, showed that COO significantly influences both word-of-mouth and product repurchase behavior. In addition, also regarding Korean products, using a sample of 491 American and Chinese consumers aged 20 and older, Jin and colleagues (2020) showed that product-specific country image, also referred to as micro country image had a positive influence on quality ratings of Korean cosmetics in contrast to overall country image (macro country image) and prototypical brand image (e.g. Samsung). However, the same authors (Jin *et al.*, 2019) examined the impact of Korea's macro and micro image and the level of materialism of global consumers on the quality evaluation of Korean cosmetics, a sample of 900 consumers aged 20 or older from the USA, France, China, and Vietnam. They showed that only in the USA and France was the effect of macro and micro country image on quality evaluation significant, while the impact of micro country image was strong in all four countries. Furthermore, the same authors (Jin *et al.*, 2019) showed with a sample of 250 consumers ages 20 and older, that for the evaluation of the quality of cosmetic products, the positive impact of the macro country image is not valuable, while the pathway related to the cultural phenomenon of the Korean Wave is significant. Also related to knowledge spillover, Xiao and colleagues (2016), with a sample of 255 Chinese consumers, stated that cinema, theater and the internet represent sources that have increased knowledge regarding Korean cosmetics. They also verified that the general CI and general product CI of Korea have a positive influence on the e-WOM and purchase intention of Korean cosmetics (Xiao *et al.*, 2016). From these studies, we can see that the COO in some cultural contexts and for some product categories is particularly important in relation to consumer purchasing behavior, while in others its influence is less. In particular, we notice that cosmetics made in France and Korea are those which have the greatest influence on the purchasing process of consumers in Lebanon, China and Taiwan. From a cultural point of view, this phenomenon can be traced back to the concept of *Mianzi* (literally, face) which represents one of the main personality characteristics of the Chinese people and other East Asian peoples (Yang, 1994; Wong and Ahuvia, 1998). According to this cultural characteristic, East Asians tend to own and purchase goods that allow them to achieve a certain social status on which they base their prestige (Yang, 1994), build their reputation (Wong and Ahuvia, 1998), and the way they are accepted by others (Huwang, 1987) by publicly displaying their wealth and willingness to be fashionable. Moreover, particularly for China, these reasons meet explanations in its cultural evolution that started after the death of Mao Tse Tung and the historic entry into the global economy in 1978, which had consequences on the consumption of products and emulation of

foreign lifestyles by the Chinese people. Foreign brands carry a symbolic meaning of modernity and prestige associated with modern and worldly lifestyles (Zhou and Hui, 2003) that meet the desire, particularly of Chinese women, to give birth to the long-suppressed desire to wear fashionable clothes and cosmetics (Barnes, 2009; Hopkins, 2007). Moreover, the phenomenon of ethnocentrism pushes consumers to prefer products from their own country as in the case of Poland, where, from a cultural perspective, national pride and entity influence people's attitudes and consumer purchasing behavior (Huddleston *et al.*, 2001; Kubacki and Skinner, 2006; Siemieniako *et al.*, 2011). However, for both product categories with less involvement, such as shampoo, and some perfumes, country of origin is not one of the key attributes that influence consumer choice in some cultural contexts such as Lebanon and Brazil, confirming that from a cultural perspective, country of origin takes on different meanings in relation to the product, cultural context, and country appeal. Finally, related to this result, in this theme we can see that culture plays an important role in consumer preferences and purchase process in different countries.

3.2 *Theme B: COO and country perception in relation to cosmetic products*

This second theme encompasses studies that have linked COO concepts to consumers' perceptions of a given country. A study by Baran (2018) conducted in Poland and based on a web panel of 1012 Polish internet users, showed that more than 30% respondents when thinking about features such as safety of using and low price of a cosmetic product refer to Poland. When they refer to the naturalness of cosmetic products, they refer not only to Poland, but also to Finland. When instead they think of prestige, they associate this characteristic with cosmetic products from France. They also associate France with high prices, along with the United Kingdom, Switzerland and the USA. However, with smaller percentages, high quality of ingredients (24.5%) and effectiveness (24.9%) are associated with Germany, pleasure of using (18.6%) with France, mediocrity (27.7%) with Israel and innovativeness (18.0%) with United States of America (Baran, 2018). In addition, another study conducted in Lithuania with a sample of 1262 cosmetic consumers identified three groups of country-of-origin based on their attractiveness. Specifically, France and Germany were classified as attractive country-of-origin, Italy and Lithuania as neutral country-of-origin and finally Russia, Poland and China as unattractive country-of-origin (Pilelienà *et al.*, 2014). Finally, Cheah and colleagues (2020), with a sample of 200 undergraduate business students in a large university in Australia, showed that regarding Australian, Italian, Korean, and Chinese-branded perfumes, no country-of-origin of these perfumes is a means of achieving status. However, among the various perfumes, Australian perfumes have been considered reliable and belonging to the emerging markets of their industry (Cheah *et al.*, 2020). Regarding this second theme, we can note that with regard to the perceptions of the various countries, French origin has its attractiveness in the cosmetic industry. Moreover, a form of patriotism also emerges in studies belonging to this second theme when we consider that Polish consumers perceive cosmetics from Poland as safe to use and when Australian consumers consider perfumes made in Australia as reliable and up-to-date.

From a cultural point of view, regarding the ethnocentrism of Polish consumers the same reflections indicated in the previous theme are valid, while that found in Australian consumers confirms the results of previous studies in which it is shown that they tend to purchase local products with high frequency, especially if they belong to categories of high symbolic impact, as cosmetics are (Strizhakova and Coulter, 2015).

3.3 *Theme C: COO and marketing strategies for cosmetics companies*

The third theme refers to the marketing strategies adopted across firms to show the COO. In particular, a study conducted in Brazil with a sample of two companies, a Brazil domestic company (Natura Cosméticos) and a France-owned company (L'Occitane au Brésil) identified six tools that companies can use to communicate brand values using the concept of country image associated with the country of origin (Suter *et al.*, 2018). Specifically, the six tools refer to the country's

natural resource properties, cultural resources (e.g., related to lifestyles), employee training on the importance of the Country Image for the brand, textual elements referring to the country (such as language and typical expressions), visual elements (e.g., images of the country, flag, landscapes and typical symbols, use of the country's name on staff uniforms) and sensory experiences (e.g. listening to country music on the website and in stores, in-store scents and essences, and packaging that evokes the country by touch). Another study refers to the country-of-origin image using the Brazilian company Natura Cosméticos as a sample as well (Sutter *et al.*, 2015). The study shows that the company leverages the country-of-origin image when implementing its international differentiation strategy. Population, economy and politics, sports and arts, nature and lifestyle are the five elements that represent Brazil's image and Natura makes use of different nuances. In particular, the company chooses to base its strategy on themes related to nature, relationships and the friendliness of the country and the Brazilian people while avoiding stereotypes such as soccer, sensuality, samba and the beach (Sutter *et al.*, 2015). Finally, a further study with a sample of seven professionals representing French cosmetics companies that operate internationally (France, USA, China, Panama and Spain), showed that the country of origin is communicated through labels, symbols, commercial discourse and strategies that emphasize the French origin of the products, which represents a real added value (Rebufet *et al.*, 2015). In addition, the study points out that communication based on these elements is more widely used by small and medium-sized businesses than larger ones. This is because small and medium-sized companies use logos that contain graphic elements evoking France (for example, a stylized Eiffel Tower) more freely than larger companies with an international character, which are often limited to displaying only a few elements such as the name of the city under the brand name (Rebufet *et al.*, 2015). From this third theme it emerges that COO communication represents a valid item in the marketing strategies not only of large multinational companies, but also of small companies that want to open up paths in international markets.

4. Conclusion and Future agenda

This study aims to provide a comprehensive view regarding the impact of COO in the cosmetics industry in relation to products from different countries and cultural contexts through a systematic literature review. We can see that it is a topic not very studied, but for our analysis twenty studies were collected and classified into three themes: COO and purchase behavior related to cosmetic products (Theme A), COO and country perception in relation to cosmetic products (Theme B), COO and marketing strategies for cosmetics companies (Theme C). Among the main results, it emerges that COO has a higher value when attributed to cosmetic products with higher emotional value, such as perfumes (Kalicharan, 2014; Montanari *et al.*, 2018; Cheah *et al.*, 2020), and a lower value for cosmetic products with lower emotional value, such as shampoo (Zbib *et al.*, 2010). Furthermore, we can see that cosmetic products from France and Korea have great appeal in many cultural contexts and that in some cultures, such as Poland, patriotism often leads consumers to prefer products from their own country. This means that the COO is linked to the culture of a people, its history and its traditions that affect the purchasing behavior of consumers. In fact, consumers choose the products they want both on the basis of the product's characteristics, such as quality and price, and on the basis of its symbolic value. The former is the case of Polish consumers who base their purchases more on the perceived quality than on the origin of the product. However, the strong ethnocentrism belonging to their culture pushes them towards quality products made in their country (Huddleston *et al.*, 2001). The second is the case of Chinese and other East Asian consumers, who tend to prefer foreign products with a strong symbolic value, such as French brand cosmetics, in order to feel more integrated into society (Wong and Ahuvia, 1998). It also emerges that COO communication is a viable marketing strategy for companies from countries with strong cosmetics traditions. Since the results of this study show how culture influences consumption choices in relation to the origin of products, they are of value not only to scholars of Cross-Cultural

Management and Marketing, but also to managers of cosmetic companies who intend to use the country of origin and the image of the country to communicate the company brand. However, our review also has limitations. First, this study is limited to analyzing peer-reviewed journal articles in a preferential manner, with the exception of only one book chapter that is strongly aligned with other research criteria. In addition, all selected studies were in English. Therefore, it would be interesting for other authors to conduct a review including other studies, for example submitted to conferences and written in languages other than English. However, although our study is based on a replicable research protocol it is appropriate for other researchers to evaluate a random sample of the coded articles to verify their validity (Ryan and Bernard, 2003). Despite these limitations, the originality of this study fills a gap in the literature related to COO and the cosmetics industry by also analyzing the phenomenon from a cross cultural perspective. From a practical point of view, this study also offers important insights for managers of cosmetics companies who intend to develop international trade using the COO as a tool on which to base a communication strategy. In addition, our study points to multiple opportunities for future research without claiming to be exhaustive. Regarding theme A, for further future studies it would be interesting to study the influence of patriotism in other cultural contexts such as Italy (or other Western European countries) and also how the made in Italy influences the purchasing process of foreign consumers in relation to cosmetic products. On the other hand, with regard to theme B, it would be interesting to discover how, contrary to the studies examined, French consumers perceive cosmetic products from other countries. Moreover, regarding theme C, it would be interesting to conduct a qualitative study both for a Korean company and for SMEs in other countries where small entrepreneurship is strongly present, such as Italy. Finally, it would be interesting to conduct quantitative studies on samples of multiple companies to build theoretical models related to COO communication in different countries.

Appendix A: Methodological procedures for search, selection, inclusion and exclusion

Inclusion criteria

1. Studies that linked the concept of COO (or CI and equivalent terminologies) to cosmetic products in different cultural contexts from both an economic and cross-cultural perspective;
2. Empirical AND conceptual AND review;
3. Peer-reviewed journal articles preferentially;
4. Both high-impact journals and lower-impact journals;
5. Exceptions for books, book chapters and working papers if they were strongly in line with the other inclusion criteria;

Exclusion Criteria

1. Papers that did not consider COO as a central topic of the paper;
2. Periodicals and conference proceedings.

Research Method - Stage I

1. Admission criteria for general keyword search using Scopus, EBSCO, and Google Scholar;
2. Initial focus on: a) citation and abstract, and b) title.
3. Key words:

- Country of Origin and cosmetic
- Country Image and cosmetic
- Country of Origin and perfume
- Country Image and perfume
- Country of Origin and skincare
- Country Image and skincare

Search method - Stage II

1. Manual search of relevant articles through the reference lists of relevant articles found in the previous stages;
2. Manual search in search engines of the journals of the studies previously identified;
3. Include and evaluate articles deemed suitable for the search criteria.

Final sample for analysis: n= 20 (nineteen papers from peer-reviewed journals and one book chapter)

Appendix B: Summary table of studies clustered by theme

Tab 1: Summary table of studies clustered by theme

Theme	Study	Country of study	Country of origin	Sample	Methodology
Theme A: COO, CI and purchase of cosmetics product	Zbib <i>et al.</i> , 2020	Lebanon	France and China	300 Lebanese female consumers	Quantitative. Structured questionnaires. One-way ANOVA, multinomial logistic regression, single and multiple regression analysis and chi-square tests
	Ishak <i>et al.</i> , 2019	Bangi Selangor (Malaysia)	Not specified	150 female consumers from four higher education institutions	Quantitative. Self-administered questionnaire, descriptive, t-test and correlation analyses
	Moslehpour <i>et al.</i> , 2017	Taiwan	Korea	437 Taiwanese people	Quantitative. Mean, median, standard deviation and other Descriptive statistics. Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), Cronbach's Alpha, Kaiser-Meyer-Olkin (KMO), Bartlett's test measure, Structural Equation Modeling (SEM)
	Tjoe and Kim, 2016	Indonesia	Korea	227 Indonesian consumers	Quantitative. Online surveys. Principal component analysis (PCA), multiple regression and process analysis
	Zbib <i>et al.</i> , 2010	Lebanon	Pantene(KSA, France and USA), Sunsilk (Egypt, Turkey and France), Palmolive (Lebanon, USA and France)	332 consumers of shampoo	Quantitative. Demographic variables; one-way ANOVA tests
	Marcoux <i>et al.</i> , 1997	Poland	Poland and Western Countries	265 Polish university students	Quantitative. Univariate analysis of the scores of preference and stepwise multiple regression analysis.
	Azuizkulov, 2013	Malaysia	Not specified	227 students from Universiti Utara Malaysia	Quantitative. Exploratory Factor Analysis, Correlation Analysis, Regression Analysis
	Montanari <i>et al.</i> , 2018	Brazil	Ralph Lauren (USA), Chanel (France), Hugo Boss (Germany)	329 students	Quantitative. Questionnaire. 1-5 Likert scale, Descriptive analysis, Kruskal-Wallis tests, non-parametric tests (Mann-Whitney test)
	Hsu <i>et al.</i> , 2017	Taiwan	Not specified	300 respondents	Quantitative. Paper-based questionnaire, Structural equation modelling, hierarchical moderated regression
	Jin <i>et al.</i> , 2020	USA and China	Korea	491 consumers ages 20 and older	Quantitative. Structural equation modeling
	Jin <i>et al.</i> , 2019	USA, France, China, Vietnam	Korea	900 consumers aged 20 or older	Quantitative. Multiple regression analyses.
	Jin <i>et al.</i> , 2019	USA and China	Korea	250 consumers ages 20 and older	Quantitative. Structural equation modeling
	Xiao <i>et al.</i> , 2016	Beijing and Shanghai (China)	Korea	255 customers	Quantitative. Survey, Descriptive statistics, Hierarchical regression analysis
	Rezvani <i>et al.</i> , 2013	Malaysia	Malaysia	196 customers	Quantitative. Survey, Descriptive data analysis
Theme B: COO, CI and country perceptions	Baran, 2018	Poland	Finland, France, Germany, Israel, Italy, Norway, Poland, Spain, Sweden, Switzerland, United Kingdom, United States	Web Panel of 1012 respondents	Quantitative. Descriptive statistics.
	Pilelienė and Šontaitė-Petkevičienė, 2014	Lithuania	Lithuania, Italy, France, Germany, Poland, Russia, China	1262 respondents	Quantitative. Questionnaire, 1-7 Likert scale, Mean, N, Standard deviation
	Cheah <i>et al.</i> , 2020	Australia	Italy, Australia, South Korea and China	200 undergraduate business students	Quantitative. Survey, ANOVA tests
Theme C: COO, CI and marketing strategies for cosmetics companies	Suter <i>et al.</i> , 2018	Brazil	Brazil and Brazil production with France origin	Two companies: Natura Cosméticos (Brazil domestic company) vs L'Occitane au Brésil (France-owned)	Qualitative. Multiple case study method, semi-structured interviews
	Sutter <i>et al.</i> , 2015	Brazil	Brazil	Natura Cosméticos S.A.	Qualitative. Case study analysis, semi-structured interviews
	Rebufet <i>et al.</i> , 2015	Not specified	France, Usa, China, Panama, Spain	7 professionals from French cosmetic companies operating internationally	Qualitative. Multiple case study method, semi-structured interviews

Source: author's elaboration

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Virtual tourism: firm-market relationships

EMERANCIA RAHARISOA *

Abstract

Objectives: *This paper seeks to understand what can be an obstacle for tourism industries to invest in virtual tourism (VT) and why some tourism firms within country strong in digital technology are being overtaken by firms sitting in other countries towards the adoption of VT.*

Methodology: *This study adopts a qualitative multiple case study approach. Triangulation of data was achieved through the supplementing secondary data with surveys to fifty-four travel agencies and seventy-five private persons, as representatives of three selected countries: Finland, France, and Italy.*

Findings: *The results identify that the behaviour of tourists influenced the relationship between tourism industries and virtual tourism market and this reason differs the tourism industries in these countries with the adoption of VT.*

Research limits: *The sample comprised three countries having different level of digital performance and technologies penetration rates, but introducing VT impressively different from their rank on technology competitiveness. Only highly educated people who are willing to understand this technology could participate on the survey.*

Practical implications: *This study provides the relationship between tourism industries and virtual tourism market that express the necessity of information towards the choice of tourists in order to evaluate the efficiency of VT.*

Originality of the study: *The research on VT is in progress but this paper try to fill the gap concerning the lack of ample estimation about the challenges affected by tourism industries among the possible future development of tourism sector to the virtual world within developed countries in Europe.*

Keywords: *virtual tourism, tourism industries, virtual tourism market, Finland, France, Italy.*

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1. Introduction

Augmented Reality (AR), Augmented Virtuality (AV) as well as Virtual Reality (VR), so many terms appear more and more from our imagination to some technologies that will revolutionize our leisure activities and even our daily lives. Research in education and training (Mikropoulos & Natsis, 2010), in medical field improving health outcomes for community-dwelling older adults (Dermody *et al.*, 2020), within games (Zyda, 2005) discuss the attendance of this innovation. The tourism sector precisely, which is not the last to be interested in a possible development of its derivation, is gradually making use of VR in order to offer tourists more choices of ways to visit an destination during their visits and especially in their experiences. However, the acceptance of such technologies will be determined by a tourist's attitudes toward authenticity with their motivations and constraints (Guttentag, 2010).

Cooper *et al.* (2005) defined tourism as a whole range of individuals, businesses, organizations and places, which combine in some way to deliver a travel experience, but Ceriani *et al.*, (2005) delimited tourism as the deployment of activities outside of everyday life and away from home. This tourism provides service-based in an important aspect in terms of management because few events can affect how tourism should be managed (Pender and Sharpley, 2005). It is an important trade fair in Europe that brings together major actors related to the tourism industry, such as innovative start up companies, high tech small and medium sized enterprises, large multinationals and academics (Aldebert *et al.*, 2011).

Around the half of the 90', scholars have already started to appreciate the VR (Milgram & Kishino, 1994; Milgram *et al.*, 1994), among tourism sector (Musil and Pigel, 1994; Cheong, 1995). Thereafter, it was necessary to know if the same technologies would only remain as fact or fantasy (Williams and Hobson, 1995) or it will provide to substitute a real holiday adequate (Sussmann and Vanhegan, 2000). Only a few years later, thanks to the strong growth of smartphones penetration rates, a rich tradition in academic VR & AR research and the continuous development of technology, researchers and businesses are increasingly attracted in this innovation causing the considerable evolution of scientific publications analysing VR research within tourism (Beck, Rainoldi, and Egger, 2019). Lee *et al.* (2015) compared two countries exploring the impact of cultural difference on acceptance of AR application, identifying how virtual worlds are accepted (Fetscherin and Lattemann, 2008) in order to understand tourists' experience exploring technology user satisfaction (Hyun, Lee and Hu, 2009; Huang *et al.*, 2016).

Recently, Kim, Lee and Jung (2020) conducted an empirical research identifying which factors encourage potential tourists to visit destinations shown in VR. On one side, this intention to experiment with virtual tourism can influence the attitudes of tourists toward their destinations and the developments of VR present a significant opportunity for the tourism industry (Tussyadiah *et al.*, 2017). On the other side, Buhalis and Law (2008) have demonstrated critical changes that will influence the tourism industry structure analyzing prior studies in the context of technologies application to tourism. Hence, technology is changing the tourism industries by altering barriers to entry, minimising switching costs, facilitating price transparency and competition, whilst enhancing production efficiency and service quality (Kim, and Lee, 2004). Although VR has demonstrated its capability and potential as a useful or critical technology for marketing in tourism sector, based upon these recent research, scholars have not given attention to understand the motivation of the implementation of this innovation due to the possible relationship between tourism firms and market within any country in Europe. This study seeks to address this gap in the literature.

One of the reasons why a large number of firms and individuals are interested in VR and AR is that they represent a large and very promising market demonstrated by scientific researchers and reliable sources such as Digi-Capital¹ and Ecorys². According to the report of the Ecorys in VR and

¹ Digi-Capital is an AR/VR/MR adviser company that offers public reports, analytics platform, strategy consulting, investment banking and its perspectives.

² Ecorys is an economic and strategy consulting firm with a global reach, serving clients in over 100 countries. The company has a history, which dates back to 1929. Ecorys Brussels serves as a focal point for the company in delivering services to their clients at European Institutions and tech companies.

its potential in Europe, the total production value of the European VR & AR industry is expected to increase to between €15 billion and €34 billion by 2020 and account directly or indirectly for 225 to 480 jobs. In addition, some scholars are increasingly predicting VR as a technology with a wide range of applications, which will influence profoundly on the future of the tourism industry (Guttentag, 2010; Marasco *et al.*, 2018; Pencarelli, 2019). In digital tourism environments, attachment to online/mobile sites, mobile devices, technology, social capital and social media plays a key role in anticipating the introduction of virtual tourism in market (Kim *et al.* 2016a; Kim, Lee, and Bonn 2016) and technological progress have been going hand in hand with tourism for years (Sheldon, 1997). The use of these technologies and applications for destination marketing has been incited from the rapid diffusion of portable devices such as tablets and smartphones and their prominent role in travel and tourism experiences (Oh *et al.*, 2009; Wang and Fesenmaier, 2013; Wang *et al.*, 2014). However, Ecorys stated that the pioneer European country of virtual tourism is France and great potential for future growth can be found in Finland and Italy. Why tourism industries in Finland, developed country with high penetration rates of technologies in Europe, have been superseded by French tourism firms in the application of virtual tourism in their services offer? How Finland and Italy, having different level of digital performance and technologies penetration rates, are positioned in the same level with the adoption of this virtual tourism? The explanation of this situation would be recognized after the responses of travel agencies and private people representing each of these three countries.

Hence, in this paper, a comprehensive view of the reasons for the delay or advance of tourism industries within the selected countries in Europe towards virtual tourism offers is presented. The motivation to conduct this study is influenced from existing barriers observed during COVID-19 pandemic limiting or even preventing people from travelling and extending beyond certain geographical boundaries. Therefore, the research highlight this situation into three phenomenon spaces: the current situation has carried negative results within tourism, travel restrictions push people to find another way to visit some destinations beyond the barrier, and tourism firms try to figure out the solutions to innovate their offers providing full satisfaction to tourists despite the existing barriers.

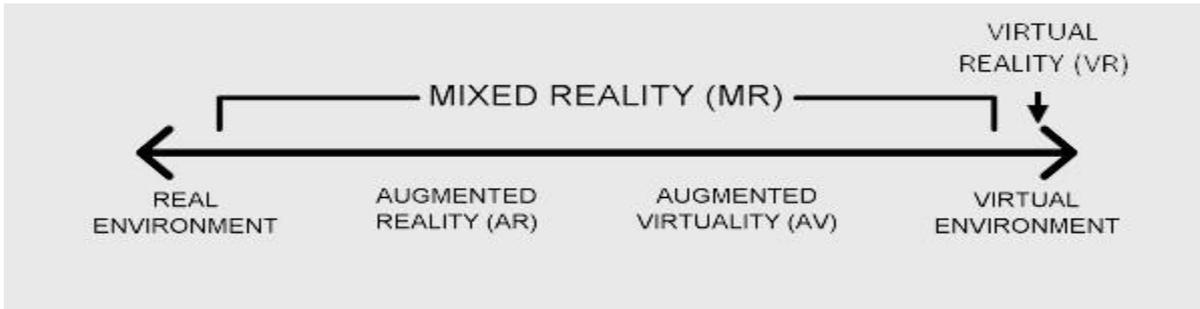
2. Theoretical background and literature review

2.1 Augmented Reality and Augmented Virtuality

In recent years, the terms Virtual Reality (VR) and Augmented Reality (AR) have each received a growing amount of interest and support that has seen the development of a number of different fields of investigation because they rely on different technologies providing very different solutions (Boud, *et al.*, 1999). Wilson (1998) categorises AR as a form of VR, while Drascic and Milgram (1996) describe VR and AR in terms of a reality-virtuality continuum, where AR is towards the real world end of the continuum and VR is at the opposite extreme.

Milgram and Kishino (1994) already distinguished the difference between the physical and virtual environments to AR, VR, Augmented Virtuality (AV), and Mixed Reality (MR). It refers to AR when some non-real elements are added in a real environment. AR can be defined as the enhancement of the real world by a virtual world, which subsequently provides additional information (Feiner, Macintyre and Seligmann, 1993). According to the AV, it represents a virtual world exactly when physical contents are added in a virtual environment. In comparison, VR simulates rather than supplements the real world (Boud, *et al.*, 1999).

Fig. 1: Reality-Virtuality continuum simplified

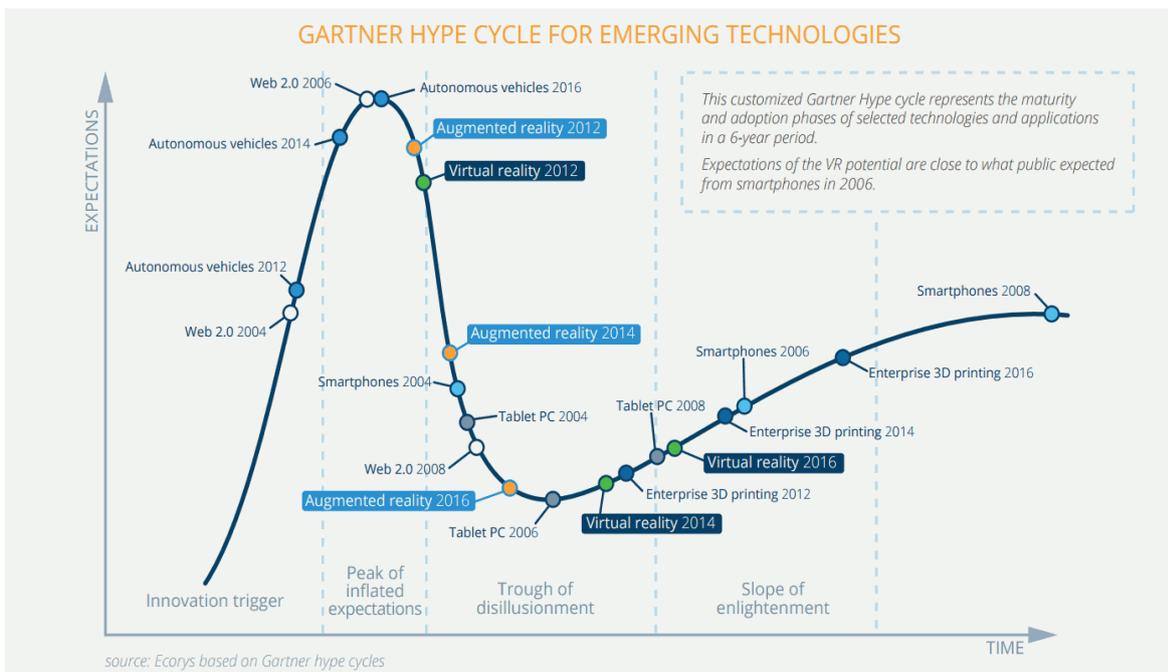


Source: Milgram *et al.* (1994), p.283.

Azuma (1997) listed three characteristics to review AR: a system that combines real and virtual content, provides a real-time interactive environment, and registers in 3D to enhance our understanding of the physical environment. AR influences the users' sense and improves the perception of the real world by providing virtual information above the users' view of the real world. It is one of the emerging technologies used in cultural heritage tourism sites around the world (Bekele and Pierdicca, 2018). MR involves the blending of real and virtual worlds (Milgram and Kishino, 1994) as to combine real and virtual objects that the user can seamlessly interact with (Rasimah *et al.*, 2011). However, whether it is AR, VR or MR, the common goal of these technologies towards tourism is to enhance our understanding of the real environment (Huang *et al.*, 2017). In order to achieve this goal, AR is best placed to make sense of reality offering to our eyes a real environment with the presence of certain digital elements, compared to VR and MR, which provide views of unreal environment adding some physical elements but if the way of recognizing things by the human brain can be modeled, computer vision will be able to handle the challenges because it is currently facing and keep moving forward (Carmigniani and Furht, 2011).

According to a typology of study named Gartner Hype Cycle, VR and AR have passed the peak of inflated expectations phase and should be adopted by a significant proportion of the population within about five years for VR and ten years for AR.

Fig. 2: Virtual Reality and its potential for Europe



Source: Ecorys

From their analyses, a significant growth in the number of creation of startups was observed during the years 2017 and 2018, because about a quarter of the startups that have been created in Europe have focused on the market of VR and AR. Then, stable growth of the VR & AR markets is expected in Europe.

2.2 *Virtual Reality in context of tourism*

In the context of tourism, Williams and Hobson (1995) defined VR as an interactive digital-generated medium that allows participants to create simulated experiences of both real and unreal environments. It is an imaginary representation of a real world using a head-mounted display (HMD) that transports users into a computer-generated virtual world, where they are expected to experience a high level of presence in the environment (Carmigniani and Fuhrt, 2011). The main goal of VR is to create in the user the illusion of being in an environment that can be perceived as a believable place with enough interactivity to perform specific tasks in an efficient and comfortable way from physical to psychological points of view (Gutierrez *et al.*, 2008). It allows one or more persons to have the feeling of being in a real destination through the intermediary of sensory-motor and cognitive activity, either by adding an artificial presence in a real world or by taking place in an imaginary world with real elements. The VR can engage and affect in real time the user's senses (Guttentag, 2010). The immersion and affective content offered from its system have an impact on the sense of presence (Baños *et al.*, 2004).

Recently, Loureiro *et al.*, (2020) have provided a comprehensive analysis of 56 articles summarizing 20 years of research on virtual reality and augmented reality in tourism context. Scientific and technical field exploit data processing and behavioral interfaces in order to simulate in a virtual world the behavior of 3D entities, which are in real time interaction with one another. This simulation of a real world where the users want to visit provides them the feeling of being immersed in the exact place thanks to the use of motor interfaces that capture his actions like voice, gestures, moves, etc. The emergence of 360° cameras alongside the various head-mounted displays indicates that the tools to both create and consume VR have moved out of the early adopter and developer phase (Yung and Lattimore, 2019). Tourists act on the virtual environment from watching a 360° video on a desktop computer, in which the users can click and drag to rotate the camera view using a mobile VR application or smart glasses based tourism augmented reality (Obeidy *et al.*, 2017).

Hence, the tourists who use VR are not only a simple external spectator observing images scrolling on a screen, but also as actors who actively participate in the transformation and construction of a virtual world. The tourism industry offers the intangible nature of most tourism products and services (Wang *et al.*, 2002) through VR but this technology is still in its infancy and has not yet been adopted by the general public (Disztinger *et al.*, 2017).

2.3 *Virtual tourism (VT), Tourism industries and Tourists*

The tourism industry consists on firms that purposely undertake joint coordination of their activities for the purpose of serving the tourists (Leiper, 1979) that points out the importance to analyze their interactions (Aldebert *et al.*, 2011). The tourist experiences constitute the essence of their services (Neuhofer *et al.*, 2013). Innovation is particularly important for the tourism industry (Hjalager, 2002) but virtual tourism provide either new opportunities or challenges for them.

Some scholars determined the developments of technology as driver of change in some aspects of tourism (Werthner and Klein, 1999; Stamboulis and Skayannis, 2003; Buhalis and Law, 2008). Evans and Sarah (2005) outlined that tourism was particularly prone to external shocks, which by their nature are unpredictable. In addition, the COVID-19 pandemic played a role in societal change leading crisis in tourism sector (Hall *et al.*, 2020; Gössling *et al.*, 2020).

Recently, Sigala (2020) reviewed the past and emerging literature in order to understand, manage and valorize both the tourism impacts and transformational affordance of COVID-19, highlighting

that technology is at the core of solutions for combating this problem and re-opening tourism. The solution seems simple but in the reality, tourism industries have many difficulties and large amount of challenges in attempting to manage the knowledge required for virtual tourism (Jia *et al.*, 2012). Hall and Williams (2008) identified that the intellectual capital and the dynamism of tourism firms, the influential role of tourism in local and regional development provide insights into the complexities inherent in the innovation process, while also emphasizing that innovation in this sector has to be understood as temporally and spatially contingent. Hence, the travel industries choose to adopt or not the virtual tourism in relation with their intellectual capital and dynamism.

However, Williams and Ponsford (2009) signalled that the importance of tourism market are becoming proactive in creating more sustainable and development forms of tourism because people have different understandings of a virtual community, depending on their specific needs and the context in which they visit a virtual community (Wang *et al.*, 2002). Some reasons that determine different modes of behaviour may motivate the attractions of tourists (Pender and Sharpley, 2005). For example, they have to be attached to VR before having the intention to visit places shown in VR tourism (Kim, Lee and Jung, 2020). The tastes of tourists, as the consumers of the tourist product, change in different directions (Stamboulis and Skayannis, 2003) because cultural profiles of one country influence the acceptance of technology applications in tourism (Lee *et al.*, 2015). Buhalis and Law (2008) outlined that the accelerating and synergistic interaction between technology and tourism in recent times has brought fundamental changes in the tourism industries in relation with the perceptions of people on its nature.

This situation presents the gap on the literature regarding the reasons for tourism industries to invest or not in virtual tourism. In general, the literature provide that the common challenges for implementing innovation such as virtual tourism to the tourism industries revolves around the resources and dynamism of the firms. These factors were identified as an obstacle or condition of access on virtual tourism market and it is incomplete due to the importance of tourism market on development forms of tourism (Williams and Ponsford, 2009). This study try to add the relationship between firms and market as a new condition of the adoption of virtual tourism through tourism industries within any country.

3. Methodology

This study adopts a multiple case study approach (Eisenhardt and Graebner, 2007) to show the reasons for tourism industries to invest or not in virtual tourism highlighting why tourism firms in Finland, developed country with high penetration rates of technologies in Europe, have been superseded by those in France in the application of virtual tourism in their services offer; and how Finland and Italy, having different level of digital performance and technologies penetration rates, are positioned in the same level with the adoption of this virtual tourism. The choice of conducting this study in a qualitative approach is in relation with the predominant of quantitative model researches on virtual tourism acceptance (Baron, Patterson and Harris, 2006; Leue *et al.*, 2014) and raised that to complete these researchs, qualitative approach deserves to be applied.

3.1 Sample

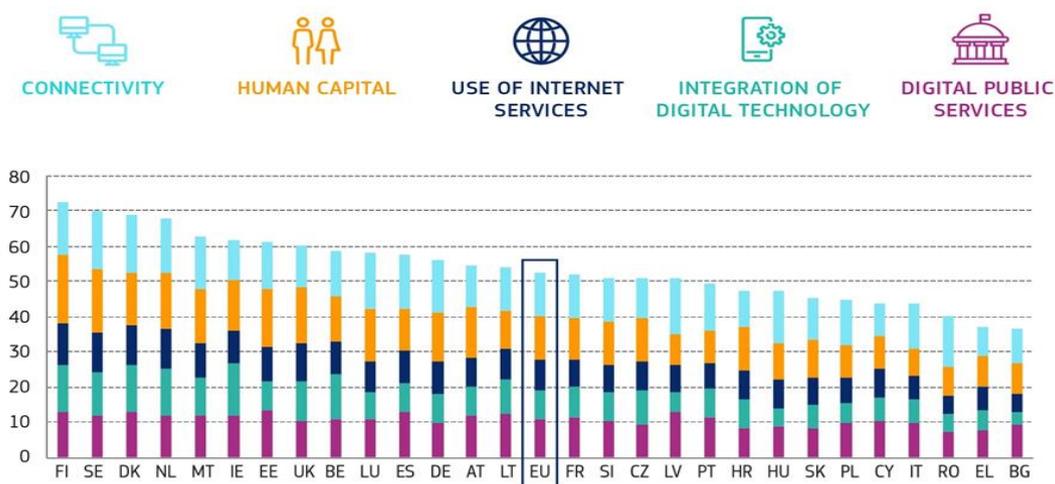
Three countries are selected: Finland, France, and Italy. The motivation to select three cases is in coherent with the proposals of Eisenhardt (1989) that solicit scholars to stay between a range of two / four cases minimum up until ten / fifteen cases maximum. Fifty-four travel agencies have been chosen with which each country corresponds to eighteen travel agencies.

Moreover, seventy-five people were surveyed through social network for which each of these mentioned three countries has twenty-five representatives in order to balance the sample for this study. One third of them were female, and all respondents have over twenty-three years old. The majority of the respondents attended a university. Two-thirds of the participants were office

workers and the remains are disabled and older people. Almost half of the participants had experienced virtual tourism from 1 to 12 months earlier.

Because this study investigates the reasons for travel agencies to invest or not in virtual tourism and seeks to understand why tourism firms in very powerful country in terms of technology are overtaken by others with virtual tourism, surveys to mix both sides of the market (tourism firms and people) are considered particularly appropriate to determine the firms vision and consumers behaviour towards this innovation. However, the sample are mainly selected because of particular criteria and purpose (Ritchie, *et al.*, 2003); that is why this research has some limitations precisely by the criteria. First, three countries were chosen due to their different levels in digital performance.

Fig. 3: Digital Economy and Society Index³ Report 2020



Source: European Commission

From Digital Economy and Society Index (DESI) in shaping Europe’s digital future in European Commission, Finland (FI) obtained the highest score as the top performer country in digitalisation of businesses; France (FR) is in the middle rating as a moderately country on technology evolution and Italy (IT) ranks among the five last countries with low level of digitalisation in European market. However, Ecorys (Virtual Reality and its potential for Europe Report) stated that France is among the European VR frontrunner countries and Finland, Italy are almost on the same level in the application of virtual tourism in their countries. This situation shows that Finland which is strong in technology, assumed the same rank of Italy, which has low level of digital competitiveness. Moreover, France is not among countries with the highest level of digital evolution, but it is among the best placed towards the application of VR.

Meanwhile, since virtual tourism has not yet been commercialized or marketed enough to be known into many tourists in Europe, before conducting a survey, it was asked whether respondents know how this innovation works in general or not. Only seventy-five people and fifty-four travel agencies who responded “yes” to this question were qualified to complete the survey. Therefore, only young and highly educated people who are willing to understand this technology could participate on the survey. However, what makes this survey more difficult is that the subjects in this study are representative of every three countries mentioned above.

3.2 Data collection

First, in order to assure the validity of the research, multiple sources of information were used to gather data from each case and allow a triangulation of information (Yin, 2003). There are online

³ The Digital Economy and Society Index (DESI) is a composite index that allows to follow the global digital performances of Europe and the comparison of EU Member States in digital competitiveness.

surveys towards fifty-four travel agencies and seventy-five private persons (with the exception of one travel agency, for which it was possible to conduct the interview by phone); information from travel agencies websites, official websites of the European Commission, and reports in important official sources Ecorys. Triangulation of data was achieved by supplementing secondary data with online surveys. The ability of today's online consumers to respond quickly to the Internet has enabled and motivated author to examine topics of interest through online surveys (Ilieva, Baron, and Healey, 2002; Evans and Mathur, 2005; Wright, 2005; Baltar and Brunet 2012).

Before choosing the selected countries, secondary data on the website of the European Commission and Ecorys were necessary. In addition, before deciding on the sample, many travel agency sites for each of the three countries have been visited to find out their identities and they were selected according to the published information. Travel agencies are not eligible to be selected in the survey if their sites did not show their legitimate identity or if there are missing necessary data. The published information in their official sites are used to be able to ask them the permission to conduct the survey and ask what method would be the most suitable to contact them. A telephone interview was possible only for one travel agency. The survey was conducted respectively in English, French and Italian languages for travel firms and people sitting in Finland, France and Italy.

For travel agencies, author sent an invitation via email for research participation with information about the purpose of the research and the security of firm information. It was asked if they are interested and know about the topic even if they did not adopted this innovation in their services offer. (i.e., "did you adopt virtual tourism in your services offer? If yes, we invite you to express if this innovation was efficiency or not for the strategy of your firms. If not, do you think to introduce this technology towards your services offer in future, justify your responses?").

For private respondents, before the first question, author provided only the definition of virtual tourism as the use of VR devices to play, enjoy, experience, travel, and explore information by looking at pictures, gaming, watching 3D 360-degree videos, watching drone videos, looking at holographic images, and other tourism-related activities. Thereafter, it was asked whether they know "how this innovation works in general or not". Only followers who responded "yes" to this question were qualified to complete the survey. The second question concerns their experience in virtual tourism (i.e., "have you had any experience with virtual tourism?"). For the respondents who had experience on it, they were invited to outline "why did you decide to use it and how was your experience on it?" For the respondents who did not have experience on this technology, it was asked "do you want to have experience on virtual tourism for the future? Justify your responses". The following question is for all respondents at the end of survey "what do you think about this technology and the possible development of it within our society?"

3.3 Data analysis

After collecting their responses, these travel firms were classified into three groups according to their situations towards the adoption of this innovation in their products. The first group concerns travel agencies, which are already adopting virtual tourism. The second group belongs to travel agencies which have not yet adopted this technology in their offers but which plan to adopt it in the undetermined future. In the third group are the travel agencies that have not yet adopted this innovation and do not think to adopt it in the future because of certain reasons. The same method was applied with responses from private individuals. These people were classified into four groups according to their responses in relation to how they agree to use virtual tourism in their experiences. The first group concerns the elderly and those with disabilities by providing appropriate responses according to their inability to travel. The second group is for people who answered mentioning their families as the reason for their opinion in this survey. The third group looks at people who do not like using this technology in the tourism sector for various reasons. The last group touches those who find this innovation very important that traveling is no longer useful to visit another place.

4. Findings

The findings show that the tourist behaviour influenced the adoption of virtual tourism to travel agencies. The relationship between tourism firms and virtual tourism market depends on tourist behaviour. Travel agencies, as all other businesses, conduct market research before adopting an innovation in their products or offers, and if any country highly developed in technology are lagging behind with virtual tourism, the reason is that the tourists in place are not so interested nor willing to have experience with it. Therefore, what is the point of adopting virtual tourism if customers are not ready to use it? Tourists in Finland found that virtual tourism is a good invented technology, but as long as they can travel and assume the natural experience on tourism, they prefer to choose the direct view of a real world without a screen as an intermediary. This situation influences the management system within Finnish tourism firms towards the choice to invest in this innovation or not. Despite Italy is among the five least developed countries in digitalisation technology in Europe, Italian travel agencies are investing into virtual tourism because Italian tourists want to try to use a current trend and then compare it with the old method and finally decide if they will continue to adopt it or not in the future. In France, two reasons remain to explain their place among the most user country of virtual reality: the fact of being addicted to the current new trend and the lack of time to travel for people who are too restrained at work.

Some travel agencies are already adopting virtual tourism. They adopt virtual reality to differentiate their offers from other competitors. It helps their clients to understand where they will visit, what they can do or not there by trying to view any destinations before deciding to travel. Until then, people with physical problems, those who are fully occupied and the elderly are the most interested in this innovation. Tourism firms obtained a positive result, thanks to this innovation, especially since the beginning of the COVID-19 pandemic. However, adopting this new trend needed a lot investment and they are afraid of not being able to earn the return on investment. Most of these travel agencies are located in France.

The travel agencies that have not yet adopted these technologies but thought to apply it soon in their offers have almost the same answers saying that it is a way to innovate tourism sector and it seems interesting but they need to first analyze the market before adopting it. Therefore, the decision on whether to access this technology in their business depends heavily on the outcome of market research. Tourists may answer, « Wow, it is a good idea » but they will not be at all agree to buy the offer once adopted, said a sales manager for one travel agency in Finland. Most of travel agencies in Finland highlighted that innovation as virtual tourism should not be driven with uncertain positive results, and the rest of them are currently assessing the situation on whether to adopt it or not.

Moreover, half of the travel agencies chosen in this study are among those who have not yet used virtual tourism in their offers and who do not want to adopt it because for them, this innovation represents many risks, especially on the return of investment. They believe that this innovation could never replace natural tourist experiences in a real destination, tasting kitchens belonging from other cultures, experiencing native languages in places, touching a real object in relation to a screen vision of a virtual or real world, etc.

From seventy-five private individuals, all the old people and those who have physical problems preventing them from traveling responded that they like using this technology and they hope to visit the whole world using a VR or AR application. Moreover, respondents with the same characteristics, who do not yet have experience in virtual tourism, look forward to their first experience but they have not yet found travel agency available to offer such services.

One in three tourists provided answers strictly in connection with their family, especially in Italy. Some tourists want only to relax within family groups, and thus meander, watch children play and not necessarily in front of screen. For them, the feeling of traveling and visiting together a place while discovering another culture is very important. By travelling together, they change some different environment from home. Other people seek satisfaction from specific wishes to observe physically particular fauna and flora. For the moment, they use virtual tourism because there are no

choice but as soon as it is possible to travel quietly with the family, surely they prefer to go physically.

Afterwards, there are those who consider this innovation as a good initiative in the tourism sector but find reasons to not use it. They found a good idea by discovering this virtual tourism but they do not feel comfortable like in a real environment. They outlined that this technology will culturally ruin a large part of young people and future generations. Half of Finnish participants provided such responses.

The others find this innovation very useful. Traveling is risk and they prefer to visit everywhere virtually. They do not have time to figure out what is the right way to travel to any country and they do not even have time to travel, that is why virtual tourism is the only way to show where they really want to go. In addition, this is a new trend and it is a pleasure for them to adopt it. Some people do not like to travel and they thank those who invented this innovation because it is a great solution. Two out of three French presented these answers.

These results show how difficult it is for some people to accept using this technology to visit virtually a destination when it is still possible to travel and physically visit tourist environments. Various reasons prevent tourists from accepting the change in the mode of visiting naturally to virtual: the desire to stay together with the family away from home while discovering another culture, the mentality addicted to traditional modes refuses to adopt experiences in artificial reality, the fear of parents for future generations to become addicted to a virtual world. However, tourists are available to appeal to this virtual reality at the time when there are barriers making it impossible for them to travel. Therefore, in the event that there are exceptional measures such as a state of health emergencies during the COVID-19 pandemic preventing the exit of all people beyond a border, this innovation is very important and would be a solution widely shared by tourists. In addition, the rate of population ageing may also influence the incentive of travel agencies to adopt it or not.

It is possible to embrace virtual tourism by watching videos from a smartphone or computer, but using a virtual reality headset or VR glass is the best way to manipulate it for the most of a feeling of immersion. One of the advantages of virtual tourism most cited by respondents was that with it, people would not disturb the nature. Humans passing through nature disturb the fauna and flora that should remain quiet in their world. This innovation would cause less disturbance to animals in tourist environments. Therefore, it is not only beneficial for the environment, but also presents advantages such as estimation of disabled or elderly people creating the chance to visit different countries without having to travel. However, after having had experience in virtual tourism, the user might find the reality bland, sad and they may be disturbed as after taking drugs. Besides these psychological and psychic problems, the tourist could also suffer physically by having headache or nausea. VR glass further poses a danger to vision due to the blue light from the screen.

5. Conclusion, Discussion and Implications

With the rapid advancement of digital technology, virtual tourism is possible thanks to the VR and AR applications. However, it is not necessarily countries with high performance in digital technology that will mostly adopt this innovation. This study investigated to understand the factors that make decelerate travel firms in some developed countries to implement virtual tourism within their offers. The findings highlight the reasons that promote or obstruct tourists to visit the virtual destinations and these reasons influenced the tourism firms to invest or not in virtual tourism, highlighting the firm-market relationships. For the travel firms, the prospect of virtual tourism adoption resides in the decisions of tourists and not only with the willingness of tourism firms to implement it because without customers interested in this innovation, they would hesitate to introduce this application towards their offers. Therefore, before introducing in virtual tourism market, travel agencies consider results of market research defining the choice of tourists and the sources of satisfaction associated with different needs and behaviours. These three countries have

different cultures and it is normal if some people accept tourist virtual experiences more easily than others do.

The findings provide theoretical and practical implications. It demonstrates that the tourism consumer behaviour influenced the attachment of tourism firms to virtual tourism and then determine the possible development of VR on tourism, providing implications for academic studies (eg. Jia *et al.*, 2012; Disztinger *et al.*, 2017; Neuhofer *et al.*, 2013; Guttentag, 2010; Marasco *et al.*, 2018; Pencarelli, 2019). This study theoretically validated that the COVID-19 pandemic played a role in societal change leading crisis in tourism sector (Hall *et al.*, 2020; Gössling *et al.*, 2020) but according to the findings, it is shown as an important factor for potential tourists to visit destinations shown in VR content, because technology is at the core of solutions for combating this problem (Sigala, 2020). In addition, the findings suggest that the decision-making of tourism firms on the adoption of virtual tourism in their services should depend on the choice of tourists and not on performance in digital technology of their country. It implies that practitioners should pay attention to the necessity of information towards the choice of tourists in order to evaluate the efficiency of virtual tourism. As markets become increasingly competitive, it becomes ever more important for tourism managers to understand the persuasive strategy for the services offer and this study will then be used to guide the choice to invest or not in this technology.

This research has some limitations. First, the sample is limited for three countries having different level of digital performance and technologies penetration rates, but introducing virtual tourism impressively different from their rank on technology competitiveness. Second, only highly educated people who are willing to understand this technology could participate on the survey because virtual tourism have not yet been commercialized enough to be known to all tourists and the explanation about the way to use it was not be provided for respondents before conducting survey.

Therefore, future research could replicate the study with more countries participants and greater representativeness. Future research could also examine what factors can influence tourists intention to embrace virtual tourism for any country. Otherwise, future research should focus directly to examine the influence of the culture on the intention of people to have experience with virtual tourism or comparing two countries exploring cultural differences in Europe or elsewhere.

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Covid-19 and recovery strategies. Some insights from an ongoing exploratory study in the hospitality sector of the historic city centre of Venice

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Abstract

Objectives. *The paper aims at understanding the progress in the response ability and response mechanisms of tourism businesses for the recovery from Covid-19.*

Methodology. *The paper presents an ongoing explorative research started in June 2020 and based on interviews and focus groups among a small sample of hotel companies in the historic center of Venice - Italy.*

Findings. *First insights show that recovery actions taken by Venetian hotels in the second part of 2020 are still quite passive and defensive, due to the persistence of the crisis and the great uncertainty. This is consistent with other evidences reported in the literature about business response during other crisis periods.*

Research limits. *The first limit is that the study focuses on a specific case - Venice -, even though some issues this city is facing are common to other destinations. Another limit is due to the small sample of the survey.*

Practical implications. *Not only the study monitors how businesses are reacting to the crisis but also it records some - positive - outcomes that are occurring to tourism in the city: the increase in direct sales and in high-profile and high spender tourists. Businesses are dealing a situation that, however negative for their revenues, opens up the prospect of a new development, different from the monoculture of mass tourism.*

Originality of the study. *Although in this paper only some first insights are discussed, the originality of the study lies on the attempt to investigate the response actions of tourism businesses just as the crisis evolves and until the full recovery.*

Key words: *hospitality industry; Covid-19; crisis; business response; recovery; qualitative research.*

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1. Introduction

The Covid-19 pandemic is not only a terrible health emergency but an increasingly evident economic crisis that is impacting any economic activity worldwide. Tourism is the worst affected industry and the recovery will likely take longer than in other sectors (Krishnan *et al.* 2020; OECD, 2020).

Tourism is not new to crisis. An extensive body of studies in the academic and research literature documents the high vulnerability and fragility of tourism to different forms of shock and crisis events happened in the past, such as financial and economic crisis (Alegre and Sard, 2015; Alonso-Almeida and Bremser, 2013; Campiranon and Scott, 2014; Cellini and Cuccia, 2015; Okumus *et al.*, 2005; Richtie *et al.*, 2010; Smeral, 2010), geo-political instability, terrorism and wars (Araña and Leon, 2008; Biggs *et al.*, 2012; Buckley and Klemm, 1992; Liu and Pratt, 2017), pandemic (Chien and Law, 2003; Gu and Wall, 2007; Henderson, 2003; Henderson and Ng, 2004; Leung and Lam, 2004; Zeng *et al.*, 2005), natural disasters (Aguirre, 2007; Biggs *et al.*, 2012; Calgaro and Lloyd, 2008; Huang and Min, 2002; Prideaux *et al.*, 2008).

However, the current Covid-19 emergency is unprecedented and different from any other crisis occurred in the past (Sigala, 2020). Even with reference to other pandemic that impacted on economy and society, they didn't lead to such significant changes on general scale and their effects were limited to some countries or industries only (Hall *et al.*, 2020). On the contrary, the spread of the Covid-19 virus, that does not seem to subside, the scale of travel restrictions, that are hindering all conditions underlying tourism, and the related social and economic impacts are affecting all countries and destinations in the world without distinction. The adverse effects of Covid-19 on tourism are expected to be long-lasting even after the pandemic is under control (Farmaki *et al.*, 2020) and to bring deep and long-term structural transformations to all tourism ecosystems (Sigala, 2020).

Since the outbreak of the pandemic in early 2020, several researchers have already investigated the negative effects of Covid-19 on tourism (see, for example: Farmaki *et al.*, 2020; Fotiadis *et al.*, 2021; Hall *et al.*, 2020; Huang *et al.*, 2020; Kaushal and Srivastava, 2020; Kock *et al.*, 2020; Polyzos *et al.*, 2020; Qiu *et al.*, 2020; Sharma and Nicolau, 2020; Sigala, 2020; Tsionas, 2020; Yeh, 2020; Yu *et al.*, 2020). However, much attention seems to be paid to monitor the impacts of Covid-19 on tourists' perception, decision-making and behaviour and to measure the figures due to the pandemic, i.e. the extent of the decline in tourism flows and business revenues (Kock *et al.*, 2020). Little consideration seems to be paid in relevant literature for the moment to the response mechanisms that tourism companies are implementing or are planning to implement in order to face the situation and to recover.

Monitoring and investigating how tourism companies are reacting and how responsive they are in relation to the evolution of the situation is certainly a crucial topic. Indeed, as pointed out by expert analysts, tourism recovery will be marked by structural shifts, that will require to reinvent and redesign travel experiences and even business models around new customer expectations (Dalrymple *et al.*, 2020; Ehrlichmann *et al.*, 2020). Those companies that, despite the deep uncertainty, will be able to work with customers, employees and partners to co-create innovative solutions in a rapid and agile manner will recover better and sooner than the others (Dalrymple *et al.*, 2020; Ehrlichmann *et al.*, 2020).

The aim of the present paper is to provide a contribution to the understanding on how tourism companies are reacting to this crisis still being within the crisis itself. In fact, the worsening of the worldwide pandemic in Winter 2020-2021 - at the time of writing - confirms a crisis still long to overcome and a period of great uncertainty to deal with. The paper is based on an ongoing exploratory study started in June 2020 on the hotel sector in the historic city of Venice - Italy. This research is aimed at investigating what are the responses of hotel companies during these hard moments and how they change as the crisis evolves, also in comparison to the recovery actions taken during other crisis period occurred in the past. Therefore, the study is monitoring the progress of the actions that hotel companies implement and/or think to implement for coping the crisis,

according to the evolution of the pandemic context and of booked room-nights. The research design is to continue the investigation during the entire pandemic period, until the full recovery. Indeed, the study, started immediately after the end of the first lockdown in Italy in June 2020, is expected to continue for several months through a repeated survey, some focus groups, and interviews among a small sample of tourism managers. In order to analysis tourism companies' responses, they are asked to express on a six-point scale how much they are implementing different categories of actions (promotion/communication, product development/adaptation, internal reorganization to the change of suppliers/intermediaries, requesting financial aid to the development of new partnership and networks, etc.) and how bookings are going also with respect to the main markets of origin and sales channels.

Specifically, this paper presents the results collected from June to November 2020 and provides some insights about how hotel companies answered to the emergency in the immediate post lockdown, also viewing the short-mid future that remains however very uncertain.

This research is in line with other studies which investigated tourism companies' preparedness and possible response in relation to the different stages of past crisis and to the varying degree of uncertainty (Campiranon and Scott, 2014; Chien and Law, 2003; Henderson and Ng, 2004; Okumus *et al.* 2003; Zeng *et al.* 2005). However, few of these studies seem to have been carried out when the crisis was still ongoing (Chien and Law, 2003; Henderson and Ng, 2004) but rather immediately after it ended.

The city of Venice can represent an interesting case study. It is one of the most popular destinations in the world and one of the most affected by Covid-19. Indeed, although Covid-19 has impacted on all tourism businesses and destinations, with -72% drop in international tourist arrivals in the world in January-October 2020 (UNWTO, 2020b), some parts of the sector and locations are more affected than others (OECD, 2020) and the recovery will vary across segments (Krishnan *et al.* 2020). In particular, those tourism businesses and destinations that, like Venice, are heavily dependent on the long-haul international market and on urban cultural tourism are likely to be the most damaged (Krishnan *et al.* 2020). The return to 2019 levels in terms of international arrivals would take two and a half to four years (UNWTO, 2020b), and although domestic travel demand will recovery faster (UNWTO, 2020a), it is unlikely that it could compensate for the decline in international flows (OECD, 2020).

This is particular truth for the city of Venice. In addition, in light of overtourism that has been afflicting the city for years, the present situation, although it has made the city dramatically empty, is considered as an opportunity for rethinking tourism development.

2. Background and literature review

2.1 Shock and crisis events in tourism

Crisis in tourism are usually related to situations in which tourists face difficulties in travelling at a global scale or specifically towards some destinations and tourism companies are threatened in the normal operation and conduct of their business (Hall, 2010; Ritchie and Jiang, 2019). More in general the term is used with reference to the impacts brought by some events on a destination, on a tourism sector, or on global scale (Hall, 2010; Ritchie and Jiang, 2019). In this sense, the term "shock event" may be more appropriate, since it is intended as a sudden and not very predictable event that brings considerable stress in the tourism industry. A shock event may not necessarily be totally negative, but be significant enough to lead to a certain transformative process of tourists' behaviour and tourism business models (Bonn and Rundle-Thiele, 2007). These disruptive events can be due to some internal organizational failure or to external factors that cannot be controlled (Ritchie and Jiang, 2019).

However, regardless of the causes, crisis and shock events usually occur in a precise time and space and have a specific duration, although their impacts may be felt for a longer period (Ren,

2000). They differ from other occurrences that, even if they may seriously impact tourism, do not happen suddenly but rather manifest themselves over the years, by producing a gradual change. This is the case, for example, of climate change that is not recognized as a crisis or a shock event, although it is generating increasing pressure in the tourism ecosystem (Hall, 2010).

Crisis and shock events in tourism have generally been investigated in the academic literature with respect to two perspectives: on the one hand, from the demand point of view, in terms for example of risk perception (connected to safety issues), destination image and the related effects on travel decisions and behaviour. Tourism is usually vulnerable to crisis and shock events, since they can seriously compromise travellers' wellbeing, security and/or income. Indeed, concerns over health, security and personal safety represent one of the factors that influences the most travel decision choices (Santana-Gallego *et al.*, 2020), together with price and disposable income (Hall, 2010). On the other hand, crisis in tourism has been investigated from the supply-side point of view at a destination and industry level, in terms of impacts on tourism businesses and ability to effectively manage the crisis. In this case, the most investigated topics are related to tourism crisis management, response and recovery strategy, tourism planning also for crisis prevention (Qiu *et al.*, 2020).

Regarding the supply-side perspective, on which this paper is mainly based, previous research investigated the impacts of crisis - including pandemics - on reservations, hotel occupancy and revenues; the ability of tourism companies to quickly adopt response mechanisms for overcome the emergency and relaunch their business; the way in which tourism managers approach strategic decision-making when dealing with shock events and the kinds of actions and strategies put in place. According to Bonn and Rundle-Thiele (2007) strategic decision-making following a crisis event tends to be based on a less analytical and consultative but more intuitive and simplified approach than decision-making adopted in normal and stable conditions.

Apart from some specific actions depending on the type of event (for example the adoption of safety protocols in case of infection diseases; or reconstruction in case of natural disasters, etc.), some categories of actions seem to mainly recur in the crisis management by tourism businesses: saving costs (in particular in the early phases); revising agreements and contracts with suppliers, vendors, etc.; lobbying for asking support measures to the Government; revising services and or developing new products; marketing strategies, including cooperation with other companies. Looking, for example, at the consequences of SARS on the hotel sector in Singapore and Hong Kong and to the related reactions of businesses to the crisis, studies found out that in the early stages of the spread of the virus, managers were unaware and unprepared and acted instinctively (Henderson and Ng, 2004), by handling cancellations and trying to implement the new safety measures (Chien and Law, 2003). Only later they took the initiative, from reactive and defensive actions to proactive and offensive ones. In addition to disease and hygiene controls, the most common strategies were about cost savings (avoiding non-essential capital expenses), lobbying for official aid from the Government, marketing and later product development, including cooperation with other companies both within and outside the tourism sector for implementing promotional campaign in order to restore destination image and stimulate tourism demand (Chien and Law, 2003; Henderson and Ng, 2004). In the case of natural disasters, such as hurricanes, earthquakes, bushfires, etc., while the stage immediately after the event usually focuses on repair, reconstruction and reopening, the following stages are based on strategic and collective marketing actions in order to rebuild destination image and tourists' confidence, by ensuring them that businesses are open and safe and that travellers can continue to experience the unique features of the destination (Prideaux *et al.*, 2008). Marketing and product development are strategic also in response to financial and economic crisis. During the last world economic crisis started in 2007, tour operators working on the Balearic Islands seemed to react to the drop in international tourists and in their spending, by using strategies other than price cutting. Rather they put efforts in product diversification and development, by selling a selection of packages that offer flexibility to consumers according to their different needs and available budget, and/or focussing on those market segments for which the price/quality factor remains particularly important even in times of crisis (Alegre and Sard, 2015).

Recovery marketing segmentation, promotion and service quality were considered as effective strategies for coping the 2007 economic crisis also in the cases of the hospitality sector in Madrid (Alonso-Almeida and Bremser, 2013) and of the hotel sector in Phuket (Campiranon and Scott, 2014). In the case of the economic crisis in Turkey in 2001 too, tourism businesses of Northern Cyprus originally adopted defensive measures (checking payments, debts, agreements and contracts with suppliers; cutting costs and staff), but later they improved their marketing and selling strategies; invested more in the quality of their services and in the development of more advanced management skills (Okumus *et al.*, 2005).

Businesses' response to crisis is more effective if they already have a crisis management plan in place, including risk assessment (Johnson Tew *et al.*, 2008). As explained by Ritchie (2004), if strategies for handling the crisis are selected only when the emergency phase has already broken out, in which the pressure is very high and prevents clear decisions, they will more likely be unsuccessfully and inefficient. Crisis management is instead a multi-step process, which requires: prevention and pre-crisis proactive planning; strategic implementation during the crisis (quickly but carefully putting into practice the most appropriate actions, including communication and control strategy, reallocation of resources, cooperation with stakeholders in tourism and other industry sectors); resolution, evaluation and feedback, in order to assess the action effectiveness, learning from the lessons, also taking the opportunity not only to recover but also to improve compared to the pre-crisis period, making positive changes to the organization.

The uniqueness of certain situations, such as pandemics, make considerably complex the advance identification and assessment of dynamics, risks, and related response strategies (Henderson and Ng, 2004; Ritchie, 2004). Nevertheless, even if some events are unpredictable in respect to timing, severity and geographical scale, it doesn't mean that they are totally inevitable (Prideaux *et al.*, 2008). As a consequence, the risk that certain disruptive events recur over time (from economic and financial crisis, that are cyclical, to infection diseases and pandemics, from earthquakes to hurricanes, floods, bushfires etc. that are more and more frequent) makes it necessary to be prepared, through crisis management planning, also based on the lessons learned from similar crisis occurred in the past, in order to provide direction and limit any damage (Henderson and Ng, 2004). In addition, the application and adaptation of crisis and disaster management theory from other disciplines can be useful for a better understanding of crisis dynamics and the development of effective crisis management in tourism (Ritchie, 2004). This is even more strategic nowadays, in which shock and crisis events, when happen, tend to be far-reaching and involve the international scale, since the substantial growth in tourists' mobility, the more general globalisation processes and the growing complexity and interconnections of tourism eco-systems (Aliperti *et al.*, 2019; Hall, 2010).

Despite the severity of many of such events, the tourism industry has shown in the past to be resilient, being able to recover relatively quickly (Farmaki *et al.*, 2020), usually making structural adjustments (Zeng *et al.*, 2005). However, if at a more general level, tourism quickly rebounds from the shock event, by returning and even surpassing the pre-crisis level, at a more local level the response times and the adverse effects may be different depending on the characteristics of the tourism industry and ecosystem. In the case of SARS in China, for example, the recovery was rapid, but non-urban peripheral areas and small businesses were found to be particularly vulnerable and weak, and, since the losses cannot be recouped, recovery strategies needed direct grants or subsidies (Zeng *et al.*, 2005).

2.2 The present Covid-19 crisis

Coming to the present crisis due to Covid-19, one of the questions and concerns of the tourism community at large (researchers, businesses and organisations, institutions) is about the ability, timing and ways of tourism recovery. Since the outbreak of the pandemic in early 2020, several studies and research have already been published, questioning about topics linked to the immediate, short- and medium-term effects and implications of the pandemic on tourism.

Some contributions focused on making forecasts of the impact on tourism demand and tourism industry, in terms of losses and possible recovery in arrivals, income and revenues (see for example, Fotiadis *et al.*, 2021; Polyzos *et al.*, 2020; Sharma and Nicolau, 2020; Tsionas, 2020).

Other studies focused on the demand-side perspective, such as tourists' risk perception, changes on travellers' decision and behaviour. According to Kock *et al.* (2020), for example, the consequences of Covid-19 tourists' psyche can lead to a paradigm shift in their behaviour and negatively impact some significant phenomenon linked to tourism, such as xenophobia and crowding perception (Kock *et al.*, 2020). However, destination loyalty and travel insurance (Kock *et al.* 2020), service quality and efficiency in crisis management and in the responses to tourists by companies (Yu *et al.*, 2020) can be of great importance in providing the tourists with a feeling of more security for travelling.

Other researchers investigated the supply-side. Focussing in particular on business recovery, some factors seems to emerge as more relevant, also confirming findings from studies about previous crisis: open and transparent communications (Huang *et al.*, 2020; Yeh *et al.*, 2020); aid from the government, for example for facing liquidity issues and employment issues (Farmaki *et al.*, 2020; Huang *et al.*, 2020; Yeh *et al.*, 2020); support and greater cooperation from distribution platforms, such as booking.com, Airbnb, ecc. (Farmaki *et al.*, 2020); hygiene and sanitation (Farmaki *et al.*, 2020; Kaushal and Srivastava, 2020); crisis management preparedness; multiskilling and professional development of the employees; optimism toward revival of the industry linked to manpower development (Kaushal and Srivastava, 2020).

Some other contributions are about the future of tourism and of tourism research. If, as it seems, it will not be possible to recover the pre-covid normality and tourism will be transformed, there is the need to question about how tourism ecosystems will face this challenge and what kind of future they wish for: they can simply continue or even expand present growth orientations or rather focus on more sustainable forms of tourism (Hall *et al.*, 2020). Indeed, Covid-19 should not be considered as an exogenous shock but as a result of the socio-economic structures and of the processes of urbanisation, globalisation, environmental change, contemporary capitalism, to which also tourism contributes with its evolution and growth paradigms. As a consequence, the challenge for tourism stakeholders and research is about how reimagine and reset tourism (Sigala, 2020).

3. Methodology

3.1 An investigation of the case of Venice, Italy

The present paper aims at investigating path and ways to recovery of the tourism hospitality industry in the short and mid-term, by choosing as study focus the city of Venice and, in particular, the medium and medium-high hotel companies of its historic centre, where the Covid-19 impacts seem to be even greater than the other areas of the municipality. The city of Venice - in particular the historic city - is one of the most popular and appreciated cultural destinations in the world, included in the UNESCO heritage list. Nonetheless, its progressive shift towards a "tourist monoculture" and overtourism is well known, amplified even more by the fragility of the entire system (its particular and delicate ecosystem linked to the Lagoon; depopulation, etc.).

In 2019 - the last year before Covid-19 - 5.5 million arrivals and 12.9 million overnight stays were recorded in the municipality of Venice and more than 60% were in the historic town. In 2019 the city registered an increase in arrivals of +5.1% and of +6.9% in overnights compared to 2018 and +9.7% and +0.8% on 2017. International tourists accounts for 86.5% of total arrivals, confirming the clear prevalence of the foreign demand, that is even more evident in the historic city (88%). With reference to the main countries of origin, 40% of foreign arrivals come from non-European long-haul markets (USA is the first market for Venice).

Regarding the accommodation offer, there are 419 hotel establishments with a total of 32523 bed places and 9085 extra-hotels with 48441 bed places in the municipality of Venice. In particular, 288

hotels (68.7%) and 8682 non-hotels (95.5%) are in the historic centre, for a total of 19972 and 39401 bed places. Here, medium and medium-high hotels account for 67,7% of all hotel establishments (City of Venice, 2020).

As concerns instead the effects of Covid-19 on tourism in the city, tourist arrivals in Venice in 2020 declined -75.8% and overnight stays -72.5% over 2019. In particular, the international market recorded a -80.7% decrease in tourist arrivals, while the domestic market limited the loss to -44.3%. The decline is much more negative than that recorded in the Veneto Region, where the city is located (the Veneto Region is the first touristic region in Italy, known for its popular destinations, such as its beaches, the Dolomites Mountains, the Garda Lake and cities of art, including Verona, Padua, Vicenza Veneto). At regional level there was a drop of -61,1% in tourist arrivals, -36.1% for the domestic market and -74.3% for the international one (Veneto Region Statistics Office).

From the tourism supply side, according to the Venetian Hotels Association, despite the major lifting of restrictions since June 2020, about 30% of hotels have remained closed during the summer season and for the others the room occupancy stops at 15% with a -22% decline in room prices. In addition, the new restrictions on people movements and to the opening hours of many food&beverage and leisure activities (such as restaurants, bars, theatre, cinema, events, etc.) introduced by the Government starting from the last week of October 2020 for stemming the second wave of infections are hindering the recovery attempt made by companies in the past recent months.

Paradoxically, since 2020 the city has been experiencing a situation that is completely opposite to overtourism, with social and economic life running - or not running - without the usual presence of tourists. Thus also the problem of sustainability has shown its own other face. Alongside the magic of streets, bridges and canals without crowd, very inspiring for imagining a better quality of life and visiting experiences, at the same time it has been experienced the profound negative impact on the social and economic life of a city too empty. It has to be noted that the city was already suffering before the outbreak of the pandemic, since November 2019, when the exceptional high water has discouraged tourists from coming on vacation causing many cancellations and missed bookings. Therefore, the city recovery from the Covid-19 crisis is also seen by public opinion and the community at large as an opportunity to rethink tourism development in Venice towards a more sustainable path.

3.2 Research design

The overall research design is aimed at conducting an exploratory study - of which this paper represents a first result - that the authors have planned to continue for several months through a repeated survey with a small sample of hotel managers, some focus groups and interviews. Starting from the literature on the impact of the previous crisis on tourism and in particular on business recovery strategies in the hospitality sector, the study is driven by three main research questions:

- What are the main response actions/strategies that hotel companies are implementing for recovery since the end of lockdown?
- Do these actions/strategies change over the months according to the situation evolution?
- Are these actions/strategies different from those implemented in the past during similar crisis?

The study tries to investigate these aspects by capturing the impressions, feelings and thoughts of hotel managers and understanding their decisions also on the basis of how they and their companies are living and feeling this exceptional moment. Therefore, the study is based on a qualitative approach, that, given the purpose of the research and the unique circumstances of the moment, is considered more appropriate, as stated also by other academicians who are investigating the effects of Covid-19 on tourism (Farmaki, 2020; Kaushal and Srivastava, 2020). Indeed, qualitative research has the merit to provide a deeper description of people's thought and then a better understanding of complex phenomenon (Ezzy, 2002). This is even more true when the problem is new and still in strong and continuous evolution, for which qualitative methods can provide more critical insights (Strauss and Corbin, 1998). The study is not investigating the topics under consideration with reference to a period that has already ended but it is taking place while the situation is ongoing and

continues to unfold. It has started in June at the end of the lockdown in Italy and the first steps took place in the last months; it will continue in the next months and, if possible, until the end of the crisis in order to record and investigate its dynamics. The research design is based on mixed method, in particular in the form of a survey to a small sample of respondents together with the focus group technique. In the light of the research purpose, these two methods are used as complementary: the survey questionnaire and the discussion guidelines were jointly designed before the results of either component were known. The aim of this triangulation design is the mutual enhancements for the analysis and comprehension of each component by the other in order to reach a broader understanding (Wolff *et al.*, 1993, 120-21; van der Plas *et al.*, 2014; Caillaud and Flick, 2017).

Prior to the design of the survey and of the focus groups guidelines, three interviews were conducted with representatives of the local hotel association - who the respondents belong - and a hotel manager (working in Venice but not included among the respondents) in order to point out main topics and then to refine each question items. It has been considered of great importance "give voice" to informants in the early stages of the research and do not impose prior constructs or theories (Gioia *et al.*, 2013).

The study involves a sample of 11 hotel companies - in the person of their hotel manager or front-office manager - of the Venice historic town, belonging to the medium and medium-high category. The sample consists of the hotel companies who decided to take part in the research on a voluntary basis, after a public invitation was launched by the authors - with the support of the Venetian Hotel Association - among all the medium and medium-high category hotels of the city centre. It accounts for 6% of all hotels of this category in the area under consideration. The decision to focus the sample on this specific category was made on the basis that it represents the main hotel offer in the city centre (67,7% of all hotel establishments). It should be noted that the study excluded luxury hotels, as they almost all belong to large international companies that develop their strategic responses following a broader logic than the local level. So these hotels are less autonomous in their strategic choices.

Regarding the survey, it has conceived as a monthly monitoring, administered and submitted through the online platform Qualtrics: at the beginning of every month, respondents are invited to fill in the same questionnaire in order to record changes in their responses over the time. An agile questionnaire was developed, starting both from previous studies in the literature and from the preliminary contribution of the experts, as explained above, and also from other surveys launched at national and local level by institutions and trade organisations during the same period. The questionnaire is based on the following 5 questions.

Evolution of booked room nights: respondents are asked to write the number of booked room nights recorded for the current month and for the following 5 months.

1. Main markets of origin for the booked room nights (domestic or foreign one): respondents are asked to select one of the following options: almost all Italians; more Italians than foreigners; half Italians and half foreigners; more foreigners than Italians; almost all foreigners.
2. Main sales/booking channels: respondents are asked to declare how important the following sale channels were for the bookings recorded in the period under consideration, according to a 5-point scale (from 1 - not at all to 5 - very important): booking.com, expedia, other OTAs - online travel agencies; tour operators; travel agencies; hotel website; other direct channels (phone, etc.).
3. Main actions/strategies implemented (or planned): a list of 14 categories of actions was proposed (rethinking communication/promotion; adaptation of target markets; renegotiation of intermediary conditions; change of intermediaries; renegotiation of supplier conditions; change of suppliers; request for deferred payments; request for extra funding; staff reorganization; staff training; logistic adaption and internal reorganization; product adaptation/development; cooperation, networking, working groups; digitization). Respondents are asked to rate each item according to how much they have been implementing that action on the basis of a six-point scale (from 0 - not at all to 5 - a lot).
4. Main support measures from government that companies need: a list of 10 interventions was

proposed (holiday bonus; communication campaigns; voucher extension; financial support; guarantees for access to credit; suspension of deadlines; tax reduction; extension of layoffs; training courses on innovation, digitalization; training courses on safety protocols). Respondents are asked to select the two most important items.

As concerns the focus group, it involves the same participants of the survey and it is planned to be repeated on several times, deepening in particular some aspects of the topic under investigation, even different from time to time, depending on the research needs. Due to health protocols in place that discourage face-to-face meetings, focus groups are carried out online, through the Zoom platform. The authors are aware that this may be an obstacle for agile interaction and discussion among participants, but many examples of virtual focus groups have already been documented in the literature (Murgado-Armenteros *et al.*, 2012). The focus group is conducted following a guideline with the specific topics/questions with which to guide the discussion. Data analysis is based on data coding and content analysis, in order to find repeated patterns of meaning from participants' responses (Liamputtong, 2011; Nyumba *et al.*, 2017).

At the time of writing, three rounds of the survey - September-November - and one online focus group - with four participants - were administered. The focus group, in particular, stimulated participants' discussion around 4 questions (changes in sales/booking channels and target markets; the role of digitalisation in this recovery stage; the importance and ability to invest now; an idea for the future of tourism in Venice).

First insights of both the survey and the focus groups are presented in the next section, although results are still partial since comparison between monthly rounds of the survey seems to be premature.

4. Results

4.1 *Research question 1: main response actions/strategies implemented for recovery since the end of lockdown*

The answers to the question included in the survey about the actions implemented by hotels show that in the early post-Covid stage (June-November 2020) the main response mechanisms referred to: organisational measures for implementing the necessary safety protocols; saving costs; reorganising and downsizing staff (use of layoffs or furloughs, smart working if possible); actions at the level of the supply chain, in particular to review the payment conditions; marketing actions, in particular for revising and adapting communication to the present situation, keeping in touch and reassuring with clients.

In the same way these answers underline a kind of limited responsiveness of Venetian hotels. In fact, for each month considered in the investigation the average and modal score of the six-point scale (from 0 - min to 5 - max) adopted to measure the efforts of companies in different types of actions is about 2.50 with a low dispersion (standard deviation of 0.9).

The reason of this behaviour can be the great uncertainty about the future, that is one of the main results coming from the focus group. The past logic of planning according to short, medium and long time seems to be little applicable, since the situation is so changeable and unknown to be able to plan about the future and to make scenarios. Several variables come into play: the spread of the virus, tourists' propensity, the airlines' ability to quickly resume flying regularly after the end of pandemic, the extension and kind of national restrictions adopted in each country. This last answer has to be understood in relation to the specific moment in which the focus group took place, i.e. a few days after the news of a possible second lockdown in France and Germany and the entry into force of the new decree of the Italian government (the second one within a week) that imposes new restrictions on business activities (for example early closing of restaurants and bars, suspension of activity in theatres, gyms, etc.) following the second wave of the virus and the increase in infections.

P2: "It is difficult to think and plan about the future. We depend on governmental decrees".

P3: "We depend not only on the Italian governmental decrees but also on the restrictions taken by the other countries... American tourists can't wait to travel back to Europe and Italy but they can't".

P4: "It is difficult to say now what are short and medium terms. We are far from seeing the end of the crisis... It also depends on when flights will resume regularly."

According to the focus group, although hotel managers are aware that it is just in times of crisis that investments can make a difference, they want to be cautious. Indeed, they are facing an urgent lack of liquidity; they are forced to dismiss or put in lay off or in furlough part of their staff, and above all they do not know how long the health and economic crisis will last. In such a situation, even the best capitalized companies don't want to take risks since they don't know how long they will be able to count on the available resources. For the moment hotel companies seems to put efforts in actions that don't require some many resources, such as revising and adapting their services for product repackaging, improving the customer care and taking advantage of the moment for training their employees (those who are still in force).

P2: "It is right to invest, but liquidity is lacking. Thinking of allocating resources to investments when you have to put our employees in layoffs... We collide with reality."

P4: "How will we be at the end? Will all tourism businesses in Venice still be there?"

P1: "We must be careful because the critical situation is still long and we do not know exactly. However, it can be an opportunity to invest in the product, since we have more time to dedicate and on the employees' training also to keep their attention alive".

P3: "Training, improvement of the customer care, some new proposals (for example ad-hoc tourist packages... These are the only things that we can do now. Things that are cost 0; that do not require financial resources but only intellectual ones".

The low propensity to dedicate resources seems to regard also digitalisation. According to the survey results, it is one of the actions with the lowest average score on the six-point scale (about 1,7 on average). Participants in the focus groups recognize that digital applications, in particular platforms for meeting online (zoom, gmeet, etc.) and social media have been very effective for staying connected with employees, partners, intermediaries, tourists and clients who could not move from home during the lockdown. However, beyond the use of digital applications for communication /booking (that were already used before Covid-19), they seem to see no further. With the exception of the only hotel part of a large international hotel group, they seem not to consider digitalization for other internal and organizational processes (internal communication, human resource management, front-office processes, i.e. web check-in and chat with clients, etc.).

P3: "Zoom for keeping in touch with partners; social media for keeping in touch with clients. For my hotel, web check-in is not needed, maybe in large hotels... Smart working is not a solution: Hospitality cannot be done at a distance!"

P1: "The company is implementing web check-in, chat applications, and other digital tools for managing front-office daily operations. The entire chain was already investing in these tools in the pre-Covid".

Despite the dramatic situation, some transformations in the market may be an opportunity for recovery, also for thinking about the future for tourism in the city of Venice. However, hotel managers do not seem to have yet clearly identified how to strategically and operationally exploit this opportunity. First of all, in the summer months following the lockdown, there has been an impressive increase of reservations through direct channels, i.e. personal website and booking engine of the hotel, via e-mail or by phone. The findings from the survey seem to confirm that most bookings done in the after-Covid period come from direct channels (website of the hotel, e-mail and phone) and very few from OTAs (Online Travel Agencies). In the question about the channels from which current reservations are coming, respondents gave to direct channels on average a score of

4,3 on a scale from 1 (minum) to 5 (maximum), while to booking.com a score of 3,7 and to other OTAs less a score less than 2. Considering the great and undisputed power of the OTAs (online travel agencies), such as Booking.com and Expedia in the pre-Covid, this new trend may turn into an opportunity for hotel companies for disintermediating their demand, as pointed out during the focus group.

P2: "Direct sales have increased."

P3: "It is very positive that direct sales have increased".

In addition, even though the number of tourists has drastically reduced, foreign tourists have not completely disappeared, although they come from short-haul foreign markets (maximum 6/7 hours away by car). Again, according to the survey 7 out 11 respondents answered that in the period under consideration the customers of their hotel were mostly foreigners rather than Italians. This is quite unexpected, since forecasts for Italian destinations in the early post lockdown period see a prevalence of the domestic market.

Surprisingly, in addition, customers of Venetian hotels in the immediate post-Covid are characterized by being up-market and bigger spender. Therefore, they are very different from the mass and low profile tourists who usually travelled to Venice and have taken advantage just of this moment when Venice is not overrun by ordinary tourists to visit the city. This trend may allow hotel companies to not lower room prices.

P3: "There are now tourists who we have not been seen in Venice for years. They are up-market. My average revenue per room has increased in recent months compared to last years. Could this be the future?"

The participants of the focus group look at this trend as an opportunity for the city to rethink its tourism development, although they are afraid it may just be a dream, since, when travel regularly resumes, mass tourism may be necessary in the presence of such an abundant supply of bed places as that of Venice. In the opinion of the focus group participants, it is up to the *governance* (the politics of the city) to make a decision about the future of Venice, not realizing, however, that the governance is done by each of them.

P2: "Tourism in Venice will return to the way it was before, if the governance does not change. Any decision made will be at the expense of someone else, but a decision is needed if we want to avoid overtourism"

P4: "In previous years many new hotels have been opened and many short-term rentals authorized. Ideally we all would like elite tourism but in the end we will regret mass tourism.

P1: "So much must start from each of us".

4.2 Research question 2: progress in the response actions/strategies over the months based on the crisis evolution

Regarding the second research question, at the time of writing, there were not significant signals that hotels' response mechanisms were changing. However, at present it is premature to draw conclusions about the evolution of the recovery strategies, since other several rounds in the next months are needed.

4.3 Research question 3: differences or similarities with actions/strategies implemented in the past during similar crisis

Also for the third research question, other several rounds in the next months are needed. However, the first insights discussed above seem to be consistent with other studies about past crisis, in particular about SARS pandemic in Singapore and Hong Kong in 2003 (Henderson and Ng, 2004; Chien and Law, 2004). They found out that, in the early stages of pandemic, hotels'

response actions focused on disease and hygiene controls, cost savings, lobbying for official aid from the Government, communication. According to Henderson and Ng (2004), hotel managers in Hong Kong acted instinctively with reactive and defensive responses and only later they were able to take proactive and offensive actions.

5. Discussion

Since the nature of the entire research, that is still ongoing, significant analysis is expected to be available after the collection of several rounds of the survey and other focus groups during the next months. However, the result of the first focus group appears almost noteworthy and some tendency can be underlined observing some answers from the survey round in September-November.

The first insights from the research clearly show the “block phase” in which Venetian hotels seemed to be, linked to the feeling of huge uncertainty that clouds the ability to react with clarity. In the period from the end of the first lock-down (June 2020) until autumn, hotel managers’ actions can be considered still passive and conservative. They were navigating on sight by taking defensive decisions day to day at the mercy of the epidemic’s evolution, both because they have been caught completely unprepared and because the situation is extremely unknown and unpredictable. The unstoppable spread of the virus and the continuous restriction measures taken by governments make it difficult to really take the situation in hand to restart.

Thinking for example of efforts put in marketing campaigns, they don’t seem to be addressed to determinedly attract new tourists, since hotel managers still don’t have a clear strategy of rethinking target markets. The changes in target clients, represented now by domestic and short-haul markets, are above all a consequence of travel restrictions and of new tourists’ behaviour and not of a real marketing strategy adopted by hotel companies. Indeed, also the reappearance in Venice of high-profile tourists, as well as the increase in direct bookings, is seen as completely surprising and unexpected. Hotel managers do not seem to have thought to take advantage of the lack of mass tourism to promote Venice to those tourists who want to visit the city without the usual crowd. Tourism businesses should look to these tourists not just as a temporary “replacement” in the absence of the usual customers but as a possible opportunity for the future, also for planning a new and more sustainable tourism development in the city.

In the same way, the decline in bookings through OTAs can be an opportunity: tourists seem to have experienced again the use of direct channels. This trend, that can increase direct sales for hotels, is probably due to the fact that tourists want to contact directly the hotel in order to be assured that it is open; what the policies are in case of cancellation; how the health situation is going in the destination. Tourists need to feel reassured and the ways in which hotels respond to clients (for example increasing flexibility in cancellation and guarantying or even improving service quality) are strategic (Yu *et al.*, 2020).

The new disruptive situation for Venice, which is suddenly emptied of almost all its tourists, seems to be making Venetian tourism businesses think about the future of the city; a future based on a different and more sustainable tourism, that in the past no one really had the courage to think. However, respondents still have no clear ideas how it could be, confirming once again that they were not yet reacting proactively.

Following Ritchie’s strategic crisis management framework (2004), Venetian hotel companies still seem to be in the emergency or intermediate stage, in which they act for damage limitation and for short term needs, and not with a long-term recovery view. The difficulty in adopting proactive response mechanism towards perturbations could be attributed to a weakness of the Venetian hotel industry, that for decades it has been accustomed to sustained growth in tourism flows, but also to a lack of a real crisis management plans by tourism companies. Nevertheless, although both the academic literature and professional experts (Dalrymple *et al.*, 2020) reminds the importance to invest also during the crisis period, for businesses it’s hard to show such enthusiasm when facing

liquidity issues and months of total inactivity. However, this is consistent with other studies about past crisis (Henderson and Ng, 2004; Chien and Law, 2004), who found out that, in the early stages of the SARS crisis in Singapore and Hong Kong, hotels' response actions were instinctive and defensive and only later they became proactive and offensive.

6. Conclusion

As the months go by, we are increasingly realizing that the recovery from Covid-19 for the tourism industry will not be rapid and it will probably bring important transformations.

The paper contributes to the present debate about the effects of Covid-19 on tourism, by taking in particular the perspective of tourism businesses, with a focus on the hospitality industry in the historic centre of Venice. Starting from the preliminary findings of a qualitative research involving a small sample of hotel companies, the paper has discussed how businesses have been trying to respond and to recover from the crisis since June 2020. The research, started just after the first lockdown and still ongoing, aims at observing how hotel managers' impressions and response mechanisms will change during the different stages of the crisis.

In terms of practical implications, the papers debate that some outcomes that the Covid-19 crisis is bringing on tourist behaviour may be positive for the tourism industry. This is, for example, the case of disintermediation from OTAs or the case of those new tourists who usually didn't come to Venice and who have started visiting it in the post-Covid (because they can't go elsewhere, or because it is close to home, etc.). It appears to be strategic for hotel companies the ability to take advantage of these trends for disintermediation, tourism diversification and innovation, also with reference to the future tourism development in the city.

Regarding the limits of the overall research design, the study focuses on a specific and unique case, i.e. the city centre of Venice, and its findings could be considered not very applicable at a more general level. Nevertheless, the paper may be useful for other similar destinations, for example based on urban and cultural tourism, or dependent on the international long-haul market or affected by overtourism. In addition, it may serve as a means of comparison with other destinations in order to understand if and how the ways and times for recovery from Covid-19 differ depending on the context.

Another limit is due to the small sample (6% of all hotels of their category in the specific area), since the low number of hotels motivated to cooperate. The low propensity to participate to a research promoted in collaboration with the hotel association can be considered an evidence in itself, but the need to expand the number of respondents remains. The paper is in addition affected by the fact that the study, as it was designed, is ongoing. Therefore, the results are not yet clear and exhaustive.

However, by discussing the findings collected so far, from June to November, the specific contribution of this paper is to provide an insight of hotels reaction (or non-reaction) and first tourism transformations in the preliminary stages of the post lockdown. After all, academic research on the legacy of Covid-19 on tourism is just beginning.

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Dynamic capabilities e opportunità di innovazione: verso una concettualizzazione dell'antifragilità

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Abstract

Obiettivi. Lo studio indaga i fattori abilitanti dell'antifragilità quale leva chiave per affrontare la complessità, sfidare l'evoluzione tecnologica e sviluppare l'innovazione. L'obiettivo è esplorare le determinanti dell'antifragilità per comprendere come cogliere opportunità di innovazione attraverso la giusta combinazione tra tecnologia, capacità dinamiche e capitale umano, esplorando il tipo di skills che possano favorire l'emergere dell'innovazione.

Metodologia. La ricerca empirica si basa sull'analisi del contenuto come inchiesta per esplorare il caso di studio di YourDigital, azienda che offre servizi di consulenza di digital strategy, fornendo ai propri clienti la possibilità di sviluppare business model flessibili, dunque atteggiamenti proattivi ed antifragile.

Risultati. I risultati consentono di introdurre un framework che identifichi in via esplorativa le dimensioni chiave e le determinanti dell'antifragilità, classificando le capacità sviluppate da YourDigital per sfruttare le opportunità di innovazione e le diverse opportunità di innovazione generate per adattarsi alla trasformazione del mercato e alle sfide ambientali.

Limiti della ricerca. Il principale limite dello studio è legato all'impossibilità di poter generalizzare i risultati ottenuti, derivante dalla natura intrinseca delle tecniche di analisi qualitative, che non si pongono l'obiettivo di ricercare nessi causali tra eventi ma semplicemente di proporre insight esplorativi legati all'osservazione in profondità di un dato contesto d'analisi.

Implicazioni pratiche. Data la necessità di chiarire le determinanti chiave dell'antifragilità nel business contemporaneo, il presente lavoro consente ai manager di comprendere al meglio come promuovere lo sviluppo di comportamenti antifragile e come abilitare le opportunità di innovazione che conseguono all'attivazione di tali capacità.

Originalità del lavoro. Lo avanza i primi passi per una classificazione delle componenti dell'antifragilità e per lo studio della relazione tra capacità dinamiche (hard e soft) e la potenziale generazione di diversi tipi di innovazione (di prodotto/ servizio, processo, business model, elementi culturali, educativi e sociali).

Parole chiave: antifragilità; dynamic capabilities; opportunità di innovazione; tecnologia; entrepreneurship; digital transformation

Objectives. The study investigates the enabling factors of antifragility as a key lever to address complexity, challenge technological evolution and develop innovation. The goal is to explore the determinants of antifragility to understand how companies can seize innovation opportunities through the right combination of technology, dynamic skills and human capital, by exploring the type of skills that can foster the emergence of innovation.

Methodology. The empirical research is based on content analysis as an inquiry to explore the case study of YourDigital, a company that offers digital strategy consulting services, providing its customers with the possibility of developing flexible business models, therefore proactive and anti-fragile attitudes.

Findings. The results allow the introduction of a framework that identifies the key dimensions of antifragility and classifies the capabilities developed by YourDigital to exploit the opportunities for innovation and the various innovation opportunities generated to adapt to the transformation of the market and to address environmental challenges.

Research limits. The main limitation of the study is the impossibility of generalizing the results obtained through qualitative techniques, which do not aim to test statistical relationships between events but propose exploratory insights related to the observation of a given context of analysis.

Practical implications. Given the need to clarify the key determinants of antifragility in contemporary business, this work allows managers to better understand how to promote the development of antifragile behaviors and how to enable the opportunities for innovation that result from the activation of these skills.

Originality of the study. The study advances the first steps for a classification of the components of antifragility and for the study of the relationship between dynamic (hard and soft) skills and the potential generation of different types of innovation (product/ service, process, business model, cultural, educational and social).

Key words: antifragility; dynamic capabilities; innovation opportunities; technology; entrepreneurship; digital transformation

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1. Introduzione

La società contemporanea e le organizzazioni odierne sono sempre più esposte a eventi dirompenti inaspettati (Pettit *et al.*, 2013) che determinano elevati livelli di caos e complessità (Polese *et al.*, 2018), incrementando l'alea manageriale. L'incertezza del contesto richiede alle aziende odierne di perseguire costantemente la vitalità e la proattività per superare, affrontare e sopravvivere a eventi quali il cambiamento climatico, le crisi economiche e politiche, le sempre più frequenti evoluzioni tecnologiche (Chroust e Aumayr, 2017). In particolare, la digitalizzazione associata alla recente situazione di crisi globale ha acuito l'instabilità dei mercati già precedente all'insorgere della pandemia da Covid-19.

Le imprese, quindi, sono chiamate ad adeguare i propri modelli di business per fronteggiare eventi di rottura e disruptive, in modo tale da sopravvivere o addirittura cogliere l'occasione per svilupparsi in un contesto di volatilità e incertezza. Tale necessità ha condotto ad una crescente attenzione verso i concetti di resilienza (Ponomarov e Holcomb, 2009; Lengnick-Hall *et al.*, 2011; Lorenz, 2013) e antifragilità (Taleb, 2012; Jaaron e Backhouse, 2014)

Nell'ultimo decennio, gli studi ecologici, sociali, manageriali e organizzativi si sono focalizzati sullo studio della resilienza quale capacità di un sistema di sviluppare reazioni adattive ad eventi di stress o a cambiamenti (Bhamra *et al.*, 2011). Più di recente, le ricerche si stanno focalizzando sull'evoluzione della resilienza nel costrutto dell'antifragilità, quale capacità di adattamento funzionale ed evolutivo, dunque non semplicemente adattativo, al cambiamento, basata su una propensione proattiva che tende non soltanto a combattere le trasformazioni ambientali ma a ricercarle volontariamente per trasformare la crisi in opportunità e intravedere nuove possibilità laddove i competitor vedono un ostacolo (Ramezani e Camarinha-Matos, 2020).

In particolare, l'evoluzione tecnologica è attualmente tra i fenomeni sociali, economici e culturali di tipo disruptive verso i quali le aziende hanno il dovere di mettersi al passo per non incrinare il proprio vantaggio competitivo. La digitalizzazione dei mercati richiede l'identificazione di nuovi tipi di competenze e capacità, nonché il riadattamento delle preesistenti, per ridefinire i modelli di business e favorire lo sviluppo dell'innovazione.

Alcuni lavori ridefiniscono le *dynamic capabilities* come la giusta miscela di risorse tangibili, umane e organizzative, di competenze tecniche e manageriali (Teece 2014; Gupta e George 2016) utili ad estrarre informazioni e valore dalle tecnologie digitali, innalzando l'efficacia decisionale e orientando all'innovazione (Tallon 2008; Chae *et al.* 2014). Al tempo stesso, i più recenti contributi sull'antifragilità definiscono tale concetto quale insieme di *dynamic capabilities* che può accrescere il potenziale creativo e la capacità immaginativa di un'impresa (Chroust e Aumayr, 2017).

Dunque, l'attivazione dinamica delle capacità e delle competenze delle risorse umane di un'organizzazione può assurgere al ruolo di leva chiave per l'attuazione di una condotta antifragile (Ramezani e Camarinha-Matos, 2020). Il capitale umano, inteso come insieme di conoscenze e competenze, assume quindi un ruolo critico nell'adozione di comportamenti antifragile, nell'identificazione di opportunità di business (Parente *et al.*, 2018) e nello sfruttamento delle opportunità di innovazione (Kim e Dong, 2019). Il presente studio, pertanto, mira ad esplorare le determinanti dell'antifragilità analizzando in particolar modo: 1) le *dynamic capabilities* che contribuiscono a definire l'adozione di una condotta antifragile; 2) le opportunità di innovazione generate dall'attivazione dinamica delle suddette capacità.

Per rispondere agli obiettivi di ricerca si propone un'analisi del contenuto come inchiesta (Rositi, 1988; Losito, 1996) sull'azienda di consulenza digitale "YourDigital", I risultati dell'analisi consentono di elaborare un framework con le principali componenti dell'antifragilità, avanzando i primi passi verso la definizione delle sotto-dimensioni del costrutto, non ancora indagate in letteratura (Chroust *et al.*, 2016) e proponendo spunti manageriali in merito al potenziamento di determinate capacità atte a stimolare le condotte antifragile e il perseguimento dell'innovazione.

2. Background teorico

Ai fini della concettualizzazione delle componenti dell'antifragility, è opportuno fornire una panoramica dei precedenti studi sul tema che definiscono tale concetto (paragrafo 2.1) per poi esplorare il ruolo delle dynamic capabilities nell'adozione di comportamenti antifragile, la cui attivazione può dar vita a diverse forme di opportunità di innovazione (paragrafo 2.2)

2.1 Antifragility

Le crisi internazionali verificatesi negli ultimi decenni, dalla crisi delle dot-com alla crisi finanziaria del 2008 alla pandemia da Covid-19 del 2020, mostrano l'importanza per le organizzazioni di accogliere comportamenti sostenibili e resilienti per sopravvivere a fattori di stress esterni inaspettati.

I recenti accadimenti globali hanno accelerato e sistematizzato la diffusione di nuovi scenari organizzativi riconducibili al contesto VUCA (Volatility, Uncertainty, Complexity, Ambiguity). (Taleb, 2012, p. 436; Gorgeon, 2015, p. 3). In questo contesto, negli studi sulla gestione dei rischi e degli eventi disruptive, resilienza (Camarinha-Matos, 2014) e antifragility (Derbyshire e Wright, 2014) sono diventate parole chiave frequentemente utilizzate (Zitzmann, 2014) per descrivere la capacità delle aziende di sopravvivere e prosperare in ambienti imprevedibili (Russo e Ciancarini, 2017).

A cavallo tra biologia, scienze sociali e management, la resilienza è definita come la capacità dei sistemi naturali di rispondere in maniera creativa ai cambiamenti ambientali e sopravvivere in un mondo volatile, incerto, complesso e ambiguo (Chawla e Lenka, 2018). Grazie al superamento degli stati di squilibrio, le aziende resilienti scoprono nuove opportunità e co-creano nuovo valore, rispondendo alla crisi (Polese *et al.*, 2017). Le organizzazioni antifragile, invece, piuttosto che adattarsi allo stato di squilibrio lo utilizzano come possibilità di miglioramento, non solo creando soluzioni originali a nuovi problemi ma prevenendo i cambiamenti ambientali e fornendo risposte proattive a problemi non ancora sorti (Taleb, 2012; Taleb and Douady, 2013, p. 1). L'antifragility consente di prevedere ed orientare le tendenze nel comportamento dei clienti e del mercato e di intercettare i nascenti bisogni tecnologici.

Negli ultimi decenni, l'instabilità strutturale dei mercati sta promovendo e valorizzando la necessità di sviluppare competenze legate alla capacità dinamica di muoversi con agilità in ambienti caratterizzati da elevata velocità evolutiva e a bassa prevedibilità e controllabilità. Diventa quindi indispensabile comprendere appieno le diverse componenti dell'antifragility in modo tale da poterla rendere misurabile e comprendere come e potenziarla, indirizzando i manager verso la gestione delle sfide future (Camarinha-Matos, 2020).

Secondo Taleb (2012), l'idea alla base dell'antifragility è quella di afferrare opportunità di miglioramento a partire da fenomeni imprevisi (Taleb, 2012; Russo e Ciancarini, 2017; Hespanhol, 2017), cercando di trarre da questi più vantaggi che svantaggi. Mentre un sistema resiliente resiste agli stati di squilibrio rimanendo inalterato e semplicemente riprendendosi dall'impasse, un sistema antifragile beneficia degli shock, cogliendo in esso input per una trasformazione (Lichtman *et al.*, 2016; Hespanhol, 2017). I sistemi antifragile, dunque, non solo sopravvivono agli shock, ma li impiegano attivamente per diventare più forti. L'antifragility è quindi una proprietà dei sistemi che si adattano alla volatilità e apprendono da esperienze, errori e incidenti attraverso un processo di learning by doing che consente di comprendere come prosperare con l'evoluzione delle condizioni (Jones, 2014). Ciò implica andare oltre il tradizionale obiettivo della resilienza, puntare al miglioramento e alla capacità di rigenerarsi, trasformarsi e apprendere dall'esperienza, ottimizzando le performance di fronte alle avversità ed estraendo il valore intrinseco degli errori imparando da essi.

L'antifragility fa leva sulle risorse aziendali e le integra modo inedito per creare soluzioni a nuovi problemi (ad esempio, combinando in modo creativo la tecnologia esistente e il capitale umano) o attivare le risorse di rete (ad esempio, collaborazioni strategiche di open innovation,

rotazione flessibile del personale) allo scopo di rendere l'organizzazione più flessibile e adattare i propri modelli di business a mercati dinamici (Ramezani e Camarinha-Matos, 2020).

Il ruolo dell'imprenditore, della sua creatività come tratto della personalità e delle sue esperienze pregresse, è altrettanto rilevante per sviluppare un atteggiamento proattivo e per organizzare e gestire le risorse umane garantendo coesione e flessibilità organizzativa ed operativa (Edwards-Schachter *et al.*, 2015).

Inoltre, un fattore abilitante per l'aumento della capacità immaginativa e creativa alla base delle condotte antifragile è la capacità di ricerca e innovazione, dunque non soltanto gli investimenti in ricerca e sviluppo, ma altresì l'uso efficiente delle tecnologie e la ristrutturazione interna, nonché l'acquisizione esterna delle risorse (Chikumbo *et al.*, 2015)

Nonostante la recente diffusione di studi sull'antifragility, non vi è ancora un quadro univoco delle componenti e delle determinanti delle condotte antifragile (Chroust *et al.*, 2016). Tuttavia, a partire dall'analisi dei principali contributi proposti in letteratura (Corvello *et al.*, 2021), è possibile configurare come fattori chiave che predispongono allo sviluppo dell'antifragilità le dimensioni descritte in precedenza: 1) l'orientamento imprenditoriale; 2) la gestione delle risorse umane (capitale umano); 3) l'uso efficiente delle tecnologie (capitale tecnologico).

2.2 *Dynamic capabilities e opportunità di innovazione*

Se dunque l'antifragility può essere considerata come una combinazione di capacità che abilita il superamento e il miglioramento continuo a seguito di eventi *disruptive*, è necessario indagare il ruolo delle dynamic capabilities nello sviluppo dei comportamenti antifragile.

Le *dynamic capabilities* (Eisenhardt e Martin, 2000; Teece e Pisano, 2003) sono il risultato operativo dell'integrazione e della riconfigurazione delle risorse per affrontare la trasformazione del mercato. Nella ricerca esistente, tali capacità sono considerate fattori abilitanti di crescita e innovazione (Teece, 2009) grazie al loro contributo attivo nello sfruttamento delle risorse competitive interne ed esterne nonché nello sviluppo di competenze uniche e specifiche per le turbolenze ambientali (Winter, 2003). Le dynamic capabilities possono essere generate dall'abilità di rinnovare le competenze e proporre risposte innovative e time-to-market ai cambiamenti tecnologici sempre più rapidi e imprevedibili nello scenario contemporaneo. Da un punto di vista strategico, queste possono essere viste come competenze da tradurre in dynamic capabilities a livello operativo grazie alla digitalizzazione dei processi aziendali e possono essere intese come risorse flessibili e proattive che consentono lo sfruttamento più efficace delle informazioni scambiate (Braganza *et al.* 2017). Data la rilevanza dell'attivazione delle dynamic capabilities quale fattore chiave per una migliore gestione delle informazioni e della conoscenza all'interno dell'impresa, tale concetto è recuperato nei più recenti studi sull'analisi dei dati aziendali al fine di riformulare la definizione "classica" di tali capacità in linea con le esigenze di un mondo smart (Gupta e George, 2016; Wamba *et al.*, 2017). Le capacità sviluppate grazie alla digitalizzazione dei processi aziendali sono intese come risorse flessibili e proattive che consentono lo sfruttamento più efficace dei dati e delle conoscenze derivanti dall'utilizzo degli analytics (Gupta e George, 2016; Braganza *et al.*, 2017). Queste competenze possono riguardare abilità tecniche (competenze tecnologiche) o capacità manageriali (orientamento strategico ai dati e proattività).

Pertanto, l'intervento umano e l'apporto creativo delle risorse umane, tra i principali driver delle condotte antifragili, possono favorire lo sviluppo di nuove capacità emergenti e dinamiche che, a loro volta, semplificando i flussi informativi, migliorando la gestione dei dati e favorendo l'arricchimento ed il rinnovamento delle conoscenze all'interno dell'impresa, possono incoraggiare l'emersione di opportunità di business e di spunti di miglioramento e innovazione (Teece *et al.*, 2009; Schoemaker *et al.*, 2018).

L'impatto delle abilità e delle risorse umane e dell'empowerment delle persone nella rigenerazione delle competenze aziendali (Kim e Dong, 2019) è sottolineato all'interno della letteratura sull'imprenditorialità, che identifica una relazione di influenza tra il capitale umano, come insieme di conoscenze e competenze, e l'identificazione di opportunità di business innovative

(Gupta e Singhal, 1993; Marvel e Lumpkin, 2007; Parente *et al.*, 2018). Altri studi sottolineano l'influenza del rinnovamento delle dynamic capabilities sulla diminuzione dell'ambiguità nel processo decisionale (Colombo e Grilli 2005; Martin *et al.* 2013) e, dunque, sulla riduzione dell'incertezza ambientale.

Si può quindi ipotizzare che un'efficace gestione delle risorse umane e dei processi di scambio di valore e conoscenza (a livello strategico) possano consentire la creazione di capacità emergenti (a livello operativo), che possono essere ridefinite come dynamic capabilities (Teece *et al.* 1997).

L'emersione di percorsi risolutivi innovativi abilitata dalle dynamic capabilities può spingere le imprese a sviluppare atteggiamenti proattivi per sopravvivere nei contesti competitivi complessi (Barile *et al.*, 2013). Dunque, le capacità dinamiche, mediante gli scambi di risorse potenziati dalle nuove tecnologie, "attivate" efficacemente dalle risorse umane, possono ridefinire la conoscenza delle aziende, consentendo di scoprire nuovi modi per rilasciare valore o intercettare bisogni latenti sul mercato (Preikschas *et al.*, 2017). In tal modo, è possibile instaurare una potenziale relazione tra le dynamic capabilities e l'emersione di opportunità di innovazione per la creazione di atteggiamenti antifragili, basati proprio sull'abilità di predire esigenze ancora sconosciute sul mercato ma che potrebbero sorgere in futuro.

Grazie al bilanciamento di risorse, tecnologie, capitale umano e skills è possibile favorire l'adozione di un orientamento imprenditoriale votato alla costante ricerca di innovazione. In alcuni lavori (Teece 2014; Gupta e George 2016), le dynamic capabilities sono considerate il risultato ottenuto mediante la co-creazione e la collaborazione tra i membri di un'organizzazione attraverso una miscela unica di risorse fisiche, umane e organizzative. La letteratura suggerisce che le capacità delle aziende digitalizzate possono quindi essere sviluppate attraverso l'esperienza delle risorse umane, la conoscenza, le capacità di problem solving, l'attitudine alla leadership e alle relazioni (Tallon 2008). Dunque, le dynamic capabilities possono essere costruite dalla combinazione di competenze tecniche e manageriali (Chae *et al.* 2014). Le prime si riferiscono al know-how necessario per utilizzare le nuove tecnologie e per estrarre valore dalla raccolta di dati e informazioni (Gupta e George 2016), mentre le competenze manageriali riguardano le connessioni interpersonali tra i membri dell'organizzazione o dei diversi dipartimenti aziendali (Bharadwaj 2000) e le regole che guidano il processo decisionale quotidiano.

In linea con la riconosciuta influenza delle dynamic capabilities sulla creazione di opportunità di innovazione per lo sviluppo dell'antifragility, il presente studio si propone di rispondere alla seguente domanda di ricerca:

DR1: Quali tipi di dynamic capabilities dovrebbero essere attivate per favorire l'antifragility?

Insieme all'esigenza di analizzare i tipi di competenze e capacità (tecniche, metodologiche, manageriali, ecc.) da svilupparsi per dare vita ad una condotta antifragile, vi è la necessità altresì di indagare come e quali opportunità di innovazione possano essere generate grazie all'adozione di business model flessibili e proattivi.

Il concetto di antifragility è strettamente legato al ruolo rilevante delle dynamic capabilities e delle risorse umane (dai leader-imprenditori al management, ai decisori, ai dipendenti, ai futuri dipendenti, ai cittadini, ecc.) come fattori chiave per l'innovazione (Lengnick-Hall *et al.*, 2011; Jaaron e Backhouse, 2014).

Pertanto, l'influenza del comportamento anti-fragile sullo sviluppo dell'innovazione sembra essere "mediata" dalla creazione di nuove *dynamic capabilities*. Diverse combinazioni di dynamic capabilities possono produrre diversi tipi di innovazione: in linea con le definizioni tradizionali, l'innovazione all'interno di un'organizzazione può essere tradotta in miglioramenti significativi o in nuovi prodotti, servizi, processi, metodi organizzativi e pratiche (Snyder *et al.*, 2016). Nel tempo, l'attenzione è stata spostata dall'innovazione tecnologica e di prodotto e, quindi, da outcome materiali, all'adozione di un orientamento sistemico legato alla proposizione di nuove pratiche e benefici sociali (Mc Elroy, 2003; Scott, 2007).

Negli studi sull'imprenditorialità, sia Covin e Slevin (1991) che Lumpkin e Dess (1996) definiscono l'innovazione in termini di sviluppo e introduzione di nuovi prodotti e servizi, mentre Robinson *et al.* (1991) la considerano in termini di riformulazione delle attività aziendali mediante nuove modalità organizzative o strategiche e di gestione. L'innovazione spesso implica la creazione o la distruzione creativa (Schumpeter, 1942) ed è risaputo che innovazione e imprenditorialità vanno di pari passo (Drucker, 1985). Gundrya, Ofsteinb e Kickulc (2014) studiano il legame tra una condotta imprenditoriale creativa ed emersione di competenze innovative. I processi imprenditoriali sono in sé dei processi creativi che richiedono continui aggiustamenti di attori, risorse, tecnologie, interazioni (Garud e Giuliani, 2013).

Tradizionalmente, il ruolo degli imprenditori è associato a tre compiti principali: l'avvio di nuove imprese, la capacità di assumersi dei rischi e lo sfruttamento di nuove opportunità in ambienti complessi (Covin e Slevin, 1991; Zahra e Neubam, 1998). Nel corso del tempo, la definizione della postura strategica degli imprenditori è stata adattata alle diverse esigenze emerse dai mercati e dalla società, enfatizzando nelle diverse concettualizzazioni la stretta relazione tra imprenditorialità e sviluppo dell'innovazione. Il concetto di imprenditorialità è stato ridefinito alla luce dell'avvento delle nuove tecnologie (Carayannis e Formica, 2008; Garud e Tuertscher, 2008), sottolineando il ruolo chiave della digitalizzazione nel rimodellare le attività imprenditoriali e nella riduzione dell'incertezza e della complessità.

Attori diversi con orientamenti e capacità diversi possono interpretare e sviluppare nuove opportunità imprenditoriali in modo diverso (Davidson e Vaast 2010). La natura varia delle capacità e abilità umane (tecniche, manageriali, relazionali, ecc.) e delle opportunità imprenditoriali può produrre diversi tipi di innovazione, come confermato dall'allargamento subito nel corso del tempo della nozione di innovazione (da tecnologica-di prodotto a sistemica, Vargo *et al.*, 2015). Pertanto, c'è la necessità di esplorare le diverse opportunità che possono essere create da quelle aziende che sfruttano al meglio le proprie risorse ed il proprio capitale umano per ricombinare dinamicamente le proprie capacità, generando quindi una condotta antifragile.

L'esplorazione delle principali dimensioni dell'antifragility permette così di identificare il ruolo attivo delle dynamic capabilities nella corretta gestione delle risorse organizzative e del capitale umano per sfruttare nuove opportunità di business e creare, quindi, innovazione. Pertanto, questo studio si concentra sullo sviluppo dell'innovazione come risultato di opportunità di business. Prima che il cambiamento tecnologico e di mercato portino le aziende a sviluppare nuovi processi, prodotti, mercati o pratiche organizzative, è opportuno scoprire le diverse opportunità da sfruttare per trasformare la crisi in una possibilità di miglioramento (Shane, 2000). Poiché le opportunità non appaiono in una forma predeterminata (Venkataraman *et al.*, 2012), il processo di identificazione delle opportunità di innovazione necessita di ulteriori indagini. Ne consegue che la seconda domanda di ricerca qui formulata è:

DR2: Quali opportunità di innovazione possono essere sviluppate attraverso l'antifragility?

3. Metodologia

Allo scopo di rispondere ai due quesiti di ricerca su formulati, lo studio analizza il caso di studio di "YourDigital", un'azienda che offre servizi di consulenza alle imprese che vogliono operare trasformazioni digitali all'interno del proprio business model. Si tratta dunque di una realtà aziendale il cui core business è lo scambio di risorse per la combinazione di conoscenza e la contaminazione di idee ed esperienze (DR1) e il cui servizio di base dell'offerta si fonda sulle competenze nella continua ricerca di opportunità di innovazione (DR2) che possono aiutare le imprese-clienti a superare e gestire momenti di crisi o forti turbolenze ambientali ed evoluzioni tecnologiche e di mercato generando, di fatto, elementi che rientrano nel concetto di antifragility.

3.1 La raccolta dei dati e il disegno della ricerca

Più che un'azienda, YourDigital si configura come un progetto aperto in costante movimento, basato sulla costruzione continua di una rete che coinvolge esperti, consulenti, ricercatori, personalità del mondo dell'innovazione. Data la rispondenza del caso selezionato rispetto agli obiettivi di ricerca, si adotta la metodologia dello studio di caso (Yin 1994), che consente un'indagine approfondita delle dinamiche alla base di un contesto complesso (Eisenhardt 1989; Tellis, 1997).

Tale metodologia di tipo qualitativo è particolarmente adatta per le fasi esplorative di una ricerca in cui i fenomeni indagati si riferiscono a costrutti multidimensionali che non sono ben operazionalizzati in letteratura (attraverso variabili quantitative o scale di misurazione), né definiti semanticamente in tutto le loro sfumature di significato (come rilevato da Ramezani e Camarinha-Matos, 2020).

YourDigital viene indagata pertanto come un complesso ecosistema in cui orientamenti imprenditoriali, tecnologie, risorse e conoscenze sono dinamicamente combinati e ricombinati per sviluppare un atteggiamento anti-fragile e ricercare opportunità di innovazione.

La tecnica utilizzata per l'analisi e l'interpretazione dei risultati è l'analisi del contenuto come inchiesta (o del terzo tipo, Losito, 1996), che permette di estrarre categorie di contenuto dai testi (unità di analisi) e consente il rilevamento dei punti focali dei contenuti analizzati (Krippendorff 2004) attraverso l'adozione di criteri semantici stabiliti dal ricercatore. L'analisi si basa su domande applicate ai testi (tabella 1) a partire da una rielaborazione delle principali determinanti dell'antifragility rintracciate in letteratura.

Per rispondere alle domande della ricerca, il lavoro identifica, a partire dalla overview teorica descritta in precedenza, i seguenti fattori chiave dell'antifragilità (Corvello *et al.*, 2021): 1) orientamento imprenditoriale; 2) gestione delle risorse umane; 3) uso della tecnologia) e concettualizza le dynamic capabilities e l'innovazione. Per ciascun fattore dell'antifragilità e per le variabili oggetto della DR1 e della DR2 (dynamic capabilities e innovazione) la scheda di analisi (riportata nella tabella sottostante) prevede una serie di domande "sommistrate" idealmente ai testi analizzati. Lo scopo è valutare l'influenza delle condotte antifragili (basate su un orientamento imprenditoriale proattivo e creativo, guidato dai dati e umano in cui le risorse umane e l'uso della tecnologia siano combinati sinergicamente a supporto della ricerca e sviluppo e del miglioramento continuo) sullo sviluppo di capacità dinamiche che abilitano la capacità di cogliere le opportunità di innovazione.

Tab. 1: La scheda di analisi del contenuto

ORIENTAMENTO IMPRENDITORIALE	Quali sono gli obiettivi strategici e la mission dell'azienda?
	Quali sono i valori su cui si impernia l'orientamento aziendale?
	Quali sono gli elementi chiave della cultura aziendale?
GESTIONE DELLE RISORSE UMANE	Qual è il peso attribuito alle risorse umane nell'orientamento strategico?
	Nella pianificazione degli obiettivi vi è l'identificazione di azioni mirate per la formazione continua dei dipendenti e/o per l'accrescimento della loro soddisfazione e/o motivazione?
	In che modo i membri dell'azienda (a ciascun livello) sono coinvolti nelle decisioni aziendali? E in quali fasi del processo decisionale?
USO DELLA TECNOLOGIA	Quali sono gli strumenti tecnologici, i tools e/o gli analytics deputati alla raccolta e analisi dei dati?
	In che modo questi sono impiegati rispetto ai principali obiettivi strategici dell'azienda?
CAPACITÀ DINAMICHE	Quali sono le skills determinanti nella proposta di soluzioni innovative?
	Qual è il ruolo rivestito dalle competenze tecniche nello sviluppo dei processi innovativi?
	Quali sono le competenze che concorrono maggiormente alla creazione del vantaggio competitivo?
RICERCA E INNOVAZIONE	Qual è il ruolo dell'innovazione per la sopravvivenza dell'azienda?
	In che modo l'azienda cerca opportunità di innovazione e cerca di prevedere le esigenze del mercato?
	Qual è il contributo del costante aggiornamento delle competenze all'interno dei processi di innovazione?
	In che modo la partecipazione e lo scambio di competenze con e tra i membri dell'azienda possono supportare lo sviluppo di opportunità di business e l'emersione di innovazione?

Fonte: ns. elaborazioni

Le principali fonti di dati secondari impiegate sono state: il sito ufficiale di YourDigital, i siti web e le pagine social dedicate ai singoli progetti smart (“HackForce”, “YourDigitalLab”, “Aurora”, ecc.), la documentazione disponibile sui diversi siti web, i canali di social media dell’azienda (Facebook, Twitter, Instagram, Youtube). L’iter di ricerca è durato complessivamente 5 mesi (da Settembre 2020 a Febbraio 2021).

3.2 L’analisi dei dati

I testi sono stati sottoposti ad un processo complesso di interpretazione semantica. Le macro-variabili (determinanti dell’antifragility, dynamic capabilities e innovazione) oggetto dell’indagine riportate in Tabella 1 e derivate dall’analisi della letteratura sono state suddivise in parole chiave utili a facilitare la ricerca dei temi all’interno del testo, i quali sono poi ulteriormente specificati in alcune sotto-dimensioni, per ciascuna delle variabili, atte a coadiuvare l’interpretazione finale dei risultati (Tabella 2).

L’analisi dei dati è stata eseguita da tre ricercatori mediante il ricorso a processi interpretativi ermeneutici (Addeo e Montesperelli, 2007), basati su di operazioni logico-concettuali di substruzione (Dulock e Holzemer 1991), che seguono un approccio di sintesi che media tra deduzione (Da variabili generali a keyword specifiche) e induzione (da keywords a sotto-dimensioni ulteriormente specifiche).

Questo approccio consente di identificare (a partire dalle variabili di partenza) tre tipi di output concettuali (vd. Tabella 2): in primo luogo, alcune keywords sono estratte dal corpus di dati, a partire dalle quali vengono derivati poi concetti più astratti (sotto-dimensioni) che, infine, sono rielaborati per individuare alcuni macro-temi e nuove concettualizzazioni inseriti all’interno del framework finale (si veda la Figura 1). Ogni ricercatore ha codificato in modo indipendente i concetti nei passaggi su illustrati. Alla fine del processo sono stati dunque eseguiti controlli di coerenza per il confronto tra i diversi schemi di codifica adottati da ciascuno per identificare le discrepanze e ottenere uno schema di codifica finale univoco.

L’iter di ricerca ha previsto, dunque, tre fasi principali: 1) teorizzazione; 2) codifica; 3) concettualizzazione. Nella prima fase, si sono stabiliti gli obiettivi dello studio e, a partire da una panoramica preliminare sulle dimensioni chiave delle variabili in oggetto, si sono derivate le domande di ricerca, selezionando così la metodologia e le tecniche da impiegare per la ricerca empirica e la progettazione della traccia dell’intervista. Dopo il disegno della ricerca, nella seconda fase della ricerca (codifica), i dati empirici ottenuti tramite l’analisi dei testi sono stati trasformati in keywords che, grazie al passaggio dall’induzione alla deduzione, hanno consentito l’identificazione di una serie di “regolarità” nei dati raccolti, poi accorpate e sintetizzate in vista della categorizzazione delle sotto-dimensioni. Infine, tramite l’uso di tali sotto-dimensioni quali categorie guida per l’elaborazione delle concettualizzazioni finali, grazie al passaggio dall’induzione alla deduzione, si sono rilevati alcuni pattern nei testi analizzati, ottenendo pertanto i risultati chiave per rispondere alle due domande di ricerca. Ad esempio, le principali abilità manageriali impiegate da YourDigital sono classificate ed etichettate per ottenere una classificazione finale delle diverse categorie di dynamic capabilities risultanti da un approccio antifragile. Come risultato dell’ultima fase di ricerca (concettualizzazione), le sotto-dimensioni vengono interpretate individuando i temi chiave ed estraendone unità minime di significato per la creazione di nuovi concetti e categorie d’analisi per la definizione: 1) delle diverse dimensioni/ fattori abilitanti dell’antifragilità; 2) delle diverse capacità dinamiche abilitate da una condotta antifragile (DR1); 3) i diversi tipi di innovazione prodotti dalle imprese antifragili grazie all’attivazione delle dynamic capabilities (DR2). I risultati sono concettualizzati all’interno del framework riportato in Figura 1, che classifica i diversi concetti identificati per ciascuna delle due domande di ricerca.

Durante lo svolgimento dell’intero iter si è adottata una strategia *variables-oriented* (Miles e Huberman, 1994) basata sul continuo rimodellamento delle macro-aree ottenute dalla letteratura (orientamento all’apprendimento, architettura tecnologica, capacità di analisi dei dati, gestione dei processi ecc.) e sulla costante reinterpretazione delle diverse dimensioni emergenti in itinere dai dati

empirici e sul confronto dei risultati ottenuti durante l'analisi per identificare somiglianze e dissomiglianze tra i concetti.

I risultati consentono di elaborare un framework in cui si identificano le principali determinanti dell'antifragility e le competenze dinamiche chiave nonché le opportunità di innovazione sviluppate tramite condotte antifragile (Figura 1).

Tab. 2: Variabili, parole chiave e sotto-dimensioni di analisi

Variabili	Keywords	Sotto-dimensioni
Orientamento imprenditoriale (Covin e Wales, 2012)	Cultura Mind-set Proattività Flessibilità Cambiamento Immaginazione Innovazione	Data-driven Diffusione decisionale Bottom-up Responsabilità Empowerment Sperimentazione
Gestione delle risorse umane (Saa-perez e García-falcón, 2002)	Persone Talent Componente umana Abilità	Aggiornamento delle competenze Tutorship Mentorship
Uso della tecnologia (Sher e Lee, 2004)	Tecnologie digitali Smart technologies Dati Big data analytics Tecnologie dell'informazione e della comunicazione	Raccolta dati Condivisione informazioni Estrazione valore Efficacia decisionale
Capacità dinamiche (Winter, 2003; Eisenhardt e Martin, 2000; Teece e Pisano, 2003)	Abilità Skills Know-how Conoscenza Saper fare	Hard skills Competenze tecniche Competenze manageriali Soft skills Creatività
Ricerca e innovazione (Lawson e Samson, 2001)	Valore Miglioramento continuo Benessere Cambiamento sociale Trasformazione	Open innovation Ottimizzazione Business model innovation Innovazione sociale

Fonte: ns. elaborazioni

4. Risultati

I dati secondari reperiti a partire dalle fonti succitate sono analizzati tramite una riconnessione delle "risposte" ottenute dai testi (alle domande riportate in Tab. 1) alle dimensioni chiave dell'antifragility identificate in letteratura (si veda la Tab.2), che induttivamente (dalla dimensione specifica a quella generale) sono state rielaborate, modificate e arricchite attraverso il confronto tra i dati (osservazione specifica) e la teoria (concetti generalizzati). Per garantire l'affidabilità dell'analisi, ogni ricercatore ha codificato in modo indipendente i dati. Quindi, partendo dalla codifica multipla di ciascuna unità testuale operata dai diversi ricercatori, sono stati eseguiti controlli di coerenza per confrontare gli schemi di codifica di ciascuno e rilevare eventuali discrepanze per ottenere uno schema di codifica unico (Krippendorff, 2004). Pertanto, il processo di analisi è stato condotto mediante la riproduzione costante di un ciclo interpretativo basato sui continui rimandi tra analisi dei dati e la riconduzione di quanto osservato ai concetti teorici di base in cui i nuovi input acquisiti sono comparati con la "vecchia" conoscenza e le teorie esistenti per pervenire ad una nuova concettualizzazione dei costrutti indagati (il framework in Fig.1).

I risultati sono riportati nei paragrafi seguenti e suddivisi in base alle due domande di ricerca indagate. Per ogni domanda di ricerca, i seguenti sottoparagrafi riportano i risultati ottenuti e discutono alcune delle keywords derivate logicamente dall'analisi classificandole in sotto-dimensioni per poi descrivere i concetti finali ottenuti nell'ultima fase dell'iter di ricerca (si veda paragrafo 3.2).

4.1 *DR1: lo sviluppo di capacità dinamiche per l'antifragilità*

La mission di YourDigital evidenzia una cultura d'impresa che, da un lato, pone al centro le risorse umane e, dall'altro, tende a creare un processo decisionale diffuso basato sui dati, che risultano essere un asset strategico.

Il ruolo delle risorse umane è considerato fondamentale per supportare i pilastri strategici dell'impresa, che fonda i propri processi conoscitivi sulle persone, sulla gestione e lo sviluppo delle risorse umane e su processi continui di aggiornamento delle competenze (come riportato nella sezione del sito aziendale dedicata all'HR).

La gestione strategica delle risorse umane, e di conseguenza delle capacità da queste possedute, si sostanzia nell'organizzazione di attività che mirano a valorizzare, promuovere e trattenere i talenti presenti all'interno dell'azienda. Un esempio è rappresentato dal progetto "Hackforce", nato per supportare e collaborare con i clienti facendo crescere i talenti. L'iniziativa, come riportato nella descrizione presente sulle pagine social di YourDigital, mette in relazione i principali talenti interni all'azienda, dotati di alcune competenze che in un dato momento risultano particolarmente richieste con dipendenti o manager delle aziende-clienti attraverso un dialogo settimanale. Prima di fare una proposta al general management in occasione di importanti progetti, il dipendente dell'azienda cliente potrà dialogare con i mentori, dipendenti strategici e rilevanti messi a disposizione da YourDigital, che l'azienda non potrebbe permettersi di assumere in altro modo e che forniscono competenze rilevanti. YourDigital mette a disposizione di altre aziende giovani talenti dotati delle competenze che i clienti richiedono in un dato momento (ma non possono avere), organizzando un'ora di dialogo alla settimana tra i giovani talenti e i membri delle imprese ospitanti, attivando uno scambio di conoscenze reciproco. Pertanto, il tutoraggio è uno dei principali driver che può favorire lo sviluppo delle risorse umane e può consentire alle aziende di sviluppare proposte innovative su questioni tecniche e specialistiche e di far in modo, da un lato, che il cliente "assorba" competenze e know-how rilevanti e, dall'altro, che i giovani talenti accumulano esperienza attivando processi di *learning by doing*. Tale tutoraggio è quindi un'attività di tipo bidirezionale: gli esponenti delle aziende clienti condividono con i giovani le loro difficoltà nei processi di impresa, mentre i talenti forniscono loro energia, visione, immaginazione, per costruire relazioni che possano co-creare proposte innovative e valore sostenibile per entrambe le parti.

Pertanto, il tutoring e il mentoring sono due dei principali driver che incoraggiano lo sviluppo di capacità nelle risorse umane che, se a loro volta opportunamente attivate, consentono alle aziende di sviluppare proposte innovative su questioni tecniche e specialistiche, "assorbendo" competenze e know-how rilevanti e trasformandosi in capacità dinamiche.

L'attenzione verso il capitale umano per agevolare lo scambio di risorse e l'attivazione dinamica delle competenze si traducono inoltre nella creazione di una serie di attività di istruzione, formazione e open innovation volte ad accrescere le competenze di dipendenti, manager e utenti dei clienti.

Nella descrizione del ruolo delle competenze nella generazione di valore in una delle interviste al fondatore di YourDigital reperibili sul canale Youtube dell'azienda, le hard skills sono definite come meno strategiche di quelle soft, poiché si tende a dare per scontato che le nuove leve possiedano alcune competenze di base e tecniche. Se il reclutamento si basa sulle hard skills, l'empowerment, l'impegno e il commitment di lungo termine coi dipendenti si basano sulle soft skills, il vero fattore competitivo che fa la differenza tra i vari membri dell'impresa. Le hard skills su cui punta l'azienda, come descritto dal manager delle risorse umane in un'intervista, si basano sulle competenze tecniche per l'analisi dei big data attraverso l'utilizzo di analisi statistiche (software, programmazione, database, sistemi cloud) e si riferiscono alla capacità di estrarre risultati significativi dai dati raccolti. La capacità di analizzare viene poi associata a una determinata sensibilità metodologica: secondo il fondatore di YourDigital l'analisi dei dati può essere fonte di molti bias ed è per questo che i dati raccolti da fonti eterogenee devono essere coordinati ed integrati, poi interpretati in linea con gli obiettivi strategici per identificare soluzioni per lo sviluppo di servizi, prodotti e processi.

Per verificare l'efficacia del processo, i manager di YourDigital cercano di armonizzare e coordinare i processi decisionali a ciascun livello organizzativo per consentire ai diversi dipendenti e manager nelle varie unità aziendali di internalizzare le strategie e di allineare i significati e il valore estratto dai dati agli obiettivi di business. Dunque, come sottolineato dal Managing partner dell'azienda in un'intervista reperibile online¹ le capacità manageriali e decisionali sono indispensabili per progettare e implementare un insieme coerente di strumenti tecnologici in linea con gli obiettivi strategici.

Date per scontate le hard skills, la componente umana è percepita come valore aggiunto. Il pensiero critico, l'interpretazione e la capacità ermeneutica di trovare soluzioni innovative sono quindi soft skills strategiche che possono fare la differenza e fornire ad un'azienda un know-how inimitabile. Inoltre, stando a quanto dichiarato dal fondatore dell'azienda, la capacità di trasformare i dati in informazioni da tradurre in conoscenza e valore per sviluppare il miglioramento continuo, il co-learning e i percorsi circolari di innovazione richiedono creatività e capacità di pensare fuori dagli schemi. Il pensiero creativo è una soft skill che può riprodurre le differenze tra diverse interpretazioni degli stessi dati dovute a differenze individuali, sistemi di valori, credenze, background, contesto ed esperienza. Questi tipi di abilità sono legati alla conoscenza tacita e sono difficili da imitare. Come dichiara il fondatore in un'intervista, “se si formano le persone a vivere, si può sfidare la crisi, permettendo all'intera organizzazione di sopravvivere nell'ambiguità e nell'incertezza del contesto. Se le persone non riescono a vivere in questo ambiente altamente turbolento, possono cadere e se le persone cadono, cadono anche i progetti”, Dunque, le capacità delle risorse umane, se dinamicamente attivate, possono favorire condotte antifragili e proattive.

Inoltre, come dichiarato dal Knowledge Manager in una delle interviste su Youtube, “la costruzione di un team multi-skills è essenziale per semplificare il processo e migliorare la comunicazione (sulle prestazioni, sui comportamenti degli utenti) in tempo reale tra il management e i dipendenti, per consentire la discussione e permettere di trasformare le informazioni rilevanti in decisioni; anche coloro che possiedono grandi competenze tecniche devono essere in grado di prendere decisioni tempestivamente e di poter spiegare e condividere in maniera efficace le motivazioni delle loro azioni”, Le capacità di interazione e di stabilire relazioni, cooperare e condividere informazioni e conoscenze con stakeholder interni ed esterni sono leve fondamentali per dialogare con i clienti attraverso la profonda comprensione delle loro esigenze, e la negoziazione attiva dei significati e la risoluzione dei conflitti per migliorare l'efficacia della comunicazione.

4.2 DR2: la creazione di opportunità di innovazione

Pertanto, come rilevato nell'analisi dei dati relativi alla prima domanda di ricerca, la promozione delle risorse umane incoraggia lo sviluppo di capacità analitiche, critiche, manageriali, creative e relazionali che, combinate con il costante scambio della conoscenza-coadiuvato altresì da un uso sapiente di un set interconnesso di tecnologie- possono contrastare l'alea manageriale e favorire l'emergere di opportunità di innovazione.

La combinazione dinamica delle capacità dà vita allo sviluppo di un atteggiamento proattivo votato all'innovazione co-sviluppata tramite la crescita delle persone, “il costante dialogo interno e il continuo aggiornamento del personale, in un clima di brainstorming in cui le persone possono sperimentare e proporre ipotesi che possono essere valutate nello sprint successivo, lavorando in Agile” (intervista al managing partner su Youtube). L'attivazione dinamica delle competenze, che favorisce la generazione di conoscenza condivisa e, quindi, di nuovo valore e innovazione, avviene attraverso attività orizzontali. Come testimoniato dalle parole del fondatore di YourDigital “ipotesi significa effettuare test, esperimenti, incoraggiare la capacità di sperimentare e implica la promozione della capacità di squadra bottom-up quale leva chiave per l'innovazione”, L'atteggiamento innovativo e propositivo dei dipendenti che formulano proposte dal basso viene

¹ <https://www.radioit.it/jacopo-mele-trasformazione-digitale-progetto-aurora/>

“premiato” per favorire l’iniziativa degli altri membri organizzativi. Responsabilità, empowerment, imprenditorialità e sperimentazione sono alcuni fattori abilitanti della co-diffusione dell’innovazione bottom-up.

L’orientamento basato sulle risorse umane e sullo scambio costante di informazioni e conoscenze sono considerati elementi complementari che dovrebbero essere equilibrati e possono produrre innovazione solo se integrati sinergicamente. Non sono caratteristiche opposte, anche se spesso la “mania” di analizzare dati può mettere in secondo piano la componente umana. Come riportato dalle parole del fondatore, in realtà “l’intervento dell’uomo prevale ancora sui dati, che da soli non hanno senso”,

Pertanto, viene confermato l’assunto che la creazione dell’innovazione debba derivare necessariamente dal giusto mix tra tecnologia e fattore umano. Se il compito dei dati è quello di potenziare le decisioni più rapide, “il compito degli uomini è quello di prendere le giuste decisioni, di compiere le scelte migliori partendo dai dati”, come affermato dal knowledge manager dell’impresa che sottolinea ulteriormente la natura circolare e bidirezionale del rapporto tra tecnologia e fattore umano.

Leva chiave per il processo di sviluppo dell’innovazione è il coinvolgimento di dipendenti, manager, clienti, utenti, talenti e potenziali collaboratori per la proposta congiunta di idee innovative.

L’innovazione creata da YourDigital è intesa principalmente come ottimizzazione e offerta di servizi innovativi. Stando a quanto riportato sul sito ufficiale, l’azienda adotta il Mc Kinsey Horizon Model composto da tre dimensioni: nel breve periodo persegue l’ottimizzazione; nel medio periodo investimenti in R&S, nel lungo periodo innovazione.

Inoltre, l’innovazione di processo “interna” e il miglioramento continuo sono realizzati grazie a strumenti specializzati per la gestione dei progetti, che vengono aggiornati sulla base degli insight raccolti dai dati. Come rivelato da uno dei project advisor in un’intervista, YourDigital ha innovato l’interfaccia di uno dei suoi strumenti interni per la gestione dei progetti: “tramite dei test, abbiamo notato che le persone lavorano meglio se hanno informazioni in prima linea per governare meglio i progetti, per rilevare se qualcosa peggiora durante il processo e per aiutare gli altri”, YourDigital “vende” le proprie conoscenze: “prima i clienti chiedevano servizi di personalizzazione e competenze tecnico/ analitiche per l’utilizzo del software [...] Oggi vogliono acquistare valore aggiunto”, Quindi, l’azienda non offre semplice consulenza digitale basata su supporto tecnico, ma “vende” ai propri clienti le competenze e le capacità per utilizzare gli strumenti.

Grazie alla condivisione di queste capacità si generano alcune tipologie di innovazione che vanno oltre la proposizione di nuovi servizi per offrire nuovi modelli di business. Il knowledge manager descrive l’innovazione realizzata grazie alla proposta di business model flessibili: “abbiamo permesso al direttore generale di una delle nostre aziende-clienti di investire su un nuovo modello di business, con nuove tecnologie, con nuovi target di clientela”,

La prospettiva sistemica sull’innovazione, che non può più basarsi solo su caratteristiche tecniche e tecnologiche, focalizza l’attenzione su caratteristiche strategiche, caratteristiche umane e approccio data-driven. Come enfatizzato dal fondatore in un’intervista “per noi l’innovazione non è solo tecnologica: a parità di tecnologie, a volte le aziende hanno bisogno di cambiare proposta. Per fare questo, le aziende dovrebbero possedere un adeguato posizionamento, governance, tecnologie, buona conoscenza dei clienti, strumenti di marketing, capacità di ascoltare le esigenze del mercato”,

L’azienda ha lanciato un progetto di Open Innovation: “YourDigital Lab”, un servizio di consulenza digitale che fornisce alle aziende “un vero e proprio laboratorio interno di innovazione, un luogo di analisi in cui soluzioni disruptive possono emergere grazie al rischio e all’investimento in sfide per gestire fasi di crisi”, Anche in questo caso, la capacità di raccogliere, analizzare e interpretare i dati può generare esiti innovativi. Tramite l’iniziativa, l’impresa inaugura una vera e propria maratona di analisi di business, proprio come in un hackathon: per due o più giorni una vera task force di professionisti siede attorno a un tavolo insieme al team interno delle aziende per ascoltare, analizzare e progettare la soluzione per lo sviluppo dell’innovazione.

Inoltre, YourDigital organizza hackathon e contest per studenti in cui un guru tecnologico sottopone ai partecipanti un dilemma etico-tecnologico. Le proposte vengono valutate da due giurie (giovani under 25 e over 25); i vincitori sono messi in relazione con 25 leader per “tutoraggi bidirezionali” (ogni talento incontra almeno 4 volte l’anno un leader di un’azienda di un settore lontano dal suo campo di conoscenza). Lo scopo di questo progetto di innovazione aperta è quello di “costruire ponti tra le generazioni e sostenere l’istruzione per i giovani dai 18 ai 23 anni”,

In questo modo, non solo si condivide conoscenza scientifica per sviluppare nuove hard skills per i futuri dipendenti, ma si formano persone sensibili ed emotive in grado di immaginare e creare, mettendo in contatto persone che non si sarebbero mai incontrate altrimenti.

L’innovazione educativa (e l’integrazione della conoscenza) è strettamente connessa allo sviluppo dell’innovazione sociale, intesa come creazione di benessere nell’intero ecosistema degli attori chiave in relazione con l’azienda (manager, dipendenti, clienti ma anche cittadini e comunità nel suo complesso). Come dichiarato dal fondatore dell’impresa: “lavoriamo per le persone che domani svilupperanno soluzioni ad alto impatto sociale lavorando sulla struttura emotiva dei giovani: i leader di domani dovrebbero varcare nuovi confini sempre più rapidamente”, Grazie ai progetti di open innovation si instaura un tutoraggio bidirezionale in cui i leader condividono con i giovani le loro debolezze, mentre i talenti forniscono loro energia, visione, immaginazione, per costruire relazioni che possano co-creare valore per l’intero territorio.

Strettamente correlato all’innovazione educativa e sociale è l’investimento nell’imprenditorialità giovanile. In particolare, con il progetto “Aurora” grazie alla collaborazione con alcune fondazioni, vengono offerti annualmente a 60.000 giovani under 25 laboratori per sviluppare progetti di innovazione. La motivazione che porta a realizzare queste attività è quella di offrire sostegno ai giovani dai 18 ai 23 anni per coadiuvarli in un’età incerta. Più di 100 giovani vengono reclutati per fornire loro esperienze di coaching per arricchire non solo le loro hard skills, ma anche soft skills per promuovere l’atteggiamento imprenditoriale e sostenere i giovani che hanno difficoltà con l’adozione di un atteggiamento di rischio.

Ai futuri talenti si insegna a superare i propri limiti, a superare continuamente i confini prendendo decisioni lungimiranti e cogliendo opportunità. L’azienda mette in contatto studenti e potenziali dipendenti con una rete di attori composta da: 1) key manager di settori d’avanguardia, innovatori d’impresa provenienti da tutto il mondo (60%); 2) manager di aziende nel settore dell’intelligenza artificiale e di altri settori altamente tecnologici (20%); 3) professionisti nel campo della filosofia, del management e delle soft skills (20%). Tali esperti con competenze eterogenee incoraggiano i giovani ad oltrepassare il confine, ad allargare gli orizzonti grazie al dialogo con altre culture ed esperienze di vita imprenditoriale.

Dunque, tramite i progetti descritti, che collegano esperti e futuri talenti, si sviluppano processi di “innovazione culturale”, Oltre ai classici tirocini aziendali si organizzano attività di reverse mentorship (studenti e talenti che diventano mentori di dipendenti senior) per sviluppare un atteggiamento proattivo verso il cambiamento. Il reverse mentorship consente quindi l’evoluzione della cultura aziendale grazie al continuo scambio di conoscenze e alla condivisione di competenze ed esperienze eterogenee, derivanti da attori diversi.

Tab. 3: I principali risultati dell’analisi

Progetti	Soggetti coinvolti	Tipi di competenze attivate	Opportunità di innovazione
Hackforce (Tutoring Mentoring)	Risorse umane interne Risorse umane esterne	Creatività, Know-how Esperienza e saper fare	Innovazione di prodotto e servizio Miglioramento continuo
Your digital Lab	Task force di talenti strategici interni all’impresa Team interni e team esterni	Proattività Competenze manageriali Immaginazione e creatività	Business model innovation e open innovation
Aurora (Reverse Mentorship)	Fondazioni Centri di ricerca Studenti universitari	Visione immaginativa Propensione al rischio e al cambiamento	Innovazione educativa e culturale

Fonte: ns. elaborazioni

5. Discussioni

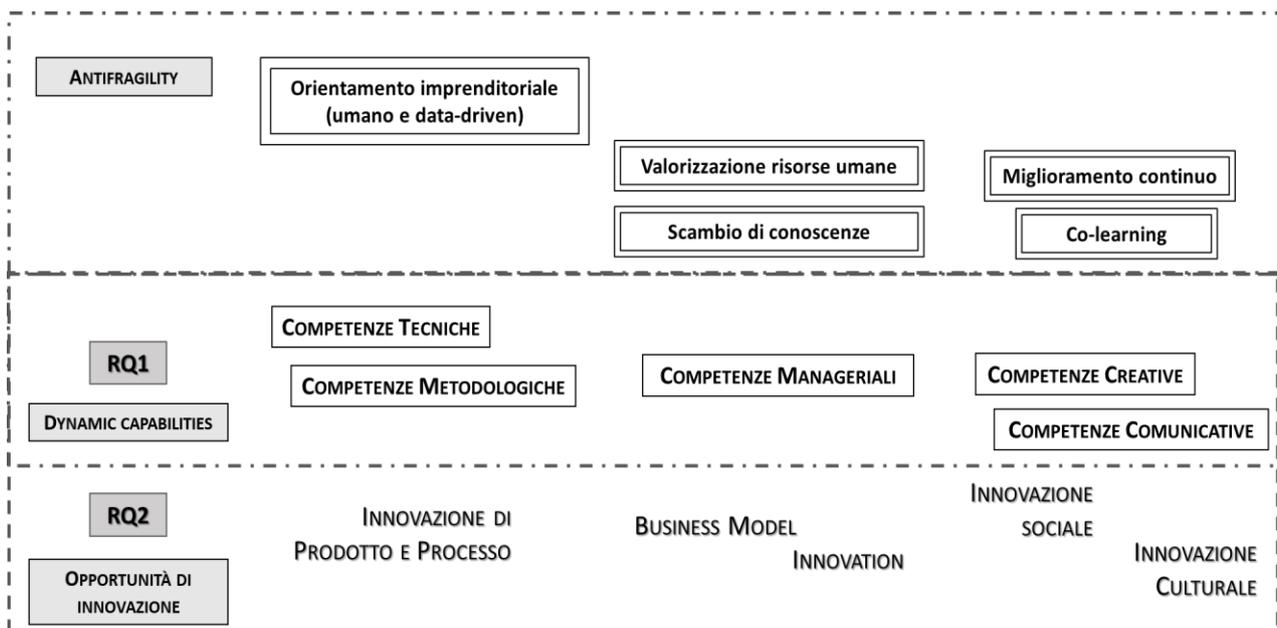
La categorizzazione delle diverse strategie, obiettivi, attività, risorse, tecnologie implementate da YourDigital e descritte nei risultati contribuisce a classificare le dimensioni principali di un approccio antifragile per lo sviluppo di opportunità imprenditoriali e di innovazione.

Si può poi notare che il potenziamento delle competenze delle persone può portare all'attivazione di dynamic capabilities fondate sulla valorizzazione delle capacità tecniche (hard skills) e capacità creative e interpretative (soft competenze) che possono trasformare le informazioni estratte dai dati in intuizioni per l'innovazione grazie all'intervento umano (DR1). Infine, grazie alla sinergia tra hard e soft skills, che si integrano per creare e co-creare conoscenza, nuovo valore e innovazione possono essere co-sviluppati, si possono dare vita a differenti modalità e risultati di innovazione (DR2).

I risultati ottenuti confermano che la complementarità e la sintesi tra promozione delle risorse umane e scambio delle conoscenze e delle dynamic capabilities possono favorire l'emergere dell'innovazione. Quindi, a partire dall'adozione di un orientamento imprenditoriale proattivo antifragile, fondato sull'attivazione di strategie e pratiche data-driven e sulla combinazione tra fattore umano e tecnologico, si può incentivare il continuo arricchimento delle conoscenze all'interno dell'impresa, favorendo l'attivazione di dynamic capabilities complementari che orientano l'impresa verso lo sviluppo dell'innovazione. In particolare, le esperienze riportate dai membri aziendali di YourDigital all'interno dei testi analizzati confermano come la gestione dei dati, delle informazioni e delle conoscenze all'interno dell'impresa alla luce di un orientamento umano e data-driven possano, attraverso la mediazione della componente umana (competenze e conoscenze), favorire la creazione di know-how per lo sviluppo di potenziali elementi innovativi (prodotti, processi, business model, pratiche sociali e culturali).

Le diverse sotto-dimensioni della condotta antifragile implementata da YourDigital e i diversi tipi di dynamic capabilities e di opportunità di innovazione generate (discussi nel precedente paragrafo ed ottenuti dall'analisi dei testi) sono stati rielaborati per derivare dei nuovi concetti teorici per ciascuna delle variabili incluse nella ricerca, ottenendo così il framework illustrato in Figura 1.

Fig. 1: I risultati: un framework delle principali dimensioni dell'antifragilità e delle principali dynamic capabilities e opportunità di innovazione generate da una condotta antifragile



Fonte: ns. elaborazioni

L'analisi del contenuto condotta tramite la concettualizzazione delle dimensioni chiave dell'antifragility consente di classificare tre dimensioni principali: 1) strategia e orientamento (orientamento basato sui dati e la valorizzazione delle risorse umane); 2) scambio di conoscenze e gestione dei processi; 3) integrazione delle conoscenze per il miglioramento continuo e il co-apprendimento.

I risultati mostrano che un orientamento umano (*dimensione 1*) e la promozione delle risorse nelle strategie aziendali può aumentare la possibilità di raggiungere crescita e benessere. Pertanto, la promozione di un processo decisionale dal basso verso l'alto fondato sulla volontà di coinvolgere le persone nelle decisioni aziendali serve a fidelizzare le risorse umane e ad accrescere le loro conoscenze.

Grazie a una serie di touchpoint, strumenti IT e ICT dipendenti con competenze tecniche (analitiche) e metodologiche (critiche) specialistiche riescono a realizzare un approccio basato sui dati (*data-driven*) fondato sulla selezione di un set di analytics e strumenti in linea con gli obiettivi strategici.

L'uso efficace delle tecnologie digitali mediata dall'intervento umano può favorire lo scambio di conoscenze e la gestione dei processi, ovvero la capacità di accrescere il know-how, di gestire e migliorare lo scambio di dati, estraendo da nuova conoscenza (*dimensione 2*). Per trarre spunti e idee innovative dai dati raccolti, sono necessarie competenze umane legate alle capacità di problem solving e all'atteggiamento manageriale nei confronti del cambiamento.

Inoltre, la capacità di supervisionare e gestire lo scambio di informazioni, risorse e conoscenze può consentire di accrescere le competenze di tutti gli attori in gioco orientando non solo l'innovazione di prodotto ma anche l'innovazione di processi e modelli di business grazie alla sinergia nella gestione e interpretazione dei dati e alla combinazione di competenze tecniche e creative (hard e soft).

L'integrazione della conoscenza può favorire la creazione di nuove capacità manageriali (*hard skills*) e di un atteggiamento proattivo e creativo (*softs skills*), dunque, antifragile, che può portare al costante rinnovamento del valore e al miglioramento continuo (*dimensione 3*) che può favorire l'emergere di innovazione nel tempo. L'engagement delle risorse umane (dipendenti esistenti e potenziali, manager, utenti, studenti, community ecc.) viene incrementato attraverso tutorship, progetti di open innovation e Hackathon che possono contribuire a generare "co-innovazione" nel tempo.

Quindi, grazie alla concettualizzazione delle dimensioni dell'antifragility è possibile categorizzare le diverse abilità generate che, attivate, possono diventare dynamic capabilities (DR1). Queste dynamic capabilities possono essere intese come il risultato dell'integrazione e della riconfigurazione delle risorse basate sull'orientamento umano che può produrre valore aggiunto per affrontare la complessità del mercato e consentire la continua trasformazione dell'organizzazione. Dall'analisi dei documenti e delle interviste reperite online, è possibile effettuare una macro-classificazione delle competenze, che sono suddivise in: hard skills (tecnico-analitiche, metodologiche, manageriali) e soft skills (creative e comunicative-relazionali). Le hard skills si riferiscono alle capacità tecniche e analitiche di gestire, raccogliere ed estrarre informazioni e valore dall'analisi dei dati. Inoltre, sono necessarie competenze metodologiche per interpretare correttamente i dati attraverso una sensibilità metodologica che consente di interpretare i risultati dell'analisi dei dati in linea con gli obiettivi strategici al fine di individuare soluzioni innovative per il miglioramento del servizio-prodotto.

Dopo l'interpretazione dei dati, sono necessarie alcune capacità manageriali, come la capacità e la prontezza di prendere decisioni per favorire l'allineamento strategico degli obiettivi, di coordinare il processo decisionale e i modelli/processi di business per coinvolgere le persone a ogni livello organizzativo e per arricchire le capacità di problem solving e intraprendere decisioni più efficaci attraverso un processo decisionale distribuito.

Le capacità creative possono essere generate grazie alla diffusione di una cultura strategica basata sull'acquisizione di un atteggiamento di "start-up" fondato su proattività, miglioramento continuo e "tensione" costante all'innovazione. Queste possono essere indirizzate nella capacità di

trasformare i dati in informazioni e valore, quindi nuovo valore per lo sviluppo di potenziali innovazioni in un processo circolare di miglioramento costante.

Le capacità comunicative e relazionali riguardano la capacità di condividere e spiegare i risultati analitici raccolti dall'interpretazione dei dati per semplificare i processi aziendali e facilitare lo scambio di informazioni.

Lo sviluppo di capacità analitiche, metodologiche, manageriali, critiche, creative e di comunicazione (quindi, sviluppo umano e miglioramento delle capacità delle persone) può favorire l'emergere di diversi tipi di opportunità di innovazione (DR2). I risultati descritti nel paragrafo precedente confermano il ruolo delle *dynamic capabilities* come fattori abilitanti per l'antifragilità e, dunque, per l'innovazione. In questo modo si può rivelare l'importanza dello scambio di conoscenze e della mediazione della componente umana con quella digitale/tecnologica per favorire l'emergere di know-how e risorse competitive per lo sviluppo di competenze uniche e specifiche per sfidare la complessità ambientale.

Pertanto, i risultati rivelano che le attività e i progetti realizzati da YourDigital consentono all'azienda di co-creare costantemente innovazione (miglioramento continuo e innovazione sistematica) generando diversi tipi di risultati di innovazione che racchiudono dimensioni diverse (organizzativa, tecnologica, umana, culturale e sociale). Grazie ai vari progetti di open innovation e di tutorship, l'azienda sviluppa diversi tipi di innovazione: 1) innovazione di prodotto; 2) innovazione di processo; 3) innovazione dei business model; 4) innovazione sociale; 5) innovazione culturale.

L'innovazione di prodotto/ processo è intesa come ottimizzazione e mira a potenziare la gestione del progetto e ad armonizzare i processi aziendali grazie all'orientamento data-driven che può portare all'introduzione di nuovi prodotti/servizi e può semplificare i flussi informativi all'interno delle aziende e lungo tutta la catena di fornitura.

L'innovazione dei business model nasce dall'applicazione di abilità umane basate su una mentalità digitale che sviluppa un nuovo orientamento proattivo che riformula, a sua volta, le pratiche per l'identificazione degli obiettivi di business per generare nuove proposte di valore, strategie, competenze, scambio di conoscenze modalità e strategie di gestione relazionale.

Il co-sviluppo di soluzioni innovative è concettualizzato in questo studio come il raggiungimento della crescita e del benessere della comunità. L'innovazione sociale è strettamente connessa alla creazione di benessere per l'intero ecosistema delle persone (manager, dipendenti, clienti ma anche cittadini e comunità nel suo insieme). Pertanto, è correlato non solo allo sviluppo di risultati sociali ma anche alla generazione di molteplici benefici per i gruppi di stakeholder coinvolti grazie a processi di co-creazione e co-innovazione (Visvizi *et al.*, 2018a; Polese *et al.*, 2018). L'innovazione culturale nasce dall'armonizzazione dell'integrazione della conoscenza attraverso progetti di innovazione aperta e tutoring che migliorano l'innovazione scientifica. Quindi, può essere definita come la creazione di nuova conoscenza per il miglioramento della crescita delle persone e la creazione di opportunità di lavoro per lo sviluppo degli ecosistemi in un periodo di crisi sociale, politica ed economica (Visvizi *et al.*, 2018b).

Di conseguenza, un atteggiamento antifragile deve partire dalla ridefinizione dell'orientamento aziendale, della strategia, della pianificazione e gestione riformulando la cultura aziendale, i processi di integrazione della conoscenza e di generazione di valore e consentendo l'emergere di diversi tipi di competenze che diventano *dynamic capabilities* (DR1) che possono portare, a loro volta, a diversi risultati di innovazione (DR2) da rigenerare nel tempo.

I risultati dello studio possono essere sintetizzati nell'elaborazione di due proposizioni che propongono nuovi spunti per la potenziale risoluzione delle domande di ricerca:

P1- La promozione delle risorse umane incoraggia lo sviluppo di capacità analitiche, critiche, manageriali, creative e relazionali che, combinate con il costante scambio della conoscenza-coadiuvato altresì da un uso sapiente di un set interconnesso di tecnologie- possono favorire l'emergere di opportunità di innovazione.

P2- La combinazione dinamica delle capacità dà vita allo sviluppo di un atteggiamento proattivo votato all'innovazione co-sviluppata che si sostanzia in opportunità di innovazione di prodotto-processo, di business model, educativa, sociale e culturale.

6. Implicazioni teoriche e manageriali

Lo studio indaga i fattori chiave per lo sviluppo di comportamenti antifragili che favoriscono l'attivazione di dynamic capabilities che consentono, a loro volta, l'emersione di opportunità di innovazione.

Quindi, da un punto di vista teorico, l'analisi proposta può essere considerata come un primo step esplorativo per identificare le diverse componenti dell'antifragility. Partendo dai risultati raggiunti, future ricerche potranno esplorare i principali driver conoscitivi, relazionali e umani che abilitano l'adesione a condotte antifragile. Ulteriori studi possono essere condotti a partire dalle dimensioni di antifragility proposte in questo lavoro. Difatti, i risultati della ricerca empirica consentono la concettualizzazione dei principali fattori abilitanti delle strategie e pratiche antifragile che possono portare le organizzazioni proattive, guidate dai dati e umane a sviluppare innovazione. Evidenziando le strategie più appropriate per sfruttare le opportunità offerte dai processi aziendali abilitati dalla tecnologia e da una buona sinergia del fattore umano/conoscitivo e del fattore tecnologico, l'analisi consente così di elaborare un framework con le principali componenti dell'antifragility, avanzando i primi passi verso la definizione delle sotto-dimensioni del costrutto, non ancora indagate in letteratura (Chroust *et al.*, 2016) e proponendo spunti manageriali in merito al potenziamento di determinate capacità atte a stimolare le condotte antifragile e il perseguimento dell'innovazione (Corvello *et al.*, 2021).

In questo modo, lo studio non soltanto risponde alla *call for research* introdotta nella letteratura esistente per lo sviluppo di studi che identifichino ed esplorino le dimensioni abilitanti delle condotte antifragile, ma dimostra altresì che le aziende guidate da un orientamento antifragile (proattivo, creativo, umano, data-driven) possono dare vita all'attivazione di dynamic capabilities (DR1) sviluppando strategie, processi e modelli di business più flessibili che consentono di cogliere più rapidamente le opportunità di innovazione emergenti dallo scenario (DR2). Il framework proposto chiarisce la relazione tra l'adozione della condotta antifragile, l'arricchimento delle capacità di impresa e l'emersione di diversi tipi di innovazione, rivelando come diversi tipi di strategie di gestione dei dati e di abilità umane possono produrre diversi risultati innovativi. L'approccio metodologico adottato, mediando tra induzione ed abduzione dei processi interpretativi, consente un'approfondita concettualizzazione dell'antifragility e del suo legame con l'innovazione, in linea con una visione sistemica che superi l'eccessiva focalizzazione sulla dimensione tecnologica.

Inoltre, il framework proposto può contribuire ad indirizzare il management verso lo sviluppo di strategie ad hoc che potenzino determinati tipi di competenze funzionali allo sviluppo dell'innovazione nei diversi profili delle imprese. Il framework integrato proposto in Figura 1 può guidare i manager nell'elaborazione di strategie efficaci per integrare con saggezza l'uso delle tecnologie intelligenti e del fattore umano per aumentare l'efficacia della gestione di processo, promuovere l'innovazione e favorire il miglioramento continuo. Grazie all'associazione di diverse competenze con diverse modalità di innovazione, i manager possono comprendere come elaborare strategie mirate per valorizzare l'innovazione, rafforzare il coinvolgimento degli attori e aumentare l'efficacia nelle diverse fasi/ momenti dei processi aziendali.

I nuovi concetti introdotti nel framework possono far luce su: 1) come le strategie e le tecnologie di analisi dei dati, se efficacemente impiegate, possono produrre nuovo valore; 2) come i vari tipi di conoscenza scambiati nelle imprese antifragile possano favorire lo sviluppo di differenti risultati di innovazione a seconda dei diversi tipi di stakeholder coinvolti. Dunque, lo studio chiarisce i meccanismi che potenzialmente guidano la relazione tra una condotta proattiva e antifragile basata sull'uso efficiente e data-driven delle TIC, la gestione delle risorse umane, la

valorizzazione e l'arricchimento delle competenze e delle capacità e lo sviluppo dell'innovazione. Di conseguenza, i manager possono trarre spunti dai risultati della ricerca empirica sulla corretta combinazione delle strategie di gestione dei dati e di gestione delle risorse umane per incoraggiare la trasformazione dei dati in conoscenze e stimolare l'armonizzazione di processi di innovazione complessi. I risultati ottenuti fanno luce su come l'analisi dei dati mediata dall'intervento umano possa potenziare l'integrazione dinamica delle capacità dei membri organizzativi attraverso un processo costante di adattamento e riconfigurazione delle conoscenze pregresse, identificando i principali driver per il miglioramento continuo.

Pertanto, lo studio arricchisce sia i precedenti studi sul tema dell'imprenditorialità che quelli sul knowledge management, esplorando la relazione tra orientamento imprenditoriale, gestione delle risorse umane e della conoscenza ed emersione delle opportunità di innovazione. In questo modo, viene introdotta una concettualizzazione originale dell'innovazione in linea con una visione sistemica e le *dynamic capabilities* vengono riformulate come abilità "attivate" di una struttura specifica (Barile *et al.*, 2016) che possono favorire la co-creazione di conoscenza e l'innovazione.

Infine, il management può comprendere come i risultati innovativi introdotti possano essere costantemente rinnovati nel tempo per perseguire il miglioramento continuo. Viene così avanzata una nuova sistematizzazione concettuale dell'innovazione, intesa sia come processo sistemico (che ingloba dimensioni gestionali, organizzative, relazionali, culturali e sociali) che come processo sistematico basato sull'instaurazione di una tensione all'innovazione e alla trasformazione dei modelli e processi organizzativi.

7. Conclusioni

L'applicazione delle competenze ai processi di impresa non garantisce automaticamente l'emersione dell'innovazione, poiché lo scambio e l'integrazione delle conoscenze, nonché processi trasparenti di gestione dell'informazione sono necessari per l'attivazione dinamica delle capacità. Grazie all'esplorazione delle principali dimensioni che favoriscono l'attuazione di condotte antifragile e lo sviluppo dell'innovazione nelle organizzazioni, è possibile rilevare diversi tipi di capacità che possono generare diversi tipi di innovazione come ricerca continua di sinergia e come costruzione incrementale di conoscenza tra gli attori.

L'identificazione dello scambio di conoscenze e della combinazione tra fattore tecnologico e umano come fattori abilitanti dello sviluppo di una mentalità proattiva ed antifragile in linea con una recente tendenza in letteratura che considera l'innovazione tecnologica come mezzo e non più come fine dei processi innovativi, che necessitano di essere riletti in una più ampia visione sistemica (Visvizi *et al.*, 2018a; Visvizi e Lytras, 2018).

Il framework che classifica le dimensioni chiave dell'antifragility, i vari tipi di abilità e di innovazione generati da YourDigital è derivato induttivamente e deduttivamente dai risultati ottenuti attraverso un processo di substruzione. Viene quindi proposta quindi una relazione tra le *dynamic capabilities* basate su *hard* e *soft skills* e la potenziale generazione di diversi tipi di innovazione (di prodotto/ servizio, processo, business model, elementi culturali, educativi e sociali).

I principali limiti dello studio sono legami all'impossibilità di poter generalizzare i risultati ottenuti, derivante dalla natura intrinseca delle tecniche di analisi qualitative, che non si pongono l'obiettivo di ricercare nessi causali tra eventi ma semplicemente di proporre insight esplorativi legati all'osservazione in profondità di un dato contesto d'analisi.

Per questo motivo, le ricerche future possono partire dai risultati proposti nel presente studio e dal framework introdotto in Figura 1 per applicare la classificazione delle diverse *dynamic capabilities* e tipologie di innovazione a specifici settori industriali o sistemi/ecosistemi di servizi (sanitari, territoriali, cluster, ecc.), valutando la generalizzabilità delle dimensioni di antifragility tramite studi di caso multipli o la comparazione tra diversi contesti.

Inoltre, il framework può rappresentare un punto di partenza per l'elaborazione di una scala di misurazione del costrutto dell'antifragility o per la conduzione di ricerche basate su di un metodo

misto che integri metodologia qualitativa (osservazione, interviste, ecc.) e quantitativa (regressione multipla o modelli equazioni strutturali) per indagare gli antecedenti e i conseguenti dello sviluppo di un comportamento antifragile.

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Ambidestramento organizzativo, diversità e valori culturali: una review sistematica della letteratura

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Abstract

Obiettivi. Il presente lavoro intende esplorare gli effetti della diversità culturale, tanto in termini di workforce diversity che di cultura nazionale, sull'abilità di bilanciare le attività di exploration ed exploitation al fine di ottenere un orientamento ambidestro, andando a rispondere alla seguente domanda di ricerca: "Nella letteratura accademica, quali sono gli impatti che la cultura, in termini di diversità e cultura nazionale, produce sull'ambidestramento organizzativo? Quali meccanismi sono rinvenibili per promuovere/bilanciare questi impatti?".

Metodologia. Systematic literature review. Sono state individuate alcune parole chiave per descrivere il fenomeno ed è stata effettuata una ricerca su database specializzati. Successivamente, gli articoli sono stati progressivamente filtrati in base a criteri di congruità con la domanda di ricerca, originalità e innovatività.

Risultati. La cultura, in termini di workforce diversity e cultura nazionale, sotto particolari condizioni, può avere impatti sia positivi che negativi sull'abilità di bilanciare le fasi di exploitation ed exploration di un'organizzazione. Sono stati individuati alcuni gap di ricerca e delineate alcune possibili ricerche future.

Limiti della ricerca. La principale limitazione è che i database selezionati non coprono tutte le possibili fonti della letteratura manageriale. Inoltre, in base alle parole chiave selezionate potrebbero essere stati esclusi altri paper rilevanti.

Implicazioni pratiche. Il lavoro offre alcuni spunti su come gestire la diversità, in termini demografici, culturali e di esperienze, per ottenere un orientamento ambidestro nei processi innovativi. Inoltre, sono state prese in esame le influenze delle culture nazionali sull'ambidestramento, con alcuni potenziali ripercussioni sui processi di internazionalizzazione.

Originalità del lavoro. Le influenze culturali e interculturali sull'ambidestramento sono un tema poco esplorato negli studi organizzativi. Questo lavoro offre una sistematizzazione dei contributi esistenti e propone alcuni possibili sviluppi futuri.

Parole chiave: ambidestramento; exploitation; exploration; culture; diversity; innovazione

Objectives. This work aims to explore the impacts of cultural diversity, both in terms of workforce diversity and national culture, on the ability to balance exploration and exploitation activities in order to obtain an ambidextrous orientation. The research question is: "In the academic literature, what are the impacts that culture has on organizational ambidexterity? What mechanisms exist to promote / balance that?".

Methodology. Systematic literature review. It has been identified some keywords to describe the phenomenon in order to seek out relevant papers on specialized databases. Subsequently, the articles were progressively filtered on the basis of criteria of congruence with the research question, originality and innovation.

Findings. Diversity and national culture, under particular circumstances, can have both positive and negative impacts on the ability to balance the exploitation and exploration activities of an organization. Some research gaps were identified and make suggestion for future research.

Research limits. The main limitation is that the selected databases do not cover all possible sources of organizational and management literature. In addition, other relevant papers may have been excluded based on the keywords selected.

Practical implications. The work offers some insights on how to manage diversity, in demographic and cultural terms, in order to obtain an ambidextrous orientation in innovative processes. In addition, the influences of national cultures on ambidexterity were examined, highlighting some relevant impacts on internationalization processes.

Originality of the study. The cultural and intercultural influences on ambidexterity are a little explored topic in organizational studies. This work tries to identify existing contributions and to propose some possible future research.

Key words: ambidexterity; exploitation; exploration; diversity; culture; innovation

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1. Introduzione

L'ambidestrismo organizzativo è la capacità di bilanciare contemporaneamente due attività apparentemente in contrasto tra loro (O'Reilly et Tushman, 2004), da un lato la ricerca dell'efficienza e della stabilità per le attività correnti di business e dall'altro la sperimentazione e la ricerca continua di nuove soluzioni per quelle future. La tensione tra queste due esigenze apparentemente contrapposte si riassumono nelle nozioni di *exploitation* ed *exploration* (March, 1991): con il primo termine si enfatizza la capacità dell'organizzazione di sfruttare le risorse in suo possesso e comprende perciò l'efficienza, il controllo, la certezza, la riduzione della variabilità, associata ad una innovazione di tipo incrementale, mentre con *exploration*, l'innovazione è di tipo radicale e discontinua ed indica perciò quelle attività relative alla sperimentazione, alla ricerca, alla presa di rischio e all'autonomia. Un'organizzazione affinché possa eccellere e sopravvivere necessita di impegnarsi in entrambe le attività. Un tale orientamento richiede, tuttavia, differenti strutture, strategie, processi, competenze e culture, spesso in contrasto tra loro; in altri termini, l'ambidestrismo organizzativo è frutto di una complessa serie di fattori ed interazioni che coinvolgono molteplici aspetti all'interno e all'esterno di un'organizzazione (Raisch et Birkinshaw, 2008).

Il presente lavoro tramite una ricerca sistematica della letteratura intende esplorare gli effetti della diversità culturale, tanto in termini di *workforce diversity* che di cultura nazionale, sull'abilità di bilanciare le attività di *exploration* ed *exploitation*, andando a rispondere alla seguente domanda di ricerca: “Nella letteratura accademica, quali sono gli impatti che la cultura, in termini di diversità, produce sull'ambidestrismo organizzativo? Quali meccanismi sono rinvenibili per promuovere/bilanciare questi impatti?”.

Ai fini del presente lavoro, per diversità si intendono le differenze che partono dalle caratteristiche demografiche e che comprendono differenze di etnia/nazionalità, genere, cultura, lingua, religione, stile di vita (Kossek et Lobel, 1996), con un particolare focus sulle differenze di tipo culturale. Invece per cultura nazionale si intendono quei valori condivisi che si manifestano tra le persone che vivono all'interno di una nazione (Hofstede, 1980): è l'insieme di credenze e valori collettivi che contraddistingue le persone di una nazionalità da quelle di un'altra in maniera stabile e immutabile (Hofstede, 2001).

Per rispondere, si procederà ad una ricerca sistematica della letteratura esistente e si prenderanno in considerazione gli articoli più rilevanti.

2. Metodologia

La metodologia individuata per rispondere alla domanda di ricerca è quella della *Systematic Literature Review* (Tranfield et al., 2003; Denyer et Tranfield, 2008). In seguito alla formulazione della *research question*, sono state ricavate alcune keyword attraverso l'analisi di alcuni articoli rilevanti nell'ambito dell'ambidestrismo organizzativo (Raisch et Birkinshaw, 2008; O'Reilly et Tushman, 2013), il diversity management (Gilbert et al., 1999; Bassett-Jones, 2005) e sui valori culturali e nazionali (Schwartz, 1999; Hofstede, 2001).

La ricerca dello stock di conoscenza è stata effettuata alla data del 4 gennaio 2021 sulle banche dati *Scopus* e *Web of Science* (Wos) utilizzando le seguenti chiavi di ricerca combinate “*ambidex**” OR (“*exploitat**” AND “*explorat**”) AND (“*cultur* value**” OR “*cultur* belie**” OR “*diversit**” OR “*natio* cultur**” OR “*cross-cultur**”) nella sezione “*article title, abstract and keywords*” di *Scopus* e in “*topic*” di *Wos*. È stato applicato il filtro “*Business, Management and Accounting*” (*Scopus*) e “*Business*”, “*Management*” (*Wos*), inoltre nella ricerca sono stati inclusi solo paper pubblicati su journal scientifici e sono quindi stati esclusi conference papers, libri e/o capitoli, monografie, in considerazione di un minore impatto sulla produzione di conoscenza (Thunnissen et Gallardo-Gallardo, 2019); infine sono stati inclusi nella ricerca solo articoli in lingua inglese e pubblicati fino

al 2020. La ricerca ha restituito rispettivamente 131 articoli su Scopus e 150 su Wos, dopo aver combinato i risultati ed eliminato gli articoli ripetuti, sono stati individuati 179 articoli.

È stata effettuata una prima analisi degli abstract e delle keyword per determinare la congruenza di ciascun articolo con gli obiettivi di ricerca: in seguito a questo primo processo, sono stati selezionati 59 paper; in questa fase sono stati esclusi quegli articoli che sono risultati come *falsi positivi* (ovvero frutto di un *match* parziale delle keyword utilizzate) o che non trattavano in maniera combinata il tema della diversità e/o dei valori culturali con il concetto di ambidestrisimo e/o con attività/innovazioni di tipo *explorative/exploitative*.

Successivamente, ciascuno dei 59 articoli è stato analizzato nella sua interezza, con il criterio della rispondenza e la coerenza con la domanda di ricerca: dopo questo passaggio, gli articoli che hanno superato quest'ultimo filtro sono stati 24; durante questa fase sono stati identificati i principali temi e raggruppati in base ad essi oltre ad essere state estratte informazioni di sintesi quali journal, anno di pubblicazione, metodologia, concetti chiave, ecc.; nel procedere nella selezione, si è seguito un principio di inclusione, articoli dubbi sono stati ugualmente inclusi nel dataset finale. Ogni articolo escluso è stato ugualmente registrato e conservato.

Il periodo di pubblicazione è compreso in un arco di 11 anni, tra il 2009 e il 2020, e sono stati pubblicati su 20 journal differenti. In considerazione della ristrettezza del campione, il lasso temporale relativamente breve, la frammentazione degli articoli, si è deciso di non impiegare analisi bibliometriche, dal momento che sarebbe stato un lavoro complementare e non essenziale all'elaborazione della valutazione dei contributi.

Di questi, 18 hanno utilizzato una metodologia quantitativa, 3 una di tipo qualitativa mentre 3 sono di tipo concettuale. 9 hanno preso in esame il fenomeno dell'ambidestrisimo a livello operativo e più in generale a livello di teams, 9 invece si sono focalizzati maggiormente sugli aspetti strategici e a livello di board e top management team mentre 6 hanno un focus sul contesto culturale nazionale. La maggior parte ha adottato una prospettiva relativa alle teorie dell'Organizational learning, Information-processing view, Social capital e Upper-Echelon. Per una lista dettagliata degli articoli vedere la Tabella 1.

Tab. 1: Lista e sintesi degli articoli esaminati. In ordine alfabetico per autore

Autore	Journal	Teoria	Tipologia/Metod.	Concetti chiave	Livello
Almor <i>et al.</i> , 2020	Long Range Planning	Upper echelon theory	Misto	La diversità di genere nei consigli di amministrazione ha un impatto positivo sugli investimenti di lungo periodo in R&D. È sufficiente una lieve diversità perché vi sia un'influenza positiva.	Strategico
Andriopoulos et Lewis (2010)	Long Range Planning	Organizational learning	Qualitativo	Tensione tra diversità e coesione in un team/gruppo. La diversità allarga competenze ed esperienze, facilita lo scambio di conoscenza. La coesione sviluppa <i>trust</i> , obiettivi e aspettative comuni. Eccesso di diversità o coesione può essere dannoso.	Operativo
Ardito <i>et al.</i> , 2019	Technological Forecasting and Social Change	-	Quantitativo	Pratiche HRM di tipo finanziario moderano la relazione tra diversità del portfolio di alleanze in chiave internazionale e l'ambidestrisimo innovativo.	Operativo
Ben Rejeb et al 2019	European Journal of Innovation Management	Resource dependence Theory and Cognitive theories	Misto	La diversità di genere modera positivamente la relazione tra funzioni e prerogative consiglio di amministrazione e orientamento ambidestro nei processi innovativi.	Strategico
Černe <i>et al.</i> , 2013	Journal of International Management	Cross-National and Cross-Cultural differences theories	Quantitativo	L'individualismo favorisce le attività di <i>exploration</i> , il collettivismo l' <i>exploitation</i> . Tuttavia, il collettivismo crea il contesto ideale per le innovazioni manageriali che a loro volta favoriscono quelle tecnologiche.	National/Cultural context
De Villiers Scheepers <i>et al.</i> , 2017	South African Journal of Business Management	-	Quantitativo	L'appartenenza al gruppo culturale <i>Ubuntu</i> (moderato collettivismo) aumenta la probabilità di comportamenti ambidestri individuali/cognitivi al fine di valorizzare le iniziative imprenditoriali.	National/Cultural context
Fang 2010	Organization Science	Organizational learning	Concettuale	La creazione di piccole unità organizzative sufficientemente eterogenee in condizioni di <i>semi isolamento</i> , in un'ottica di <i>loose-tight</i>	Operativo

				<i>ties</i> , favorisce l'orientamento ambidestro dell'organizzazione.	
García-Granero et al., 2017	Long Range Planning	-	Quantitativo	La diversità non funzionale (es. Età) all'interno del Top Management Team favorisce le attività di exploration. Il supporto/trust del CEO e un sistema di responsabilità condivise sono meccanismi di integrazione del TMT e modera/bilancia l'orientamento ambidestro.	Strategico
Guerrero 2020	Economics of Innovation and New Technology	Entrepreneurship theories	Quantitativo	La <i>workforce diversity</i> modera positivamente la relazione tra le attività di <i>exploration/ambidexterity</i> e il corporate venturing.	Operativo
Hayden 2012	International Studies of Management and Organization	Organizational learning, knowledge recombination theories	Quantitativo	<i>Trade-off</i> tra TMT diversity ed <i>exploitation/exploration</i> . Maggiore diversità impatta positivamente <i>exploration</i> in termini di innovazioni radicali, minore diversità invece <i>exploitaion</i> in termini di innovazioni incrementali.	Strategico
Li 2012	Journal of Organizational Change Management	Information-processing perspective, social capital theories	Quantitativo	Promuovere la formazione di social capital nel TMT può essere un meccanismo di integrazione tale da favorire e bilanciare le attività di <i>exploitation/exploration</i> e TMT diversity.	Strategico
Li 2014	Innovation: Management, Policy and Practice	Information-processing perspective, social capital theories	Quantitativo	La diversità del TMT ha un effetto positivo sull' <i>enviromental scanning</i> e su una maggiore apertura verso la pianificazione strategica che a loro volta hanno un effetto positivo sull'ambidestrisimo. Tale eterogeneità produce conflitto interpersonale: meccanismi di social integration, la promozione di una visione comune e un sistema adeguato di incentivi aiuta a tenere basso/ritardare l'insorgere di questi conflitti.	Strategico
Li et al., 2018	Management Decision	Organizational learning, Differentiation-integration view	Quantitativo	Esiste una relazione curvilinea tra diversità e abilità ambidestra di un team. Questa relazione è mediata dal costruito <i>team reflexivity</i> , la capacità di riflettere e comunicare tra i membri del team obiettivi, strategie ecc. e adattarli alle circostanze correnti e future; la relazione è inoltre moderata dal costruito <i>shared meta-knowledge</i> , la <i>consapevolezza collettiva</i> di sapere chi conosce (o sa fare) cosa all'interno del team.	Operativo
Li et Cui 2018	Management and Organization Review	Upper-echelon perspective	Quantitativo	Le <i>faultline demografiche</i> sono in grado di creare dei sottogruppi relativamente coesi all'interno del TMT e di essere <i>resistenti</i> alla cultura data dal contesto nazionale e di favorire in questo modo un orientamento ambidestro	Strategico
Lim et António 2020	International Journal of Business Innovation and Research	-	Quantitativo, Meta-Analysis	La cultura nazionale influenza l'orientamento ambidestro di un'organizzazione. <i>Future/Performance orientation</i> impattano negativamente sul bilanciamento tra <i>exploration/exploitation</i> mentre <i>In-Group collectivism</i> lo favorisce nella misura in cui consente di creare sottounità fortemente coese e motivate dedite esclusivamente ad una tipologia di attività	National/Cultural context
McCardle et al., 2019	Operations Management Research	-	Quantitativo	I contesti culturali caratterizzati da una bassa <i>power distance</i> ed alto individualismo influenzano positivamente le <i>explorative performance</i> mentre quelli caratterizzati da un alto <i>power distance</i> e basso individualismo influenzano quelle <i>exploitative</i> .	National/Cultural context
Medcof et Wang 2017	International Journal of Technology Management	Cross-National differences theories	Concettuale	Framework concettuale che inquadra le attività di <i>exploitation</i> ed <i>exploration</i> nelle dimensioni culturali di Hofstede (1980),	National/Cultural context
Mueller et al., 2013	Journal of Management	Cross-National and Cross-Cultural differences theories	Quantitativo, Meta-Analysis	Collettivismo e Power distance favoriscono le performance delle attività <i>explorative</i> ; le stesse dimensioni non impattano su quelle <i>exploitative</i> .	National/Cultural context
Park et Kim 2015	Asia Pacific Journal of Management	Organizational learning	Quantitativo	L'invecchiamento della workforce ha una relazione diretta e positiva sulle performance <i>exploitative</i> e ad U invertita sulle performance di <i>exploration</i> . La diversità in termini di età modera positivamente entrambe le relazioni.	Operativo
Röd 2019	Journal of Family Business Management	Upper echelon theory	Quantitativo	Nelle aziende a conduzione familiare, la diversità in termini di coinvolgimento di persone <i>esterne</i> ha effetti positivi	Strategico

				sull'orientamento ambidestro; questo è moderato dall'ampiezza delle collaborazioni in chiave di Open Innovation, quest'ultimo è influenzato positivamente anche dalla diversità generazionale intra-familiare.	
Solheim et Herstad 2018	International Journal of Innovation and Technology Management	Cognitive resource diversity perspective, organizational learning	Quantitativo	La diversità in termini di esperienze non correlate alle attività/mansioni lavorative influenza positivamente comportamenti innovativi e favorisce un orientamento ambidestro	Operativo
Umans 2013	Corporate Ownership and Control	Organizational learning, Upper echelon theory	Quantitativo	La diversità culturale del TMT impatta negativamente l'orientamento ambidestro dell'organizzazione in termini di decisioni strategiche.	Strategico
Wang et Rafiq 2009	European Journal of Innovation Management	Organizational learning	Concettuale	La diversità e meccanismi che promuovono comportamenti <i>goal-oriented</i> sono necessari per promuovere un orientamento ambidestro.	Operativo
Wang et Rafiq 2014	British Journal of Management	Organizational learning	Quantitativo	L' <i>ambidextrous organizational culture</i> , formata da <i>organizational diversity</i> e <i>shared vision</i> è un meccanismo in grado di gestire la diversità; è un antecedente dell'ambidestrismo contestuale e quest'ultimo media la relazione tra diversità e performance.	Operativo

Fonte: A cura dell'autore

3. Risultati

3.1 Gli impatti culturali a livello operativo/individuale

Il *conflitto* tra un orientamento rivolto verso l'*exploitation* e l'*exploration* è possibile ravvisarlo a livello individuale, nella misura in cui viene richiesto di adottare comportamenti tesi all'*allineamento* e all'adattabilità per affrontare i *task* emergenti, durante le attività quotidiane ed operative (Gibson et Birkinshaw, 2004). La soluzione del conflitto è da rintracciarsi nei meccanismi di integrazione e *conciliazione* tra le attività conflittuali (Adler *et al.*, 1999), come la creazione di un *contesto* favorevole attraverso l'utilizzo di leve manageriali (Gibson et Birkinshaw, 2004) e, più in generale, con il tramite di pratiche organizzative e di gestione delle risorse umane.

Nella letteratura presa in esame ampia rilevanza viene data al concetto della cd. *workforce diversity*, ovvero l'eterogeneità della forza lavoro in termini di genere, età, etnia, valori culturali, esperienze, disabilità, educazione, skill ecc. (Cox, 1994; Ivancevich et Gilbert, 2000). Tale diversità da un lato apporta visioni, esperienze, conoscenze e idee differenti, alimentando la creatività e rinnovando la base di conoscenza di un'organizzazione, con potenziali effetti positivi sui processi innovativi (*exploration*); da un altro può produrre problemi di comunicazione, incomprensioni che possono sfociare in conflitto e minare la collaborazione e la coesione sociale in un gruppo, con evidenti problemi sulle *routine* e *performance* (*exploitation*). In questo senso, una maggiore/minore omogeneità del personale sembra essere collegata ad una tensione da controllare, *superare* come nell'ambidestrismo. Park et Kim (2015) ad esempio hanno dimostrato empiricamente come l'invecchiamento della forza lavoro possa avere effetti positivi sulle capacità di *exploitation* ma negativi sull'*exploration* dell'organizzazione e, allo stesso tempo, una maggiore differenziazione generazionale sia in grado di moderare questa relazione: è importante constatare che questa relazione sia ad U rovesciata e quindi richiede in ogni caso un bilanciamento perché si possano produrre gli effetti desiderati; Solheim et Herstad (2018) sostengono che la *varietà* delle risorse umane in termini di *work-life experiences* sia fortemente correlata con l'abilità di ottenere un orientamento ambidestro. Andriopoulos et Lewis (2010) stressano il concetto di paradosso tra diversità-coesione all'interno di un team: da un lato, la diversità aumenta l'ampiezza delle competenze e delle esperienze, facilitando lo scambio di idee e incoraggiando l'espressione individuale, con effetti positivi sulla motivazione e il *commitment* verso il gruppo stesso; la coesione, invece, consente di sviluppare comprensione reciproca e *trust*, che sono alla base della condivisione di scopi e aspettative comuni che aiutano il lavoro di gruppo e l'efficienza. Tuttavia,

troppa coesione o *troppa* diversità portano a conseguenze negative: la prima ostacola la varietà e l'efficienza dei processi decisionali fino ad arrivare a fenomeni di *groupthink*, l'eccessiva diversità, invece, limita il *trust* e promuove un'eccessiva individualità a danno degli obiettivi del gruppo stesso. In questo senso, gli autori arrivano alla conclusione che si tratta di un paradosso che va gestito ricorrendo a vari espedienti: come quello di formare i team facendo attenzione al numero di persone che hanno avuto esperienze in comune, promuovendo momenti di condivisione e conoscenza all'entrata di nuovi membri, utilizzando gli stessi spazi fisici e gli uffici in modo che possano incoraggiare interazione e scambio e, all'occorrenza, separazione, tra i vari team di prodotto, funzione e specializzazione. Un altro meccanismo di tipo *strutturale* (Fang, 2010), è quello che vede la soluzione di creare piccoli sotto-gruppi sufficientemente eterogenei in condizioni di *semi-isolamento*, in un'ottica di *loose-tight ties*: in questo modo la fase di *exploration* e la generazione di nuove idee sarebbero *protette*, trovando il tempo di essere raffinate e perfezionate e, allo stesso tempo, avere supporto, risorse e sviluppare sinergie con gli altri sotto-gruppi e più in generale con il resto dell'organizzazione.

Li *et al.*, (2018) hanno sviluppato e dimostrato un contributo teorico che vede la relazione tra *diversità* di un team e il suo orientamento ambidestro mediata dal *team reflexivity* e moderata dallo *shared meta-knowledge*. Con *team reflexivity* ci si riferisce al processo nel quale i membri del team riflettono e comunicano fra di loro gli obiettivi, le strategie e i processi e, in questa interazione, sono in grado di adattarli alle situazioni correnti e future; lo *shared meta-knowledge* si riferisce invece alla consapevolezza collettiva di sapere *chi conosce (o sa fare) cosa all'interno del team*. In altri termini, il *team reflexivity* e lo *shared meta-knowledge* sono due meccanismi di integrazione che consentono di fare leva sulla *diversità* del team per raggiungere un orientamento ambidestro attraverso la *discussione*, *interazione* e la messa a sistema della conoscenza presente all'interno del team.

Un altro meccanismo per bilanciare la *workforce diversity* è tramite l'elaborazione della cd. *ambidextrous organizational culture* (Wang et Rafiq, 2009; 2012): essa ricomprende i concetti di *diversità organizzativa* e *visione condivisa*. La prima è costituita da un insieme di valori che incoraggiano e premiano le differenze e di norme che riconoscono e ricompensano i diversi punti di vista, *skills* e conoscenze; la visione condivisa costituisce invece l'insieme di valori e regole che spingono tutti i membri dell'organizzazione nello sviluppo, comunicazione, disseminazione e implementazione degli obiettivi organizzativi: costituisce, in altri termini, un meccanismo di delimitazione per lo scambio e l'integrazione delle risorse, specialmente quando emergono più opportunità di innovazione e le risorse sono scarse, senza il quale l'organizzazione sarebbe spinta in direzioni diverse dai propri membri, perdendo così coerenza interna.

Wang et Rafiq (2012) hanno successivamente dimostrato che l'*ambidextrous organizational culture* ha un impatto positivo sull'ambidestrisimo contestuale (Gibson et Birkinshaw, 2004) e che quest'ultimo svolga la funzione di mediatore della relazione tra la cultura organizzativa ambidestra e lo sviluppo di nuovi prodotti.

Lo stesso lavoro, la cui parte empirica è basata su un campione di aziende cinesi e britanniche appartenenti a tre settori differenti, ha rilevato che non sussistono differenze imputabili all'appartenenza nazionale e che quindi l'ambidestrisimo contestuale non venga influenzato da differenze interculturali o di settore, ma che dipenda unicamente dall'eterogeneità di risorse e *capabilities* presenti a livello di *business unit*. Tuttavia, McCardle *et al.*, (2019) hanno mostrato un'influenza importante delle culture nazionali caratterizzata da un alto *individualism* e un più basso *power distance* sulle capacità di *exploration* nell'ambito dell'ambidestrisimo operativo, in linea col fatto che simili culture tendono ad essere più aperte verso le nuove idee e la sperimentazione e a premiare i comportamenti innovativi (Ashkanasy *et al.*, 2002; Hofstede, 2003),

Guerrero (2020) individua una relazione parziale tra lavoratori *non-nativi* ed immigrati e capacità *ambidestre* nelle fasi di *exploitation* ed *exploration* di opportunità imprenditoriali nell'ambito del *corporate venturing*; l'autore muove dalla considerazione che i lavoratori non-nativi sono spesso fonte di informazioni sui mercati delle proprie terre d'origini e allo stesso tempo possono attivare una rete di relazioni in patria con il risultato di ridurre potenzialmente le barriere

d'ingresso. Infine, vale la pena citare come la diversità nel portafoglio di alleanze in chiave internazionale sia un antecedente all'ambidestrismo innovativo (Ardito *et al.*, 2019), tuttavia questa relazione è ad U invertita: la diversità sebbene apporti benefici in termini di accesso a conoscenza diversificata, sviluppo di nuovi schemi mentali e tecniche di *problem solving*, comporta anche dei costi relativi alla riluttanza/rifiuto dei dipendenti di gestire l'innovazione efficacemente a causa di vincoli manageriali, culturali e cognitivi; tale relazione, però, è moderata da pratiche HRM impattanti sulla motivazione come gli incentivi finanziari.

3.2 Gli impatti culturali a livello di board e top management/strategico

A livello strategico, l'ambidestrismo si riferisce all'abilità di allocare risorse e definire gli obiettivi di breve e medio-lungo periodo tra le fasi di *exploration* ed *exploitation*: gli approcci basati sulla *leadership* sono considerati come uno dei mezzi per risolvere questa tensione (Heavey et Simsek, 2014; Raisch et Birkinshaw, 2008) e in questo senso al Top Management Team (TMT) viene richiesto di essere impegnato tanto nei processi di differenziazione che in quelli di integrazione (Smith et Tushman, 2005): il primo si realizza assegnando, per esempio, i singoli membri a specifici task, in base a caratteristiche funzionali, comportamentali ecc.; l'integrazione richiede la capacità di costruire modelli mentali e *cognitive frames* che consentano e facilitino lo scambio e la condivisione di informazioni e conoscenze. La diversità del Top Management Team (TMT) in termini di caratteristiche demografiche, culturali, esperienze e competenze può avere degli effetti positivi nella misura in cui tale eterogeneità allarga la portata delle informazioni raccolte e incoraggia la formulazione di molteplici soluzioni al fine di affrontare il dinamismo organizzativo e la complessità ambientale ma, allo stesso tempo, ciò può portare conflitto o comportamenti non cooperativi (Pitcher et Smith, 2001).

Hayden et al (2012) rileva come la diversità in termini di esperienza abbia un effetto misto: positivo sull'*exploration* ma negativo sull'*exploitation*; gli autori sostengono che sebbene la diversità allarghi l'accesso a informazioni e conoscenze favorendo un processo decisionale *explorative-oriented*, questa allo stesso tempo ne pregiudichi la *profondità* con il rischio di disperdere risorse limitate. Più drastico Umans (2013) che sostiene invece che la diversità culturale abbia effetti negativi sull'ottenimento di un orientamento ambidestro e che ciò, in ultima istanza, impatti sulle performance dell'impresa. Garcia-Granero *et al.*, (2017) hanno dimostrato come la diversità in termini di età influenzi le capacità di agire in maniera ambidestra del TMT: dal momento che l'età, influenzando comportamenti e stili di vita, fa percepire differente ciascun membro rispetto all'altro; ciò può portare alla formazione di sottogruppi e, quindi, in prospettiva condurre a conflitti e danneggiare la possibilità di stringere accordi, dialogare e interagire compromettendo le attività *exploitative* ed *explorative*. Ben Rejeb *et al.*, (2019) hanno rilevato un effetto positivo nella relazione tra diversità di genere e orientamento ambidestro dei consigli di amministrazione: la presenza femminile apporta diversità sociale, cognitiva e informativa, promuove uno stile più partecipativo che, in cambio, impatta positivamente sulle performance del board e nel processo decisionale che, in ultima analisi, favorisce l'ambidestrismo; anche Almor et. al. (2020), per ragioni simili, giungono alle medesime conclusioni sulla relazione tra diversità di genere e attività *explorative* nel campo del R&D, aggiungendo che è sufficiente anche una lieve diversità di genere per ottenere influenze significative.

Li (2013) sostiene che il *social capital* sia in grado di moderare la tensione tra *diversità* e ambidestrismo: esso è considerato una sorta di meccanismo di governance informale, che faciliterebbe la condivisione e lo scambio di informazioni tra i membri del TMT. Successivamente sempre Li (2014) dimostra empiricamente come la diversità del TMT se da un lato favorisce l'*environmental scanning* e un'apertura verso la pianificazione strategica (a vantaggio dell'ambidestrismo), da un altro produce conflitti funzionali, di processo e relazionali; la chiave è allora moderare, *tenere basso* il conflitto interpersonale e intra-gruppo, promuovendo un'integrazione sociale attraverso una visione condivisa ed utilizzando la leva degli incentivi materiali e non; a conclusioni simili arrivano anche Garcia-Granero *et al.*, (2017), i quali

aggiungono che la percezione della fiducia del Ceo nelle attività del TMT aiuta a moderare il conflitto e a ridurre gli atteggiamenti competitivi tra gli stessi membri.

Röd (2019), nell'ambito delle imprese a conduzione familiare, rileva che gli effetti della diversità del TMT - in termini di diversità generazionale e di non-appartenenza al nucleo familiare, sull'orientamento ambidestro - sono positivamente mediati dalla partecipazione ad alleanze innovative: una maggiore diversificazione nel TMT è quindi un elemento abilitante per ottenere un orientamento ambidestro e conseguire innovazione e cambiamento, facendo leva su attività e politiche di *Open Innovation*.

Il fenomeno del *TMT faultline setting* (Lau et Murnighan, 1998), il processo per il quale il TMT si suddivide in sottogruppi sulla base di attributi demografici, aiuta a fornire un'altra prospettiva tra diversità, cultura nazionale e ambidestrisimo; Li et Cui (2018) sostengono infatti che queste suddivisioni in sotto-gruppi consentano al TMT di deviare dalla cultura nazionale nella misura in cui i membri del TMT sperimentano all'interno del proprio sotto-gruppo una forte identificazione sociale e coesione. Nello specifico, gli autori dimostrano empiricamente che, nel contesto cinese, un TMT caratterizzato da una *faultline* demografica sia in grado di colmare il *power distance* e ridurre i vincoli sociali e psicologici alla libertà di espressione e di dibattito, rafforzando lo scambio di conoscenza e creando le condizioni per un ambiente ideale per l'interazione e il dibattito, a differenza di quanto sostenuto da Garcia-Granero *et al.*, (2017); gli autori dimostrano empiricamente che ciò modera positivamente la relazione tra la diversità funzionale del TMT e la sua capacità di agire in maniera ambidestra nelle operazioni di internazionalizzazione.

3.3 Gli impatti del contesto culturale nazionale

La cultura nazionale si manifesta nei valori condivisi tra le persone che vivono all'interno di una nazione (Hofstede, 1980): è l'insieme di credenze e valori collettivi che contraddistingue le persone di una nazionalità da quelle di un'altra in maniera stabile e immutabile (Hofstede, 2001). Le differenze culturali possono essere responsabili non solo delle variazioni transnazionali in *innovation performance* ma influenzano anche la relazione tra i diversi tipi di innovazione a livello organizzativo, in termini di input, processi e output (Rosenbusch *et al.*, 2011); da questo punto di vista appare interessante comprendere come le differenze nazionali possono contribuire a influenzare l'ambidestrisimo organizzativo, in modo da poter valutare il livello di adattamento tra la cultura nazionale, in cui l'organizzazione è radicata, e le pratiche e le strategie organizzative, al fine di promuovere un simile orientamento.

Mueller *et al.*, (2013) prendono in esame come la cultura nazionale, descritta in termini di *collettivismo*, *individualismo* e *uncertainty avoidance* influenzi la relazione tra le attività di *exploitation* ed *exploration* e le performance: le evidenze empiriche mostrano che le fasi di *exploration* sono influenzate positivamente da elevati livelli di *power distance*, collettivismo e bassa *uncertainty avoidance*, mentre l'*exploitation* pare non dipendere dalla cultura nazionale nella stessa misura. Se quest'ultima evidenza sembra essere in linea con l'idea che le attività legate all'*exploitation* siano maggiormente *task-oriented* piuttosto che *people-oriented*; lo stesso non si può dire per l'influenza del collettivismo sulle fasi di *exploration*, se si considera che tradizionalmente le società individualiste sono più favorevoli alle innovazioni radicali perché forniscono un contesto più tollerante ed offrono maggiori incentivi sociali agli individui (Taylor et Wilson, 2012), Tuttavia, Černe *et al.*, (2013) confermano almeno parzialmente queste evidenze: sebbene il collettivismo influenzi negativamente la fase di invenzione/scoperta (*exploration*) e positivamente quella di *exploitation*, la dimensione collettivista modera e rafforza positivamente la relazione tra innovazioni manageriali e innovazioni tecnologiche; in sostanza, gli autori sottolineano che un ambiente, caratterizzato dalla dimensione collettivista, enfatizzando la collaborazione e lo scambio di informazioni, è vantaggioso per le innovazioni manageriali e organizzative al fine di sostenere le scoperte tecnologiche.

Lim et António (2020) attraverso una meta-analisi che prende in considerazione la letteratura esistente, hanno analizzato gli effetti delle varie dimensioni della cultura nazionale nella relazione

tra ambidestrisimo e performance: tra queste, sono risultate significative l'impatto negativo del *future orientation* e del *performance orientation*; entrambe producono l'effetto di *sbilanciare* l'orientamento ambidestro a danno delle performance, un eccessivo orientamento verso il futuro genera un *bias* verso le attività di *exploration* e, allo stesso modo, per l'orientamento alle performance in riferimento alle attività di *exploitation*; ciò è in linea con quanto descritto da larga parte della letteratura esistente sull'ambidestrisimo organizzativo (O'Reilly et Tushman, 2013). Inoltre le evidenze empiriche sostengono anche l'effetto positivo che l'*in-group collectivism* ha sulla relazione tra ambidestrisimo e performance: l'*in-group collectivism* descrive il grado con cui una società stressa il concetto di coesione, lealtà e orgoglio all'interno di organizzazioni e famiglia (House et al., 2002); calato in una realtà organizzativa questo costrutto faciliterebbe la creazione di sotto-unità particolarmente coese (*tribe-like work groups*), con un effetto positivo sull'orientamento ambidestro nella misura in cui è possibile disporre di unità organizzative esclusivamente dedicate ad attività di *exploitation* ed *exploration*, rivelandosi in questo senso adatta a soluzioni organizzative di tipo strutturali e spaziali al fine di conseguire l'ambidestrisimo.

Medcof et Wang (2017) sulla scorta delle teorie di Birkinshaw et Gupta (2013), Hofstede (1980, 2005), Jones et Davis (2000) e Nakata et Sivakumar (1996) propongono un modello nel quale inquadrare l'innovazione *exploitative* ed *explorative* e la cultura nazionale (Tabella 2).

Il modello parte dall'assunto che qualunque entità sociale - una nazione, un'organizzazione, un'unità - possiede una cultura che in base allo *score* delle dimensioni di Hofstede può collocarsi lungo un *continuum*, i cui estremi sono le culture di tipo *exploratory* ed *exploitative*; l'entità che si colloca in uno dei due estremi sarà più efficace nel condurre quel tipo di innovazione e, conseguentemente, nel caso di un'impresa, dovrà individuare le strategie più opportune per alleviare/moderare questo tipo di *trade-off* anche, ma non necessariamente, in un'ottica ambidestra. Il modello in ogni caso va preso con le dovute cautele: esso non è stato testato e ha ricevuto peraltro solo parziale conferma dall'analisi della letteratura esistente.

Tab. 2: CEE Model - A cura di Medcof et Wang (2017)

Support for exploratory innovation (exploratory culture)	Support for exploitative innovation (exploitative culture)
Low power distance	High power distance
Individualism	Collectivism
Low masculinity	High masculinity
Low uncertainty avoidance	High uncertainty avoidance
Long-term orientation	Short-term orientation

Fonte: A cura di Medcof et Wang (2017)

Il contesto culturale è in grado di influenzare anche il cd. ambidestrisimo cognitivo o individuale (Bledow et al., 2009), questo si riferisce alle attività collegate all'efficienza, scelta, esecuzione (*exploitation*), sperimentazione, flessibilità e innovazione (*exploration*) (Boumgarden et al., 2012): nello specifico è stato rilevato come le donne appartenenti al particolare gruppo culturale *Ubuntu* hanno più probabilità nel mostrare un orientamento ambidestro quando devono affrontare iniziative imprenditoriali (de Villiers Scheepers et al., 2017); *Ubuntu* è un'ideologia diffusa nell'Africa subsahariana e in particolare in Sudafrica, che è possibile descrivere come un *moderato collettivismo* (Bullough et al., 2014); le persone che abbracciano questa ideologia hanno accesso alle risorse collettive appartenenti al proprio gruppo (culturale), abbassano la percezione del rischio e trasformano gli imprevisti in opportunità, influenzando positivamente le abilità *ambidestre* in riferimento alla valorizzazione delle iniziative imprenditoriali.

4. Discussione e ricerche future

Sebbene gli studi teorici abbiano inquadrato la diversità in termini positivi sottolineando la capacità di apportare creatività e nuove idee (McLeod and Lobel, 1992), alimentando i processi innovativi; gli studi empirici, tuttavia, hanno suggerito risultati diversi: l'eterogeneità danneggia

l'efficacia e le performance del gruppo a causa di problematiche connesse alla comunicazione, nascita di conflitto e diminuzione di integrazione sociale (Elron, 1997; Jackson *et al.*, 2003); molti studi hanno evidenziato queste problematiche a livello di Top Management Team (Hambirck *et al.*, 1998; Umans, 2009). In realtà, come si è visto, il problema è di natura complessa ed esistono variabili che possono intervenire, mediare o moderare gli effetti della diversità (Pitcher and Smith, 2001; Umans, 2009) ma, in termini generali, ciò porta con sé molteplici opportunità di ricerca.

In base alla prospettiva assunta, il *diversity* può essere considerato tanto un antecedente, nel momento in cui *fornisce* la differenziazione necessaria in termini esperienze, conoscenze, risorse cognitive ecc. per le attività legate all'*exploration*, quanto un moderatore al fine di ottenere un *bilanciamento* tra le due tipologie di attività potenzialmente in conflitto; allo stesso tempo, l'ambidestrisimo può essere considerato un mediatore - il *meccanismo* - attraverso cui la *diversità* può essere valorizzata. Isolare e individuare il tipo di relazione che lega diversità ed ambidestrisimo rappresenta un problema di ricerca piuttosto rilevante e sfidante. In questo senso, la ricerca dovrebbe muovere da una prospettiva in cui ci si concentra sul binomio *diversità-performance* finanziarie - che è quello prevalente - verso una in cui sono tenuti in considerazione anche altri indicatori di performance non finanziari così come altri *outcome* organizzativi.

Alcuni dei meccanismi individuati per gestire e convogliare la *diversità* comprendono gli aspetti *soft* di un'organizzazione, nei termini della costruzione e promozione di una cultura e un contesto organizzativo che promuova l'inclusione, lo scambio di conoscenza, *trust* e supporto; essi sono, in larga parte, gli stessi per lo sviluppo del cd. ambidestrisimo contestuale (Gibson et Birkinshaw 2004; Ghoshal et Bartlett, 1994): da questo punto di vista, la gestione della diversità e la costruzione di un'organizzazione ambidestra potrebbe affidarsi ai medesimi strumenti e pratiche, rappresentando quindi due facce della stessa medaglia; indagare sui meccanismi abilitanti per attivare questa relazione significa far luce su pratiche HRM, sistemi premiali ed incentivanti, l'adozione di sistemi informativi capaci di facilitare comunicazione e scambio di conoscenza, ognuno dei quali può essere studiato in funzione del suo contributo - tanto alla teoria che alla pratica - per la costruzione di un'organizzazione ambidestra.

Per motivi simili, l'analisi non può prescindere dall'adozione di una prospettiva multilivello: se partire dalle caratteristiche demografiche e culturali individuali è di fondamentale importanza per comprendere meglio le *micro-foundations*, è necessario che tali caratteristiche vadano indagate quando diventano relazioni all'interno dello stesso team, unità organizzativa e nell'organizzazione nel suo insieme (ed oltre), nel momento in cui si realizza - o non si realizza - l'interazione e lo scambio concreto di conoscenze e risorse: ad esempio, se a livello individuale tali differenze possono contribuire ad apportare la generazione di innovazione, è solo a livello di *top e middle-management* che è possibile sfruttarla nella misura in cui questi hanno un accesso diretto a *networks*, risorse e supporto dell'organizzazione.

Infine, il contesto in cui opera concretamente un'organizzazione è altresì ugualmente importante. Ogni organizzazione è radicata in un ambiente culturale, sociale, legale e politico; le strutture interne, strategie e comportamenti sono entro una certa misura il riflesso di questo ambiente: dalla letteratura emergente, i contributi che descrivono e spiegano l'influenza dei valori culturali nazionali sulle modalità dell'adozione di un orientamento ambidestro e di questo sulle performance sono in numero molto limitato. In generale, la cultura nazionale può essere tanto un antecedente (Newman et Nollen, 1996; Schneider, 1989) quanto agire come moderatore (Freytag et Thurik, 2007; Marino *et al.*, 2002; Rauch *et al.*, 2010) delle scelte strategiche intraprese da un'organizzazione: entrambe le impostazioni di ricerca possono coesistere tenendo come riferimento la provenienza delle organizzazioni coinvolte nello studio; ad esempio, in uno studio nel quale sono prese come riferimento organizzazioni provenienti da differenti contesti nazionali, allora l'influenza della cultura nazionale può essere intesa come antecedente delle decisioni ed attività strategiche, al contrario, laddove il contesto di ricerca veda organizzazioni con il medesimo background nazionale, allora la componente della cultura nazionale potrebbe essere interpretata come moderatore tra strategia e grado di orientamento ambidestro e tra quest'ultimo e performance organizzative, nella misura in cui le scelte strategiche abbiano il giusto *fit* con la cultura nazionale.

Comprendere meglio come i valori nazionali impattino sull'adozione e il grado di un orientamento ambidestro - nonché sul tipo di relazione - e di come questi influenzino a loro volta decisioni, comportamenti e performance degli attori organizzativi (Junni *et al.*, 2013), anche in chiave di relazioni interorganizzative (Im et Rai, 2008; Laikka *et al.*, 2015), rappresenta un oggetto di studio ancora poco esplorato.

Dall'analisi della letteratura presa in esame, è possibile individuare alcuni possibili *gap di ricerca* dai quali sviluppare ricerche future:

- a) L'impatto della diversità sul conseguimento dell'ambidestrismo individuale (Mom *et al.*, 2009) non è preso in considerazione. L'ambidestrismo individuale è la capacità dell'individuo di eseguire attività contraddittorie e passare tra differenti *mindset* e set di azioni (Bledow *et al.*, 2009). In che modo le caratteristiche socio-demografiche e l'insieme di valori culturali incide su questa capacità? La ricerca deve prendere in esame i diversi ruoli organizzativi (leader, manager, impiegato ecc.) e non può prescindere dall'integrare prospettive *micro*, ovvero psicologiche, e *macro*, relativa alla dimensione organizzativa.
- b) Dalla review di buona parte della letteratura, gli impatti della *diversità* sull'ambidestrismo si esauriscono, in estrema sintesi, con potenziali benefici sulle fasi di *exploration*, nella misura in cui allarga la base di conoscenza, informazioni ecc., e con potenziali effetti negativi sulle attività di *exploitation*, in termini di incomprensioni, conflitto ecc. a detrimento dell'efficienza. Una simile impostazione pare essere riduttiva: allargare l'approccio, studiando eventuali ricadute negative - *dark side* - sull'*exploration* (es. *information overload*, eccesso di progetti falliti ecc.) così come degli effetti positivi sull'*exploitation* (es. riduzione delle barriere d'ingresso, individuazione di mercati adiacenti, ecc.) può aiutare a comprendere meglio il fenomeno.
- c) Inquadrare la relazione tra diversità e ambidestrismo in una prospettiva dinamica. Il tempo è una prospettiva di ricerca negli studi sull'ambidestrismo molto importante (Raisch *et al.*, 2009), oltre ad essere un meccanismo di soluzione del paradosso tramite il cd. ambidestrismo sequenziale (O'Reilly et Tushman, 2013; Gupta *et al.*, 2006), gli stessi *outcome* delle attività di *exploration* ed *exploitation* differiscono in base al tempo (March, 1991). Se ed in che modo gli impatti che la diversità produce sull'ambidestrismo cambiano nel tempo? Esso modera positivamente o negativamente tale relazione? È plausibile ipotizzare che nel corso del tempo i valori culturali, le esperienze, le competenze e più in generale la diversità, tendano a subire un processo di adattamento e convergere, divenendo meno evidenti; gli stessi valori culturali del particolare contesto in cui l'organizzazione si trova ad operare sono destinati a cambiare nel lungo periodo. Studiare gli effetti del tempo su questa relazione, significa approfondire l'interazione tra diversità, cultura organizzativa e processi di adattamento; non può prescindere da studi *cross-sectional* e longitudinali ed è auspicabile che si impieghino teorie provenienti da altri ambiti, come la sociologia e l'antropologia.
- d) La relazione tra ambidestrismo organizzativo e performance è influenzata dal settore di appartenenza dell'organizzazione: in termini generali essa è maggiormente avvertibile in settori ad alta innovazione e caratterizzati da volatilità, instabilità e pressione competitiva (Floyd et Lane, 2000; Jansen *et al.*, 2005; Raisch et Hotz, 2010). La relazione tra diversità e ambidestrismo e relativi risultati è influenzata dal settore? A riguardo, mancano studi diretti, tuttavia è plausibile ipotizzare che gli impatti della diversità siano maggiori in determinati settori (ad es. in ambito turistico o più in generale nei servizi) con ricadute più importanti sugli *outcome* delle fasi di *exploration*; allo stesso modo è interessante comprendere gli impatti sulle attività di *exploitation* in settori caratterizzati da elevata stabilità.
- e) L'influenza dei fattori contingenti sull'ambidestrismo organizzativo, in special modo la relazione con le performance, rappresentano un campo tuttora poco sviluppato (Raisch et Birkinshaw, 2008). I lavori che hanno preso come riferimento la relazione tra contesto culturale nazionale e ambidestrismo sono ancora pochi e per lo più hanno una portata descrittiva ed esplorativa, tuttavia hanno mostrato alcune evidenze interessanti. In questo senso, sono necessari ulteriori studi comparativi nazionali, regionali e inter-culturali per individuare complementarità tra caratteristiche culturali dell'ambiente istituzionale, cultura organizzativa e *outcome*

dell'ambidestrisimo. Più nello specifico, il contesto culturale nazionale e infranazionale può rappresentare una peculiare opportunità per bilanciare in maniera ottimale le fasi di *exploration* ed *exploitation*: localizzare sotto-unità dedicate in un contesto più favorevole ad una o l'altra attività oppure adottando una strategia di *networking* (Gupta *et al.*, 2006) con organizzazioni che risiedono in un ambiente culturale più idoneo rappresenterebbe un meccanismo per bilanciare con efficacia la tensione tra *exploration* ed *exploitation*; nell'ultimo caso, è plausibile che quest'ultima soluzione possa essere adottata da organizzazioni più piccole, con minori risorse a disposizione, che non sono in grado di sostenere soluzioni di differenziazione di tipo strutturale.

5. Conclusioni

L'ambidestrisimo organizzativo è un fenomeno multilivello che si sostanzia in un *mix* di design, leadership, pratiche e cultura organizzativa: ciascun elemento rappresenta una leva su cui agire per bilanciare la tensione tra *exploitation* ed *exploration*; ottenere un tale bilanciamento è cruciale per le organizzazioni che si trovano costrette a rispondere e adattarsi con rapidità ai cambiamenti di un sistema sempre più instabile e volatile. Nella ormai molto ampia letteratura riguardante l'ambidestrisimo¹, l'aspetto dei valori culturali riveste tuttora un aspetto secondario: in generale, mancano ricerche interculturali e comparative che possano mettere in evidenza e in contrasto impatti, pratiche e modalità differenti per la gestione e la risoluzione della tensione; ad esempio, lo stesso apporto di personale con *background* culturali differenti, ora che la globalizzazione ha innescato processi migratori irreversibili, rimane tuttora poco esplorato in ambito di ambidestrisimo organizzativo e di pratiche relative alla gestione e sviluppo delle risorse umane, nonostante il potenziale bagaglio di *nuova* conoscenza e relazioni che hanno con sé.

La *diversità* rappresenta un ulteriore tassello, un'ulteriore *tensione*, da bilanciare per comprendere meglio il fenomeno e costruire un'organizzazione ambidestra. Il presente lavoro contribuisce a fornire una prospettiva unitaria sui modi in cui la diversità e i valori culturali influenzano le attività di *exploration* ed *exploitation* e i processi innovativi all'interno di un'organizzazione e fornisce alcuni punti di partenza per ulteriori ricerche: l'eterogeneità apporta nuove conoscenze, differenti punti di vista, informazioni che rinnovano la base di conoscenza e forniscono opportunità per l'apprendimento organizzativo. L'ambidestrisimo organizzativo in questo senso appare, potenzialmente, una leva per mobilitare e convogliare energie e risorse e, attraverso meccanismi di integrazione e differenziazione, risolvere problematiche relative al conflitto, dispersione di risorse, inefficienze.

Questo lavoro fornisce anche implicazioni pratiche ai *practioneers*, nella misura in cui sottolinea l'importanza della diversità sociodemografica e culturale e alcuni meccanismi per raggiungere un orientamento ambidestro; inoltre, invita a tenere in conto anche il contesto culturale nazionale nelle strategie di internazionalizzazione, di partnership e *networking* per massimizzare gli *outcome* in termini di innovazione ed efficienza.

La principale limitazione del presente lavoro riguarda la possibilità di aver escluso altri studi e ricerche potenzialmente pertinenti con la domanda di ricerca, dal momento che le banche dati utilizzate per la ricerca non sono esaustive; inoltre, il processo di *screening* e di analisi potrebbe aver scontato un certo grado di soggettività.

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¹ A gennaio 2021 con una ricerca su Scopus con la parola chiave "ambidex*" vengono restituiti 2727 documenti.

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Innovazioni ambientali e sviluppo sostenibile: il ruolo delle imprese familiari

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Abstract

Obiettivi. *Obiettivo dell'articolo è quello di comprendere se le imprese familiari abbiano un impatto positivo sul livello di innovazioni ambientali sostenibili. In ottica SEW, si vuole dimostrare come le caratteristiche tipiche delle imprese di famiglia, diversamente da quanto affermato dall'Ability and Willigness Paradox, portino questa tipologia di impresa ad essere più propensa, rispetto alle imprese non familiari, a sviluppare innovazioni ambientali. Si analizza inoltre l'effetto moderatore delle slack resources, per verificare se influenzino positivamente la propensione e la capacità delle imprese familiari di sviluppare innovazioni ambientali sostenibili.*

Metodologia. *Grazie a un campione di 2475 imprese italiane aggiornato al 2017, sono stati stimati due modelli di Poisson.*

Risultati. *Le imprese familiari sono più propense a sviluppare innovazioni ambientali sostenibili. Due tipologie di slack resources, available e potential, sono risultate moderatori positivi di questo effetto.*

Limiti della ricerca. *Il campione è costituito da sole imprese italiane e la misura dell'innovazione ambientale sostenibile avviene tramite il conteggio del numero di brevetti depositati.*

Implicazioni pratiche. *Fine ultimo dello studio è quello di suggerire pratiche manageriali utili per i manager e proprietari di imprese di famiglia in merito all'importanza di una strategia ambientale sostenibile e dello sviluppo di innovazioni sostenibili. Importanti implicazioni di policy seguono.*

Originalità del lavoro. *Lo studio contribuisce alla ricerca sulle imprese di famiglia approfondendo il tema della sostenibilità ambientale e indagando l'effetto moderatore delle slack resources. In particolare, si dimostra il superamento dell'Ability and Willigness Paradox, almeno per quanto riguarda le innovazioni ambientali sostenibili.*

Parole chiave: *Imprese familiari; Sostenibilità; Socio Emotional Wealth; Innovazione ambientale.*

Objectives. *The main aim of this paper is to understand whether family businesses have a positive impact on the level of sustainable environmental innovation. From an SEW perspective, this paper is designed to demonstrate how the typical characteristics of family businesses, unlike what is stated by the Ability and Willigness Paradox, lead this type of firms to be more prone than non-family firms to develop environmental innovations. The moderating effect of slack resources is also analyzed, in order to verify whether they influence positively the ability of family businesses to develop sustainable environmental innovation.*

Methodology. *Through a sample of 2475 Italian companies updated to 2017, two Poisson models were estimated.*

Findings. *Family businesses are more prone to develop sustainable environmental innovation. Two types of slack resources, available and potential, are positive moderators of this effect.*

Research limits. *The sample is made up of only Italian companies and sustainable environmental innovation is measured by counting the number of environmental patents filed.*

Practical implications. *The main goal of this paper is to suggest useful managerial practices for managers and owners of family businesses regarding the importance of a sustainable environmental strategy and the development of sustainable innovation. There are also important policy implications.*

Originality of the study. *The study contributes to research on family businesses by investigating the issue of environmental sustainability and the moderating effect of slack resources. In particular, the overcoming of the Ability and Willigness Paradox is demonstrated, at least as regards sustainable environmental innovation.*

Key words: *Family business; Sustainability; Socio Emotional Wealth; Environmental innovation.*

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1. Introduzione

Le risorse in natura sono scarse e hanno una capacità limitata di rigenerarsi. Fenomeni sempre più rilevanti come l'aumento della popolazione e l'eccessivo consumo, stanno mettendo a rischio la disponibilità di risorse per le generazioni future (IISD, 1995; WCED, 1987). Le problematiche ambientali iniziarono ad essere percepite come rilevanti dalle comunità accademiche e dagli enti pubblici e privati a partire dagli anni '60 del secolo scorso, a seguito dei primi movimenti ambientalisti di denuncia sugli effetti inquinanti dello sviluppo industriale. Da quel momento in poi si susseguirono una serie di conferenze internazionali finalizzate a diffondere la consapevolezza che lo sviluppo sostenibile rappresenta l'unica alternativa per salvaguardare il benessere di tutte le generazioni. Nel 1983 venne istituita la World Commission on Environment and Development (WCED) con l'obiettivo di promuovere forme di cooperazione internazionale per risolvere la problematica ambientale a livello globale. Nel 1987 la WCED definì nel Rapporto "Our Common Future" (meglio conosciuto come Rapporto Brundtland) il concetto di sostenibilità come "uno sviluppo che garantisce i bisogni delle generazioni attuali senza compromettere la possibilità delle generazioni future di soddisfare i propri bisogni".

La letteratura sulla sostenibilità delle imprese presenta diverse definizioni di sostenibilità che variano a seconda del tema rispetto al quale si focalizzano, del settore di riferimento, delle condizioni istituzionali e del mercato di riferimento (Elkington, 1997; Gladwin *et al.*, 1995). Spesso, si confonde erroneamente il concetto di sostenibilità con quello di responsabilità di un'impresa o si tende a considerare solo la componente ambientale della sostenibilità, ignorando che il suo significato è olistico e comprende anche gli aspetti sociali ed economici (Stilgoe *et al.*, 2013; Carroll *et al.*, 2010; Schiederig *et al.*, 2012). Essere sostenibile per un'impresa significa, infatti, avere un'attitudine a comportarsi responsabilmente a livello economico, sociale e ambientale per tutelare il benessere di lungo termine di tutti gli stakeholder dell'impresa (Dyck e Neubert, 2009; Porter e Kramer, 2006). Bansal e DesJardine (2014) definiscono la sostenibilità aziendale come "la capacità delle imprese di rispondere alle proprie esigenze finanziarie di breve termine senza compromettere la propria (o altrui) capacità di soddisfare le proprie esigenze future". Questa definizione evidenzia l'elemento che distinguerebbe il concetto di responsabilità da quello di sostenibilità ovvero il fattore tempo. Infatti, mentre le azioni di Corporate Social Responsibility si focalizzano sulla soddisfazione degli interessi degli stakeholder attuali, le azioni di sostenibilità delle imprese richiederebbero un'allocazione intertemporale delle risorse disponibili finalizzata a raggiungere obiettivi di breve termine, senza però precludere la possibilità di raggiungere anche obiettivi di lungo periodo.

Questo tema sta assumendo sempre più rilevanza tra i policy maker, le istituzioni siano esse pubbliche o private, i manager, i proprietari di imprese e i singoli cittadini. Lo sviluppo sostenibile, infatti, è considerato il modello migliore da adottare per superare le problematiche ambientali, sociali ed economiche che caratterizzano la società. Inoltre, tale strategia offre alle imprese la possibilità di migliorare la propria performance e la propria reputazione nei confronti di tutti gli stakeholder. Tuttavia, solo di recente, alcuni studiosi si sono interessati al modo in cui una specifica categoria di imprese, quelle di famiglia, si avvicina alla sostenibilità per capire se e come le loro caratteristiche idiosincratiche possano impattare positivamente sull'implementazione di un percorso di sostenibilità.

Le imprese di famiglia, secondo il Family Firm Institute (2019), rappresentano circa i due terzi delle imprese private presenti a livello mondiale e il 90% di tutte le imprese. In Europa sono più di 14 milioni e si stima che contribuiscano alla creazione di oltre 60 milioni di posti di lavoro nel settore privato. Secondo il X Osservatorio AUB, tra le imprese italiane con un fatturato maggiore a 20 milioni di euro, quelle di famiglia ne rappresentano il 65% e, tra le imprese italiane con un fatturato inferiore a tale livello, ne rappresentano l'85%. Le imprese di famiglia, quindi, contribuiscono in modo significativo alla creazione di benessere nelle economie locali e nazionali (Astrachan e Shanker, 2003) e per tale motivo rappresentano un partner strategico rilevante delle pubbliche istituzioni per tentare di realizzare gli sfidanti obiettivi dell'Agenda 2030.

In Italia, da una prima indagine avviata dall'Istat, è stato definito un quadro strategico di riferimento in grado di fornire evidenze empiriche sulle azioni di sostenibilità delle imprese. I risultati mostrano che l'84,3% delle imprese intervistate tra il 2016 e il 2018 ha portato a termine almeno un'azione di sostenibilità sociale e l'75,8% delle imprese ha realizzato almeno un'azione di sostenibilità ambientale. Pur consapevoli del connotato olistico della sostenibilità e della sua composizione integrata che comprende anche aspetti economici e sociali, questo articolo si focalizzerà sull'aspetto ambientale della sostenibilità, in particolare sulle innovazioni sostenibili. Obiettivo finale dell'articolo è infatti quello di comprendere se le imprese di famiglia abbiano un impatto positivo sul livello di innovazioni ambientali e verificare l'effetto moderatore delle *slack resources*.

In letteratura si individuano due elementi indispensabili affinché un'impresa possa adottare una strategia ambientale proattiva: la volontà o la motivazione (i.e. *willingness* o *motivation*) che sprona l'impresa a predisporre tale strategia e l'abilità (i.e. *ability*) ovvero la disponibilità dell'impresa a riservare delle risorse per la sua implementazione (Sharma e Sharma, 2011). Le imprese di famiglia sono ricordate in letteratura come imprese più avverse al rischio e meno propense ad innovare. Chrisman *et al.* (2015), utilizzando il framework della Socio Emotional Wealth (SEW), spiegano il comportamento delle imprese di famiglia rispetto all'innovazione con il fenomeno conosciuto come *Ability and Willingness Paradox*. Gli studiosi affermano che le imprese di famiglia hanno maggiori capacità ad innovare rispetto alle imprese non familiari, ma al contempo sostengono che sono però poco propense a farlo. L'obiettivo principale di questo elaborato sarà quello di capire se tale paradosso riguardi anche le innovazioni ambientali o se invece, grazie ai benefici che una strategia ambientale proattiva può portare ad un'impresa di famiglia, questa riesca a superare il paradosso e dimostrarsi sia più propensa sia più capace rispetto ad un'impresa non familiare a sviluppare innovazioni ambientali sostenibili.

Seguendo il framework della SEW, si ipotizza che le imprese familiari possano avere un impatto positivo sullo sviluppo di innovazioni ambientali sostenibili poiché, diversamente dalle imprese non familiari, che spesso intraprendono uno sviluppo sostenibile per raggiungere obiettivi di breve periodo come il profitto o per migliorare la propria performance economico-finanziaria, le imprese di famiglia tendono a intraprendere un percorso legato alla sostenibilità per tutelare il loro patrimonio intangibile socio-emozionale attraverso le generazioni. Nel dettaglio, riprendendo l'approccio *mixed gamble* all'innovazione, suggerito da Gomez-Mejia *et al.* (2014), questa visione di lungo periodo renderebbe i potenziali guadagni in termini di SEW maggiori delle possibili perdite, socioemozionali ed economiche, stimolando l'impresa ad investire in innovazioni ambientali sostenibili.

Considerando, infine, che le innovazioni ambientali, oltre ad un orientamento al lungo periodo (Wang e Basal, 2012), necessitano di una maggiore disponibilità di risorse (Aiello *et al.*, 2019), ci si interroga sull'effetto moderatore delle *slack resources*. Da letteratura emerge un gap sui fattori che moderano la propensione e la capacità delle imprese familiari a sviluppare tali innovazioni ambientali. Nel presente lavoro si ipotizza che la presenza di *slack resources* moderi positivamente la propensione delle imprese di famiglia a sviluppare innovazioni ambientali poiché in grado di attenuare la loro avversione al rischio e il timore di perdere il proprio patrimonio intangibile socio-emozionale (Cyert e March, 1963; Nohria e Gulati, 1996). In particolare, verranno considerate tutte e tre le tipologie distintamente (i.e. *recoverable*, *available*, *potential*). Anche in questo caso, riprendendo l'approccio *mixed gamble* (Gomez-Mejia *et al.*, 2014), una maggiore disponibilità di queste risorse modera positivamente l'effetto sull'innovazione ambientale. In particolare, dal lato negativo della medaglia queste risorse riducono le potenziali perdite di patrimonio socio-emozionale, grazie alla copertura finanziaria che le stesse garantiscono, mentre dal lato positivo aumentano il potenziale di guadagno del patrimonio socio-emozionale. Per questo motivo, è probabile che l'effetto duplice della maggiore disponibilità di *slack resources* incoraggi le imprese a correre il rischio innovando, superando il paradosso dell'*Ability and Willingness*.

Per testare tali ipotesi di ricerca, scaturite dall'analisi della letteratura, si proporrà un'analisi empirica quantitativa su un campione di imprese italiane familiari e non familiari.

2. Framework teorico

2.1 Le imprese familiari in ottica SEW

In letteratura diversi sono i framework teorici utilizzati per analizzare le imprese di famiglia. Una recente review della letteratura (Dowson e Mussolino, 2014) classifica gli articoli in tre categorie. La prima categoria si basa sulla teoria dell'agenzia e tenta di spiegare il comportamento delle imprese di famiglia introducendo il costrutto della *Socioemotional Wealth* o patrimonio socio-emozionale (Gómez-Mejía *et al.*, 2007; Berrone *et al.*, 2010; Berrone *et al.*, 2012). La seconda categoria si pone l'obiettivo di comprendere l'importanza del coinvolgimento della famiglia nel business, affinché questo possa sopravvivere attraverso le generazioni, definendo il concetto di *essence-of-family-business* (Chua *et al.*, 1999; Chrisman *et al.*, 2005). Infine, la terza categoria, si basa sulla *Resource-Based View* e, definendo il costrutto della familiness, inteso come "l'insieme unico di risorse di cui dispone una particolare azienda a causa delle interazioni di sistema tra la famiglia, i suoi singoli membri e l'azienda" (Habbershon e Williams, 1999), suggerisce che le imprese di famiglia presentano delle risorse uniche, determinate dall'interazione tra la famiglia e il business, grazie alle quali possono raggiungere un vantaggio competitivo rispetto alle imprese non familiari (Habbershon e Williams, 1999; Pearson *et al.*, 2008).

Alcuni di questi paradigmi, come quello della Agency Theory, della Stewardship Theory e della Resource-Based View, appartengono a domini esclusivamente economico-finanziari e di management. Alla luce della definizione adottata di sostenibilità e nella prospettiva di dare risalto a valori non solo strettamente economici ma anche sociali, il costrutto della socioemotional wealth sembra quindi essere quello più appropriato per comprendere l'approccio delle imprese di famiglia rispetto alle altre imprese (Gómez-Mejía *et al.*, 2007; Berrone *et al.*, 2010; Berrone *et al.*, 2012), in termini di sviluppo di innovazioni ambientali sostenibili.

Socioemotional wealth è il framework con cui si identificano tutti gli aspetti non finanziari dell'impresa che soddisfano i bisogni affettivi della famiglia costituendo il patrimonio intangibile socio-emozionale di un'impresa di famiglia (Gómez-Mejía *et al.*, 2007). Tra questi valori sono compresi obiettivi non economici come l'impegno a forgiare un'identità unica tra la famiglia e l'impresa, l'interesse ad avere un'influenza sulle decisioni dell'impresa e il desiderio di mantenere il controllo sull'impresa attraverso le generazioni (Berrone *et al.*, 2010; Gómez-Mejía *et al.*, 2007; Berrone *et al.*, 2012). La relazione impresa-famiglia è spesso alimentata da emozioni e da sentimenti di responsabilità, d'impegno, di collettivismo e di altruismo e per questo le imprese di famiglia gestiscono l'attività d'impresa in modo diverso dagli altri tipi di business (Gómez-Mejía *et al.*, 2007). Tra gli altri, lo studio di Berrone *et al.* (2012) definisce le imprese di famiglia sulla base di cinque dimensioni in ottica SEW.

La prima dimensione si riferisce al desiderio dei membri della famiglia di esercitare il proprio controllo e di avere il potere di influenzare le decisioni riguardanti l'attività del business.

La seconda dimensione riguarda l'identificazione dei membri della famiglia con l'impresa stessa, come se quest'ultima fosse un'estensione della famiglia. Questa caratteristica sprona le imprese di famiglia a preservare la propria reputazione sia all'interno dell'organizzazione sia all'esterno e le incoraggia ad essere più inclini ai temi ambientali e sociali al fine di mantenere un'immagine positiva della famiglia.

La terza dimensione riguarda la creazione di legami sociali vincolanti non solo tra i membri della famiglia ma anche con gli stakeholder e con la comunità di riferimento. Anche Debicki *et al.* (2016), descrivono il desiderio tipico delle imprese familiari di avere una buona reputazione nella comunità di riferimento. Le imprese familiari, per ottenere la stima degli stakeholder, sono disposte ad adottare pratiche di sostenibilità ambientale che vadano a beneficio della società. Una buona reputazione, infatti, permette alle imprese di ottenere la fiducia e l'ammirazione dei propri stakeholder e, dal punto di vista economico, consente di migliorare la propria performance (Barney, 1991; Deephouse, 2000; Rindova *et al.*, 2005; Roberts e Dowling, 2002).

La quarta dimensione riguarda l'attaccamento emotivo dei membri della famiglia. La storia, il vissuto e le conoscenze tramandate influenzano e plasmano le attività correnti in grado di riconoscere il *modus operandi* altruistico, tipico delle imprese di famiglia, finalizzato a mantenere l'armonia della famiglia (Núñez-Cacho *et al.*, 2018).

La quinta dimensione si riferisce al desiderio di trasmettere un'azienda sana e con un vantaggio competitivo alle generazioni successive. Per le imprese di famiglia, infatti, l'investimento nell'azienda di tempo e risorse rappresenta sempre un investimento a lungo termine (Debicki *et al.*, 2016). Alcune imprese di famiglia, per realizzare obiettivi non economici, stabiliscono delle strategie su un orizzonte temporale ampio (i.e. orientamento al lungo termine), consapevoli che le scelte compiute da una generazione potranno avere degli effetti anche sulle generazioni successive (Berrone *et al.*, 2010; Miller e Le Breton-Miller, 2005; Gómez-Mejía *et al.*, 2007; Sharma e Sharma, 2011). Poiché l'orientamento al lungo periodo è un requisito essenziale per lo sviluppo sostenibile di un'impresa ed è una caratteristica tipica delle imprese di famiglia si può dedurre che le imprese di famiglia, per loro natura, dovrebbero essere più propense rispetto alle imprese non familiari ad intraprendere un percorso di sostenibilità.

Concludendo, alla luce della letteratura sopra citata, la conservazione del patrimonio socio-emozionale e della reputazione dell'impresa e l'orientamento al lungo periodo tipico delle imprese di famiglia potrebbero rappresentare degli stimoli in grado di migliorare l'orientamento alla sostenibilità delle imprese di famiglia (Berrone *et al.*, 2010). Le imprese di famiglia di successo, ossia quelle che riescono a sopravvivere attraverso le generazioni, predispongono delle attività al fine di creare un benessere diffuso rivolto non solo all'impresa e alle generazioni future ma anche agli stakeholder della comunità di riferimento. Al fine di ottenere uno status forte nella comunità di riferimento e migliorare la propria reputazione, alcune imprese di famiglia sono disposte a sviluppare un percorso di sostenibilità sociale e ambientale (López-Pérez *et al.*, 2018). Oltre a tali motivazioni, le imprese di famiglia potrebbero ambire ad uno sviluppo sostenibile dell'impresa per avere un ruolo attivo nella comunità e contribuire in modo positivo alla crescita e al benessere della comunità stessa. Conseguentemente si potrebbe dedurre che le imprese di famiglia siano più propense rispetto alle imprese non familiari ad implementare un percorso di sostenibilità.

2.2 Imprese di famiglia e orientamento alla sostenibilità

Nella letteratura sulla sostenibilità nelle imprese di famiglia si possono identificare tre principali filoni di ricerca. Il primo filone indaga i motivi che spronano un'impresa di famiglia ad avvicinarsi al tema della sostenibilità. Le principali motivazioni per investire nella sostenibilità riguardano la ricerca di legittimità aziendale, il successo di mercato e il miglioramento interno (Windolph, Harms, e Schaltegger, 2014). Un secondo filone di indagine si interroga invece sui metodi e sulle pratiche che favoriscono l'orientamento alla sostenibilità in un'impresa di famiglia come il ruolo dei manager, il ruolo dell'innovazione e il ruolo della performance (Chrisman *et al.*, 2015; Patel e Chrisman, 2014; De Massis *et al.*, 2014). Infine, una terza corrente mira a comprendere i fattori che permettono alle imprese di famiglia di mantenere la loro conformazione attraverso le generazioni e indagano quindi il ruolo del passaggio generazionale (James, 1999; Lumpkin e Brigham, 2011).

Un primo fattore in grado di favorire l'orientamento alla sostenibilità nelle imprese di famiglia è l'orientamento al lungo periodo. Spesso, infatti, le imprese di famiglia cercano di preservare il lavoro, la sicurezza e il profitto per le generazioni successive, scegliendo investimenti di lungo termine come l'implementazione di un percorso di sostenibilità (Memili *et al.*, 2018). Un orientamento al lungo periodo sembra quindi avere un impatto positivo sulla sostenibilità delle imprese di famiglia se vengono adottati criteri meritocratici ovvero se gli interessi dell'impresa prevalgono sugli interessi personali dei membri della famiglia. Allo stesso tempo, un percorso di sostenibilità incoraggia una pianificazione e un orientamento al lungo periodo da parte delle imprese di famiglia (Broccardo *et al.*, 2018).

Un secondo fattore può essere individuato nelle caratteristiche specifiche dell'impresa come il grado di coinvolgimento della famiglia nel management, la dimensione e l'età dell'impresa. In

particolare, le imprese di famiglia con un maggiore coinvolgimento della famiglia nella gestione dell'impresa sembrano presentare un maggiore impegno per la sostenibilità e un atteggiamento proattivo nell'implementazione di pratiche di sostenibilità (Marques *et al.*, 2014). Opinioni contrastanti emergono per quanto riguarda la dimensione e l'età dell'impresa. Alcune evidenze suggeriscono che le piccole, le medie e le grandi imprese sono sostenibili allo stesso modo ma comunicano le loro pratiche di sostenibilità in modo diverso (Caserio e Napoli, 2016). Mentre Huang *et al.* (2009) hanno dimostrato un'influenza negativa dell'età sullo sviluppo di innovazioni ambientali da parte delle imprese di famiglia.

Anche i valori specifici e l'esperienza educativa della famiglia e dei manager sembrano avere una forte influenza sui comportamenti di sostenibilità delle imprese di famiglia. La disciplina, l'abilità e l'impegno nei confronti dell'impresa e della società tramandati da una generazione a quella successiva e ai manager sembrano favorire un atteggiamento di lealtà, di fiducia, rispetto, equità e trasparenza nei confronti degli stakeholder interni ed esterni all'organizzazione (Le Breton-Mille e Miller, 2016). Per quanto concerne gli stakeholder esterni, le imprese di famiglia tendono ad instaurare con essi un dialogo e delle relazioni informali piuttosto che utilizzare una forma di comunicazione articolata come spesso fanno le imprese non familiari (Campopiano e De Massis, 2015). Implementare percorsi di sostenibilità potrebbe rivelarsi particolarmente interessante per le imprese di famiglia poiché consentirebbe loro di sviluppare una reputazione positiva nella comunità di riferimento e di preservare la propria attività d'impresa attraverso le generazioni (Andersson *et al.*, 2002; Gómez-Mejía *et al.*, 2007).

In letteratura, tuttavia, esistono risultati contrastanti in riferimento alla performance sociale ambientale delle imprese di famiglia. Le imprese di famiglia di nuova costituzione sembrano infatti essere meno preoccupate della preservazione della loro reputazione rispetto a imprese che operano da diverse generazioni e, pertanto, queste ultime saranno più inclini a predisporre strategie di sostenibilità rispetto alle prime (Campopiano e De Massis, 2015). Berrone *et al.* (2010), hanno dimostrato che le imprese a controllo familiare sembrano conseguire performance sociali ambientali migliori rispetto alle non familiari, in modo particolare quando l'impresa concentra la propria attività in un'area geografica specifica e quindi quando l'impresa è più vicina alla comunità esterna con cui si relaziona.

Si individuano due elementi indispensabili affinché un'impresa possa prendere in considerazione una strategia ambientale proattiva: la volontà o la motivazione (*willingness* o *motivation*) che sprona l'impresa a predisporre tale strategia e l'abilità (*ability*) ovvero la disponibilità dell'impresa a riservare delle risorse per la sua implementazione (Sharma e Sharma, 2011). Sharma e Sharma (2011) affermano che le imprese familiari con un alto coinvolgimento di membri della famiglia sono più propense, rispetto ai business non familiari, a definire una strategia ambientale proattiva ovvero che vada oltre le regolamentazioni ambientali obbligatorie per ottenere contemporaneamente benefici economici e ambientali.

Concludendo, all'interno delle imprese familiari è proprio la famiglia che può influenzare le attitudini e i valori manageriali necessari per implementare una strategia ambientale proattiva ed è sempre la famiglia che può decidere l'allocazione ottimale di risorse da destinare all'attuazione di tale strategia. In particolare, nelle forme più strutturate di strategia ambientale proattiva, può essere contemplata la possibilità di sviluppare innovazioni ambientali sostenibili ovvero ridisegnare e innovare prodotti, processi e modelli di business, affinché questi output abbiano un impatto minore sull'ambiente naturale, permettendo alle imprese di raggiungere specifici obiettivi di sostenibilità ambientale (Rennings, 2000).

2.3 Imprese di famiglia e innovazioni ambientali sostenibili

Per orientamento alla sostenibilità ambientale si intende la propensione delle imprese a includere attenzione al loro impatto ambientale nelle proprie attività strategiche, tattiche e operative (Amankwah-Amoah *et al.*, 2019). Le innovazioni ambientali, apportando miglioramenti tecnologici, permettono di ridurre le emissioni, di ottimizzare l'utilizzo di materie prime e consentono alle

imprese di raggiungere obiettivi ambientali con costi minori (Johnstone *et al.*, 2012). L'eco-innovazione, in particolare, permette alle imprese di migliorare l'efficienza delle risorse e di realizzare una crescita economica rispettosa dell'ambiente. Oltre a modificare i prodotti, i processi e le pratiche di un'organizzazione, riducendo l'utilizzo di risorse naturali per la produzione, le innovazioni orientate alla sostenibilità plasmano i valori e la cultura dell'impresa creando un valore non solo economico ma anche sociale e ambientale (Adams *et al.*, 2016). Pur consapevoli che in letteratura i termini innovazione green, eco-innovazione e innovazione ambientale sostenibile presentano delle accezioni diverse (Schiederig *et al.*, 2012), in questo articolo si utilizzano come sinonimi, poiché riferibili al medesimo argomento. In particolare, per innovazioni ambientali si intende processi, pratiche, sistemi e prodotti nuovi o modificati che vanno a beneficio dell'ambiente e che contribuiscono alla sostenibilità ambientale (Oltra e Saint Jean, 2009).

In letteratura sono presenti diversi studi sulle innovazioni ambientali e sulle imprese di famiglia ma i ricercatori hanno dato scarsa attenzione alla combinazione di questi due argomenti. Le ricerche sul tema delle innovazioni ambientali nelle imprese di famiglia sono poche e si basano prevalentemente sul confronto tra imprese familiari e non (Doluca *et al.*, 2018; Scott-Young, 2013).

Diversi sono gli obiettivi che le imprese sperano di raggiungere introducendo innovazioni ambientali. Infatti, mentre le imprese di famiglia auspicano a migliorare la qualità dei prodotti, l'immagine della famiglia, la reputazione e ad incrementare la quota di mercato per trasmettere alla generazione successiva un'azienda sana, le imprese non familiari sono più interessate a raggiungere obiettivi di breve termine e legati al profitto (Dangelico *et al.*, 2019; Delmas e Gergaud, 2014; Huang *et al.*, 2009; Scott-Young, 2013). Le innovazioni ambientali, in generale, sono considerate dalle imprese di famiglia un'opportunità per ottenere un vantaggio competitivo di lungo periodo, mentre dalle imprese non familiari, sono considerate una necessità per mantenere la quota di mercato, per soddisfare i propri clienti e per rispettare gli standard legali (Dangelico *et al.*, 2019). Questa evidenza si può spiegare in logica SEW in quanto le imprese di famiglia, per conservare il proprio patrimonio socio-emozionale, sono disposte ad innovare per raggiungere obiettivi di lungo periodo (Berrone *et al.*, 2010; Berrone *et al.*, 2012).

Le innovazioni ambientali sono infatti fortemente caratterizzate da un orientamento al lungo periodo (Wang e Basal 2012) e risultano più complesse e caratterizzate da un livello maggiore di novità, di incertezza e varietà e, pertanto, richiedono competenze più complesse e diversificate rispetto alle altre innovazioni. Le imprese di famiglia per loro natura sono più conservative, hanno un'organizzazione più rigida e sono più avverse al rischio rispetto ai business non familiari e quindi potrebbero non essere disposte a investire per sviluppare innovazioni ambientali (Zahra *et al.*, 2004). Aiello *et al.* (2019), analizzando i brevetti ambientali depositati da un campione di 4200 imprese italiane, hanno infatti dimostrato che le imprese di famiglia sembrano essere meno propense rispetto alle imprese non familiari ad introdurre innovazioni ambientali.

Seguendo la stessa ipotesi di ricerca, lo studio di Doluca *et al.* (2018) ha indagato il comportamento di un gruppo di imprese tedesche (familiari e non) in riferimento all'entità delle loro attività, delle loro innovazioni e delle loro performance legate all'ambiente, in un arco temporale dal 2001 al 2016. Da tale indagine emerge che le imprese di famiglia, in una prima fase di diffusione delle innovazioni ambientali, sembrano essere più conservative e meno propense a sviluppare tali innovazioni rispetto alle imprese non familiari, mentre in un momento successivo, le imprese di famiglia sembrano adottare e sviluppare le innovazioni ambientali in modo più stabile e meno volatile rispetto alle altre imprese. Questa evidenza probabilmente è dovuta al fatto che in una fase iniziale di diffusione di innovazioni ambientali le imprese di famiglia siano state avverse al rischio e quindi meno propense ad adottarle, ma in una seconda fase, dopo aver appurato che tali innovazioni permettono di preservare la SEW, si siano dimostrate più abili e più costanti nello sviluppo di tali innovazioni (Doluca *et al.*, 2018).

3. Sviluppo delle ipotesi

Chrisman *et al.* (2015), utilizzando il framework SEW, spiegano il comportamento delle imprese di famiglia rispetto all'innovazione con il fenomeno dell'*Ability and Willingness Paradox*. Questi studiosi affermano che le imprese di famiglia hanno maggiori capacità di innovare rispetto alle imprese non familiari, ma che sono poco propense a farlo. A supporto di questa letteratura, lo studio di Duran *et al.* (2016) dimostra che le imprese di famiglia, pur investendo meno risorse in attività di ricerca e sviluppo rispetto alle imprese non familiari, riescano ad ottenere maggiori output innovativi. Nonostante ciò, le imprese di famiglia sembrano meno propense al cambiamento, più conservative, più avverse al rischio e conseguentemente meno propense ad innovare rispetto alle imprese non familiari (Chrisman *et al.*, 2015). Tuttavia, lo studio di Gómez-Mejía *et al.* (2007) dimostra che le imprese di famiglia, pur di mantenere il controllo dell'impresa attraverso le generazioni e di conservare il proprio patrimonio intangibile socio-emozionale, sono disposte a correre dei rischi che potrebbero compromettere o alterare la performance finanziaria dell'impresa. Seguendo questa linea di pensiero, anche Berrone *et al.* (2010) sostengono che se le imprese di famiglia dovessero scegliere tra un'azione in grado di ridurre il loro rischio economico ma che farebbe perdere parte del proprio patrimonio socio-emozionale e un'azione che permetterebbe di proteggerlo a discapito dei benefici economici, tenderanno ad optare per quest'ultima alternativa.

Risulta quindi interessante capire se tale paradosso riguardi anche le innovazioni ambientali o se invece, grazie ai benefici che una strategia ambientale proattiva può portare ad un'impresa di famiglia, questa riesca a superare il paradosso e dimostrarsi quindi sia più propensa sia più capace rispetto ad un'impresa non familiare.

Alcune delle peculiarità delle imprese familiari sembrano incoraggiare un percorso di sostenibilità ambientale proattivo che comporti lo sviluppo di innovazioni ambientali. Le imprese di famiglia potrebbero essere più propense a sviluppare tali innovazioni perché oltre a migliorare la performance finanziaria, di mercato ed economica, possono avere un impatto positivo sulla reputazione dell'impresa, sul miglioramento della qualità del prodotto e sulla soddisfazione degli stakeholder e quindi consentono la conservazione del patrimonio socio-emozionale (Dangelico *et al.*, 2019; Dangelico e Pontrandolfo, 2015). Come affermato precedentemente, l'orientamento al lungo periodo, tipico delle imprese di famiglia, poiché legato al desiderio di trasmettere alle generazioni future un'impresa sana, potrebbe contribuire in modo positivo allo sviluppo di innovazioni ambientali sostenibili. Infine, anche il desiderio di mantenere uno status forte e migliorare la propria reputazione nei confronti della comunità di riferimento, sembrano incentivare le imprese di famiglia a sviluppare innovazioni ambientali sostenibili (López-Pérez *et al.*, 2018).

Tutte queste caratteristiche, tipiche delle imprese di famiglia, rappresentano il lato positivo della SEW e fanno dedurre, diversamente da quanto affermato dall'*Ability and Willingness Paradox*, che le imprese di famiglia siano più propense, rispetto alle imprese non familiari, a sviluppare innovazioni ambientali.

Seguendo il framework della SEW, si ipotizza quindi che essere impresa familiare abbia un impatto positivo sullo sviluppo di innovazioni ambientali sostenibili. Tale ipotesi, se verificata empiricamente, consentirebbe di superare il paradosso dell'*Ability and Willingness Paradox*, almeno per quanto riguarda le innovazioni ambientali sostenibili.

Dunque, coerentemente con quanto affermato, si ipotizza:

Ipotesi 1. Le imprese di famiglia sono più propense, rispetto alle imprese non familiari, a sviluppare innovazioni ambientali.

Le innovazioni ambientali richiedono la disponibilità di ingenti risorse finanziarie per essere sviluppate ma le risorse di un'impresa, come ricorda la teoria della *Resource Based View*, sono limitate e quindi spetta alle governance delle imprese saperle allocare nel modo migliore per raggiungere gli obiettivi, siano essi di breve o di lungo termine. Interessante è indagare se la presenza di *slack resources* ovvero risorse finanziarie di riserva e in eccesso rispetto al minimo

necessario per produrre un determinato livello di output (Nohria e Gulati, 1996, p. 1246), possa avere un effetto moderatore positivo sulla capacità delle imprese familiari di sviluppare innovazioni ambientali sostenibili.

La presenza di *slack resources* permetterebbe alle imprese di famiglia di superare la loro eventuale avversione al rischio e il timore di perdere il proprio patrimonio socio-emozionale (Cyert e March, 1963; Nohria e Gulati, 1996). La mancanza di risorse, infatti, scoraggia le imprese di famiglia ad incrementare i propri costi per esplorare progetti innovativi dai benefici incerti (Gomez-Mejia *et al.*, 2011). Diversamente, se le imprese di famiglia possedessero risorse in eccesso da dedicare al benessere delle future generazioni, si potrebbe ipotizzare che le utilizzino per sviluppare innovazioni ambientali sostenibili orientate al lungo periodo con un alto livello di rischio che possano preservare la continuità dell'impresa e la sua crescita (Duran *et al.*, 2016).

Tali risorse permetterebbero alle imprese di proteggere il proprio core business da eventuali modelli di business disruptive che si potrebbero presentare sul mercato, consentendo alle imprese di avere delle risorse surplus utilizzabili per innovare (Clayton e van Bever, 2014). Nello specifico permetterebbero alle imprese di sviluppare internamente innovazioni ambientali e di brevettarle per poi essere più competitivi sul mercato. Infatti, le imprese che presentano delle risorse di riserva sembrano più capaci di adattarsi a contesti complessi o competitivi e più abili ad ottenere successo in un ambiente incerto e mutabile (Cyert e March, 1963). Quindi la presenza di risorse in eccesso può costituire un moderatore per indagare la propensione delle imprese di famiglia a sviluppare innovazioni e a brevettarle; inoltre, può essere ritenuto un elemento interessante per comprendere la propensione e la capacità di innovare delle imprese di famiglia (Liu *et al.*, 2017).

La letteratura sulle *slack resources* identifica tre tipologie: *available*, *recoverable* e *potential slack resources* (Bourgeois III e Singh, 1983). Le *available slack resources*, definite come risorse immediatamente disponibili o risorse non ancora assorbite, rappresentano la liquidità di breve periodo (Greve, 2007). Tale ammontare di risorse non dovrebbe fornire necessariamente alle imprese la giusta motivazione per sperimentare o per sviluppare innovazioni ambientali particolarmente rischiose, che comportano costi certi nel breve periodo e benefici incerti nel lungo periodo (Greve, 2007). Solitamente, invece, vengono utilizzate per coprire delle perdite di breve periodo dovute a cambiamenti inaspettati del contesto strategico (Lin *et al.*, 2009). Le *recoverable slack resources*, diversamente, rappresentano per le imprese delle riserve finanziarie di lungo periodo che motivano le imprese verso innovazioni che comportino dei rischi maggiori (Greve, 2007). Le *potential slack resources* riguardano riserve basate sulla capacità delle imprese di prendere a prestito delle risorse finanziarie anche di lungo periodo (Bourgeois III e Singh, 1983). Pertanto, un livello maggiore di tali risorse (i.e. *recoverable* e *potential*) dovrebbe incoraggiare le imprese di famiglia a sviluppare innovazioni ambientali sostenibili poiché in grado di ridurrebbe la loro avversione al rischio e il loro timore di perdere il proprio patrimonio socio-emozionale, così spronarle a sviluppare innovazioni ambientali.

Concludendo, tenendo in considerazione la necessità di comprendere se ci siano dei fattori in grado di moderare la relazione tra impresa di famiglia e capacità e propensione ad innovare (Chrisman *et al.*, 2015), si ritiene utile indagare la seguente ipotesi di ricerca:

Ipotesi 2. La presenza di *slack resources* modera positivamente la propensione e la capacità delle imprese di famiglia di sviluppare innovazioni ambientali.

4. Analisi empirica

4.1 Dati, fonti e variabili

L'analisi empirica utilizza un database composto da un campione di 2475 imprese italiane. Il contesto italiano risulta appropriato per questa analisi, considerati i dati incoraggianti che emergono da un'analisi Istat sulle azioni di sostenibilità delle imprese italiane come prova della loro disponibilità ad intraprendere uno sviluppo sostenibile per rispondere alle esigenze di uno

stakeholder sempre più attento e per tentare di raggiungere gli sfidanti obiettivi dell'Agenda 2030. Inoltre, l'Italia risulta tra le prime 13 nazioni più impegnate nel brevettare innovazioni idonee a gestione la raccolta, il recupero e lo smaltimento dei rifiuti solidi, a controllare dell'inquinamento idrico e le emissioni di gas inquinati (OECD, 2009). I data base impiegati sono: Espacenet (per i dati di brevetto), Aida Bureau Van Dijk (per i dati di bilancio), Reprint (per i dati di internazionalizzazione). Un'impresa è stata classificata come family se il 50% + 1 della proprietà risultava essere detenuta da membri della famiglia altrimenti è stata classificata come impresa non family. È stata indagata la propensione a sviluppare innovazioni ambientali considerando grazie ai brevetti relativi alle categorie IPC Air Pollution, Water Pollution e Solid Waste (Johnstone *et al.*, 2012). Questa variabile (*Sostenibilità*) sarà utilizzata come misura dell'innovazione ambientale e quindi come misura della sostenibilità ambientale delle imprese, e rappresenta il numero di brevetti depositati nelle tre classi al 2017. Per una migliore comprensione del contesto di riferimento, nella categoria Air Pollution sono rappresentate tutte le innovazioni in grado di ridurre le emissioni inquinanti come ad esempio filtri, purificatori, inceneritori speciali, separatori di sostanze o apparecchiature in grado di rilevare e controllare le emissioni di gas inquinati. Nella categoria Water Pollution sono rappresentate le innovazioni per la purificazione dell'acqua o per la raccolta e il trattamento dell'acqua di scarto o di liquidi inquinanti, mentre nella categoria Solide Waste si considerano le innovazioni relative, ad esempio, alla raccolta dei rifiuti solidi, al loro trasporto e al loro riutilizzo e al loro smaltimento. Tali brevetti rappresentano innovazioni che apportando miglioramenti tecnologici, permettono di ridurre le emissioni, di ottimizzare l'utilizzo di materie prime e consentono alle imprese di raggiungere obiettivi ambientali con costi minori (Johnstone *et al.*, 2012).

Infine, i dati relativi alle imprese del campione sono stati completati con informazioni di natura strutturale, contabile e finanziaria relativi all'anno 2017. Tra questi compare il settore di appartenenza, l'anno di costituzione dell'impresa, la sede legale, il fatturato e il numero di dipendenti, gli indicatori di redditività e profittabilità e altri elementi di stato patrimoniale, conto economico e rendiconto finanziario.

Le variabili utilizzate nelle analisi sono riportate in Tab 1.

Tab. 1: Descrizione delle variabili

Variabile	Descrizione	Fonte
Sostenibilità	Numero di brevetti ambientali depositati al 2017	PATSTAT
Multinazionale	Variabile dummy uguale a 1 se multinazionale, altrimenti 0	REPRINT
Family	Variabile dummy uguale a 1 se il 50% + 1 della proprietà è detenuta da membri della famiglia, altrimenti 0.	REPRINT
Età	Numero di anni dalla fondazione (al 2017)	AIDA
Settore	Primario (1), Secondario (2), Terziario (3).	AIDA
Area	Nord (1), Centro (2), Sud (3)	AIDA
Dimensione	Logaritmo dei ricavi dell'impresa	AIDA
ROE	Return on investment	AIDA
ASR	Flusso di cassa della gestione/Totale attività	AIDA
RSR	Capitale investito (D+E) / Ricavi	AIDA
PSR	Debiti a lungo termine/ Totale attività	AIDA

Fonte: ns. elaborazioni

4.2 I modelli di analisi

Per testare le ipotesi sono stati sviluppati due modelli di regressione di Poisson.

La prima ipotesi di ricerca stabilisce che le imprese di famiglia dovrebbero essere più propense, rispetto ai business non family, a sviluppare innovazioni ambientali proprio per la loro tendenza a voler proteggere il proprio patrimonio intangibile socio-emozionale attraverso le generazioni. Al fine di testare questa ipotesi, il Modello 1, la variabile dipendente è discreta.

Modello 1: Sostenibilità = f (Family; Variabili di controllo)

Nella seconda ipotesi di ricerca si afferma che la presenza di slack resources dovrebbe moderare positivamente la propensione e la capacità delle imprese di famiglia di sviluppare innovazioni ambientali poiché attenua la loro avversione al rischio e le sprona ad innovare. Il modello 2 può essere sintetizzato così:

Modello 2: Sostenibilità = f (Family; Family*ASR; Family*PSR; Family*RSR; Variabili di controllo)

In Tab 2. sono riportate statistiche descrittive e la correlazione di Pearson tra variabili dipendente, indipendenti e di controllo. Tutte le variabili continue usate nelle interazioni sono state centrate. I coefficienti di correlazione e i valori dei Variance Influence Factor (VIF) indicano che non sono presenti situazioni problematiche di multicollinearità.

Tab. 2: Statistiche descrittive e correlazione delle variabili

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
[1]	Sostenibilità	1.000												
[2]	Multinazionale	-0.106	1.000											
[3]	Family	-0.001	0.280	1.000										
[4]	Età	-0.068	0.309	0.094	1.000									
[5]	Settore1	0.004	0.217	0.090	0.102	1.000								
[6]	Settore2	0.009	-0.138	-0.064	-0.049	-0.793	1.000							
[7]	Area1	-0.017	-0.079	-0.045	0.040	-0.069	0.011	1.000						
[8]	Area2	0.079	0.273	0.189	0.113	0.115	-0.082	-0.121	1.000					
[9]	Dimensione	0.047	0.482	0.119	0.343	0.128	-0.064	-0.046	0.385	1.000				
[10]	ROE	-0.007	-0.048	0.020	-0.073	-0.004	0.010	-0.040	0.010	0.090	1.000			
[11]	ASR	0.029	-0.008	0.004	-0.036	0.017	0.007	-0.034	0.079	0.127	0.693	1.000		
[12]	RSR	-0.016	0.030	-0.015	0.063	0.016	-0.013	-0.005	-0.073	-0.154	-0.036	-0.052	1.000	
[13]	PSR	0.072	0.278	0.096	0.075	0.052	-0.039	-0.043	0.135	0.087	-0.097	-0.090	0.027	1.000
	Oss.	2475	2475	2475	2475	2475	2475	2475	2475	2475	2475	2475	2475	2475
	Media	0.308	0.630	0.555	35.477	0.794	0.141	0.009	0.622	9.272	8.070	0.062	18.972	0.091
	Dev. St.	0.982	0.483	0.497	23.925	0.405	0.348	0.094	0.485	2.481	21.650	0.076	312.930	0.136
	Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-6.908	-143.890	-0.719	-1175.58	0.000
	Max	17.000	1.000	1.000	187.000	1.000	1.000	1.000	1.000	17.182	108.550	0.792	11854.12	1.290
	VIF		1.564	1.106	1.234	1.018	1.148	3.459	3.403	1.553	1.851	1.832	10.189	1.111

Fonte: ns. elaborazioni

4.3 Risultati

Tab. 3 e Tab. 4 mostrano i risultati dei modelli di regressione di Poisson realizzati con R per analizzare l'effetto delle imprese familiari sull'innovazione sostenibile ambientale. I modelli differiscono per la presenza in Modello 2 dei termini di interazione *Family*ASR*, *Family*RSR* e *Family*PSR*.

Tab. 3: Risultati del Modello 1.

	Sostenibilità				
	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	-2.942	0.225		-13.063	< 0.000
Multinazionale	-1.311	0.091		-14.443	< 0.000
Family	0.184	0.077		2.401	0.016
Età	-0.012	0.002		-5.959	< 0.000
Settore1	-0.380	0.584	-0.651		0.515
Settore2	0.482	0.089		5.419	< 0.000
Area1	0.436	0.168		2.597	0.009
Area2	0.310	0.187		1.661	0.097
Ricavi (Log)	0.188	0.019		9.748	< 0.000
ROE	-0.008	0.002		-3.665	< 0.000
ASR		1.928	0.644		2.993
RSR	0.000	0.001		-0.187	0.851
PSR		2.073	0.221		9.381

Fonte: ns. elaborazioni. Pseudo R² = 0.0841.

Analizzando il Modello 1. (Tab 3.), *Family* ha un effetto significativo e positivo sulla variabile dipendente, supportando la prima ipotesi di ricerca. Tra le variabili di controllo, *Età* e *ROE* hanno un effetto negativo e significativo sulla variabile dipendente. *Settore2*, ovvero l'appartenenza al settore secondario, *Area1*, ovvero la localizzazione nel Nord Italia dell'impresa, e *Dimensione* sono significative ed hanno impatto positivo. Anche *ASR* e *PSR* hanno un effetto significativo e positivo sulla variabile dipendente. Tra le caratteristiche dell'impresa, *Multinazionale* ha un impatto statisticamente significativo su *Sostenibilità*, ma con effetto negativo.

Tab. 4: Risultati del Modello 2

	Sostenibilità			
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-2.846	0.228	-12.466	< 0.000
Multinazionale	-1.313	0.092	-14.339	< 0.000
Family	-0.112	0.119	-0.937	0.878
Età	-0.012	0.002	-6.047	< 0.000
Settore1	-0.396	0.584	-0.678	0.498
Settore2	0.486	0.089	5.464	< 0.000
Area1	0.442	0.168	2.625	0.009
Area2	0.315	0.187	1.686	0.092
Ricavi (Log)	0.191	0.019	9.853	< 0.000
ROE	-0.008	0.002	-3.909	< 0.000
ASR	0.965	0.858	1.125	0.261
RSR	-0.001	0.002	-0.377	0.706
PSR	1.550	0.312	4.965	< 0.000
Family*ASR	2.185	0.987	2.214	0.027
Family*RSR	0.001	0.002	0.381	0.703
Family*PSR	1.185	0.432	2.743	0.006

Fonte: ns. elaborazioni. Pseudo R²= 0.0891

In Modello 2 tra i termini di interazione *Family*ASR* e *Family*PSR* hanno effetto significativo e positivo, supportando la seconda ipotesi di ricerca. L'effetto di *Family*RSR* non è significativo. Infine, le variabili di controllo, *Multinazionale* e *PSR* mantengono gli effetti descritti in Modello 1. L'effetto di *ASR* rimane positivo ma in questo caso non è significativo.

5. Discussione e conclusione

Per affrontare le grandi sfide ambientali come i cambiamenti climatici, la perdita di biodiversità e l'impoverimento delle risorse naturali, sono necessari da un lato nuovi modelli economici e sociali e dall'altro innovazioni in grado di portare benefici ambientali.

Le imprese, diversamente da quanto accadeva in passato, non possono più permettersi di trascurare i problemi legati alla sostenibilità ambientale perché il comportamento ambientale ha un forte impatto sull'immagine pubblica, sulle prestazioni delle imprese e sul raggiungimento di uno sviluppo sostenibile della società (Doluca *et al.*, 2018). I governi, inoltre, hanno imposto regolamenti e leggi per incoraggiare le imprese a diventare sempre più rispettose nei confronti dell'ambiente. Altri driver che possono spronare le imprese a sviluppare un orientamento alla sostenibilità ambientale sono rappresentati dalle pressioni esercitate dagli stakeholder dell'impresa, dal desiderio di consolidare la propria reputazione come azienda green e dall'opportunità di beneficiare di incentivi statali come sgravi fiscali e sussidi (Amankwah-Amoah *et al.*, 2019).

L'influenza delle imprese di famiglia sullo sviluppo economico e sociale globale è evidente e la letteratura è unanime nell'affermare che, pur essendole imprese familiari un gruppo eterogeneo di imprese con valori, obiettivi e strategie diverse le une dalle altre, tutte sono caratterizzate dall'obiettivo di garantire la continuità nel lungo periodo affinché anche le generazioni successive a quella in carica possano beneficiare di un'azienda sana, sostenibile e longeva (Sirmon e Hitt, 2003; Miller e Le Breton-Miller, 2005). Tali evidenze suggeriscono una maggiore propensione delle

imprese familiari ad intraprendere un percorso in termini sostenibili (Bansal e DesJardine, 2014; De Massis *et al.*, 2015). Lo sviluppo di innovazioni, tuttavia, comporta investimenti consistenti e rischi che non tutte le imprese sono disposte ad accettare.

Le analisi confermano che le imprese a controllo familiare sono più inclini a sviluppare innovazioni ambientali sostenibili rispetto alle imprese non familiari, supportando la teoria SEW. La scelta di adottare comportamenti che vanno a beneficio dell'ambiente, come ipotizzato, è dovuta al desiderio di proiettare e mantenere un'immagine positiva di sé nei confronti della comunità, di ricevere riconoscimenti per azioni generose, di godere di prestigio, di mantenere relazioni con la comunità, di soddisfare i bisogni affettivi della famiglia e di mantenere un orientamento al lungo termine. Per questo, possiamo affermare che le imprese di famiglia dispongano della motivazione, della *Willingness*, per realizzare strategie innovative ambientali, al contrario di quanto supposto dall'*Ability and Willingness Paradox*. Non solo, la presenza della famiglia influenza gli atteggiamenti, le norme e il comportamento della coalizione di comando nel predisporre le risorse per adottare una strategia di sostenibilità ambientale proattiva (Sharma e Sharma, 2011). Inoltre, la propensione all'innovazione aumenta nel caso di *available* e *potential slack resources*. I risultati confermano che una maggiore disponibilità di queste risorse stimola le imprese a correre il rischio di innovare, modificando la percezione dell'azzardo. L'effetto duplice delle risorse rende la ponderazione guadagni-perdite sbilanciata verso i guadagni. Da queste evidenze possiamo affermare che le *slack resources* rappresentano una leva efficace per superare il paradosso dell'*Ability and Willingness*, almeno per quanto riguarda le innovazioni ambientali sostenibili.

I risultati ottenuti da questo studio possono suggerire implicazioni manageriali significative, date le conseguenze gestionali e strategiche che ne derivano. Anche le implicazioni di policy sono importanti. Lo sviluppo di innovazioni ambientali sostenibili rappresenta infatti uno degli obiettivi fondamentali della politica. Gli interventi a sostegno in tal senso hanno assunto negli ultimi anni un ruolo cruciale e strategico sempre maggiore. In questo contesto le evidenze emerse dalla presente ricerca possono servire come prima base per una riflessione sul tipo di incentivi pubblici da impiegare. Di solito, infatti, gli incentivi sono tarati sulla dimensione dell'impresa e, viceversa, trascurano le strutture di governance e le loro caratteristiche. Il presente lavoro indica invece che la capacità di sviluppare innovazioni ambientali sostenibili di un'impresa dipende in via rilevante dalla componente socio emozionale di un'impresa. L'impresa familiare in effetti necessita di sostegni, in quanto, come più volte ribadito, tende ad autofinanziarsi e ad opporsi all'adozione di soluzioni che compromettano il controllo familiare e, anche per queste ragioni, la sua crescita ne risulta compromessa.

Il presente studio non è esente da limiti. In primo luogo, il campione è costituito da sole imprese italiane, mentre sarebbe importante analizzare il contesto europeo. Un altro limite risiede nella misura del grado di innovazione ambientale sostenibile tramite brevetto, sarebbe interessante invece misurare anche l'innovazione per cui non viene attuato uno strumento di protezione della proprietà intellettuale. Inoltre, è noto come le imprese di famiglia siano eterogenee pur nella loro peculiarità. Risulta quindi interessante indagare come il ruolo della governance, del livello di managerialità e di apertura verso l'esterno, impattino sul fenomeno dell'innovazione sostenibile. Sarebbe interessante inoltre estendere l'analisi introducendo nuovi elementi chiave, quali per esempio la cultura organizzativa, l'eterogeneità o l'esperienza organizzativa e manageriale. Visto il ruolo fondamentale ricoperto dai giovani successori nel processo di sviluppo potrebbe inoltre essere utile verificare con maggiore profondità il ruolo degli eredi nel passaggio generazionale.

Ancora molti sono quindi gli interrogativi relativamente alle innovazioni ambientali nelle imprese di famiglia e si auspicano ulteriori sviluppi in questa direzione (Calabrò *et al.*, 2019; Bansal e DesJardine, 2014).

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Accessibilità e inclusione sociale: un'indagine empirica sull'adozione del W3C nei corporate website

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Abstract

Obiettivi. Al fine di valutare il rispetto dei principi di inclusione sociale degli utenti disabili, lo studio indaga l'adozione dei requisiti di accessibilità nei corporate website delle organizzazioni sostenibili.

Metodologia. È stata condotta una content analysis volta ad individuare l'applicazione delle linee guida internazionali emesse dal World Wide Web Consortium (W3C) nei siti web di 311 organizzazioni classificate nel Dow Jones Sustainability Word Index (DJSWI) 2018. La raccolta dei dati sui siti web aziendali è stata eseguita da luglio a dicembre 2019.

Risultati. I risultati dimostrano che la maggior parte dei siti web delle imprese risulta essere poco conforme alle linee guida in materia di accessibilità, sebbene emergano alcune differenze settoriali e spaziali. Lo studio evidenzia, infatti, che il rispetto degli standard del W3C è associato sia all'appartenenza a differenti business activity, sia alla provenienza geografica delle aziende.

Limiti della ricerca. L'adozione del metodo della content analysis implica i tipici limiti connessi alla valutazione soggettiva dei ricercatori. Il campione di imprese esaminate potrà essere ampliato in future indagini in materia, nel rispetto dell'equi-distribuzione delle organizzazioni per ciò che riguarda i settori e le aree geografiche.

Implicazioni pratiche. I risultati consentono ai responsabili e consulenti della digital communication delle organizzazioni di valutare e migliorare le performance aziendali relative alle pratiche di accessibilità nei siti web. L'accesso ai contenuti e ai servizi digitali costituisce un requisito indispensabile per attuare azioni di sostenibilità, in grado di accrescere la legittimazione sociale e la reputazione aziendale e di sviluppare, in particolare, l'engagement degli utenti disabili.

Originalità del lavoro. Lo studio costituisce un primo step in un filone di ricerca ancora poco indagato. Il paper contribuisce al dibattito sul tema dell'accessibilità online per gli utenti disabili, fornendo prime evidenze empiriche sull'adozione delle linee guida internazionali da parte delle organizzazioni sostenibili.

Parole chiave: accessibilità; inclusione; sostenibilità; W3C; corporate website.

Objectives. In order to assess the compliance with the principles of social inclusion of disabled users, the study investigates the adoption of accessibility requirements in the corporate websites of sustainable organizations.

Methodology. A content analysis was conducted to identify the application of the World Wide Web Consortium (W3C) guidelines on the websites of 311 organizations classified in the Dow Jones Sustainability Word Index (DJSWI) 2018. The data collection on the corporate websites was performed from July to December 2019.

Findings. Results show that the majority of business websites appears to be poorly compliant with accessibility guidelines, although some sectoral and spatial differences emerge. The study shows, in fact, that the compliance with W3C standards is associated with both the belonging to different business activities and the geographical origin of companies.

Research limits. The adoption of the content analysis method implies the typical limits associated with the subjective evaluation of researchers. The sample of companies examined may be expanded in future investigation, in compliance with the equitable distribution of organizations with regard to sectors and geographical areas.

Practical implications. Results allow managers and consultants of corporate digital communication to evaluate and improve corporate performance relating to accessibility practices on websites. The access to digital content and services is an indispensable requirement for implementing sustainability actions, capable of increasing social legitimacy and corporate reputation and to develop, in particular, the engagement of disabled users.

Originality of the study. The study constitutes a first step in a line of research that has not yet been investigated. The paper contributes to the debate on the online accessibility for disabled users, providing first empirical evidence on the adoption of international guidelines by sustainable organizations.

Key words: accessibility; inclusion; sustainability; W3C; corporate website.

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1. Introduzione

L'accessibilità ai contenuti e agli strumenti digitali, volta ad evitare qualsiasi forma di discriminazione determinata da una condizione di handicap e a garantire l'inclusione sociale di tutti i pubblici (Nielsen, 2000; Adam and Kreps, 2009; Coleman *et al.*, 2016), rappresenta una tematica fortemente ancorata alla sostenibilità aziendale (Ball *et al.*, 2005; Gould *et al.*, 2020). Infatti, al fine di conseguire uno sviluppo sostenibile e ottenere legittimazione sociale (Fernando and Lawrence, 2014; Luo *et al.*, 2015), l'impresa deve promuovere una *corporate culture* basata sull'inclusione e sulla partecipazione per favorire una completa integrazione dei disabili nelle dinamiche aziendali. Con un approccio etico ai problemi dei meno abili e con l'assunzione spontanea di comportamenti socialmente responsabili, l'impresa può ottenere fiducia e instaurare legami stabili con i propri stakeholder, migliorando il proprio capitale reputazionale (Fombrun and van Riel, 2004).

Al fine di favorire l'inclusione sociale dei disabili, le imprese devono innanzitutto garantire l'accessibilità ai contenuti informatici presenti nel corporate website (Sanil and Ramakrishnan, 2015). Il sito web, infatti, rappresenta il principale strumento di comunicazione digitale attraverso cui le organizzazioni veicolano informazioni aziendali (valori, *commitment*, attività, *performance*), e promuovono processi di *stakeholder engagement* (Friedman and Miles, 2006; Viglia *et al.*, 2018). In quest'ottica, il corporate website contribuisce allo sviluppo di forme di partecipazione consapevole da parte degli utenti disabili e consente un'interazione positiva con l'ambiente digitale aziendale (Anderberg and Jönsson, 2005; Baroni and Lazzari, 2013).

Nello specifico, un sito web per essere accessibile deve adeguarsi agli standard tecnici previsti dalle linee guida internazionali *Web Content Accessibility Guidelines* (WCAG), emesse dal *World Wide Web Consortium* (W3C - organismo internazionale nato con lo scopo di sviluppare protocolli e standard per il web) nell'ambito della *Web Accessibility Initiative* (WAI - sezione che si occupa di diffondere la cultura dell'accessibilità nel web). L'adozione di tali criteri consente ai siti web di erogare servizi e condividere informazioni fruibili da tutti gli utenti, grazie soprattutto all'uso di tecnologie assistive che garantiscono contenuti alternativi e configurazioni personalizzate.

Nonostante il crescente interesse nei confronti dei principi di inclusione sociale, e il sempre più attuale dibattito, nazionale ed internazionale, sulle normative in materia di accessibilità digitale (De Andrés *et al.*, 2010; Adelopo *et al.*, 2012; Coleman *et al.*, 2016), indagini empiriche tese ad indagare il rispetto dei requisiti di accessibilità nei corporate website di imprese sostenibili risultano ancora limitate sia nell'ambito accademico, che della *business community*. Il presente paper cerca di colmare questo gap attraverso uno studio esplorativo volto ad indagare la presenza degli standard del W3C nei siti web di 311 organizzazioni classificate nel *Dow Jones Sustainability World Index* (DJSWI) 2018 e appartenenti a diversi ambiti geografici e a differenti *business activity*.

In linea con l'obiettivo della ricerca, il lavoro si sviluppa nel modo seguente. Nel *background concettuale* saranno approfonditi i temi relativi al diritto all'accessibilità, all'inclusione sociale e al legame con la sostenibilità, nonché gli standard del W3C, cui seguirà la descrizione dell'approccio metodologico impiegato e la presentazione dell'indagine empirica. Successivamente, la discussione dei risultati dello studio esplorativo fornirà spunti di riflessione per i manager e i consulenti di comunicazione digitale d'impresa.

2. Background concettuale

2.1. Il diritto all'accessibilità per le persone disabili: tra inclusione e sostenibilità

L'inclusione della disabilità si inserisce a pieno titolo nelle pratiche di *corporate sustainability* (Quaddus and Siddique, 2011; Gould *et al.*, 2020). Un'organizzazione, infatti, rispetta i principi di *Corporate Social Responsibility* (CSR) e si può definire sostenibile se è in grado di garantire il giusto equilibrio tra il conseguimento delle performance economiche, la preservazione delle risorse ambientali e il progresso sociale ("3P" - Profit, Planet e People) (Savitz and Weber, 2006). In

particolare, la dimensione “People” riguarda la capacità dell’organizzazione di rispettare le istanze e le aspettative dei propri pubblici e comprende tematiche relative a diversi ambiti della sostenibilità sociale, tra cui il rispetto dei diritti umani e dei principi di pari opportunità e di non discriminazione. In effetti, l’impresa ha la necessità di ottenere sostegno e legittimazione da parte degli stakeholder (Luo *et al.*, 2015), appartenenti anche alle categorie più svantaggiate, che reclamano sempre di più il diritto ad essere informati circa le scelte operate e le azioni da essa svolte (Greenwood, 2007; Gambetti *et al.*, 2017).

In questa prospettiva, facendo riferimento ai principi di indipendenza, uguaglianza e partecipazione, la Convenzione ONU sui diritti delle persone con disabilità considera incondizionato il diritto all’accessibilità che esprime “la misura in cui prodotti, sistemi, servizi, ambienti e strutture sono in grado di essere utilizzati da una popolazione con la più ampia varietà di caratteristiche e capacità (ad es. fisiche, cognitive), per raggiungere un determinato obiettivo in un contesto specifico” (Persson *et al.*, 2015, p. 524).

L’accessibilità può essere considerata il “grado zero” di garanzia democratica (Silvestri and Ducci, 2004; Coleman *et al.*, 2016). A tal riguardo, assumono un ruolo rilevante le Tecnologie dell’Informazione e della Comunicazione (ICT) in quanto, se progettate secondo i requisiti di “equità d’uso”, rappresentano un importante strumento di supporto per l’accessibilità e l’inclusione sociale (Adelopo *et al.*, 2012).

In particolare, l’accesso alle ICT per gli utenti che presentano deficit di abilità deve basarsi sui parametri di “web eQuality”, adottati per garantire un utilizzo compatibile dei contenuti web per le persone con disabilità sensoriali (non vedenti e non udenti), disabilità motorie (persone con impedimenti nell’uso delle mani) e disabilità cognitive (Maretti, 2003). Ognuna delle categorie di disabilità presenta problemi di varia complessità che necessitano di soluzioni digitali specifiche al fine di consentire l’accesso alle informazioni veicolate dalle aziende.

In quest’ottica, le ICT promuovono processi “inclusivi” e “partecipativi” di *stakeholder engagement* che possono contribuire, in modo significativo, a migliorare la sostenibilità delle decisioni e delle condotte aziendali (Friedman and Miles, 2006; Viglia *et al.*, 2018). Un’organizzazione realmente sostenibile inevitabilmente è tesa, infatti, a dialogare con tutti i portatori d’interesse, senza alcuna discriminazione, a coinvolgerli nelle dinamiche aziendali e a prestare ascolto alle loro richieste (Porter and Kramer, 2011; Golinelli and Volpe, 2012; Vollero *et al.*, 2019). Lo sviluppo di una “relazione sostenibile” tra l’organizzazione e i suoi pubblici, basata sul principio di inclusione sociale, appare connaturale al concetto stesso di *corporate sustainability* (Mathur *et al.*, 2008; Prado-Lorenzo *et al.*, 2009).

Tuttavia, qualora le tecnologie informatiche vengano progettate senza tener conto delle esigenze di accessibilità delle persone con disabilità, possono configurarsi come una barriera, traducendosi in strumenti di esclusione sociale (Goggin and Newell, 2003; Seymour, 2004). La tematica dell’accesso alle ICT viene, dunque, inquadrata nell’ambito del diritto all’informazione e alla comunicazione (Zaccaria and Valastro, 1998) e nella questione più ampia del *digital divide* che pone in luce e denuncia le disuguaglianze derivanti dall’impossibilità di accedere ai contenuti digitali (Sartori, 2006; Bentivegna, 2009; Van Dijk, 2020).

Da questa consapevolezza derivano le normative internazionali e nazionali in materia di accessibilità degli strumenti informatici destinate a garantire l’eguaglianza di accesso all’informazione e la fruibilità dei contenuti digitali per tutti gli utenti, evitando i fattori di emarginazione (Baroni and Lazzari, 2013).

In molti Paesi, i siti web e le applicazioni mobili devono garantire la conformità agli standard di accessibilità web previsti dalle diverse norme (come EN 301 549 in Europa, ADA e Section 508 in America, AODA in Canada), seguendo le linee guida internazionali WCAG del W3C.

Le normative connesse all’accessibilità dei contenuti informativi hanno coinvolto in una prima fase le organizzazioni pubbliche (Di Giorgi and Bargellini, 2006). Diversi studi evidenziano che sia in ambito europeo, che nel contesto statunitense, ancora pochi siti web governativi sono pienamente conformi agli standard WCAG (Kuzma *et al.*, 2009). Inoltre, si rilevano significative lacune anche nell’accessibilità mediante i social network (Lee *et al.*, 2014).

Mentre in alcune province del Canada gli standard di accessibilità si applicano sia ai soggetti pubblici che privati (AODA), in Europa, la possibilità di ampliare la platea delle organizzazioni obbligate al rispetto dei requisiti di accessibilità è stata incoraggiata dalla direttiva (UE) 2016/2102 che, pur costituendo una disciplina in materia di accessibilità dei siti web e delle applicazioni mobili degli enti pubblici, consente agli Stati Membri di estenderne l'applicazione agli enti privati in settori quali sanità, servizi per l'infanzia, inclusione sociale e sicurezza sociale, servizi di trasporto e dell'elettricità, del gas, dell'energia termica, dell'acqua, servizi delle comunicazioni elettroniche e dei servizi postali. Un maggiore impulso in questo senso è stato dato dalla direttiva (UE) 2019/882, che ha previsto per prodotti e servizi (relativi a trasporti, e-commerce, media e settore finanziario) forniti ai consumatori a partire da giugno 2025, il rispetto di specifici requisiti di accessibilità anche in merito ai siti web, da parte degli operatori economici. Da giugno del 2025, infatti, nessun prodotto o servizio non accessibile potrà essere immesso nel mercato europeo.

Nell'ambito delle legislazioni nazionali, si è assistito ad un processo di recepimento e attuazione di tali normative. In Italia, la legge 4/2004 "Disposizioni per favorire l'accesso dei soggetti disabili agli strumenti informatici" (Legge Stanca) ha segnato un importante traguardo nell'affermazione del diritto all'accessibilità in termini di inclusione degli utenti appartenenti a categorie svantaggiate, garantendo un livello minimo di accessibilità dei siti web delle Amministrazioni pubbliche, anche con l'emanazione di specifiche linee guida basate sulle WCAG. L'avvio nel 2020 di una sostanziale riforma della Legge ha anticipato parzialmente il recepimento della direttiva 2019/882, con l'inserimento anche delle grandi realtà aziendali del settore privato tra i destinatari della normativa, con esclusione delle micro-imprese. In particolare, l'art. 29 del decreto Semplificazioni (d.l. n. 76/2020 convertito con modificazioni dalla l.n. 120/2020) prevede l'estensione degli obblighi di accessibilità definiti dalla legge Stanca (l. 4/2004) anche ai soggetti privati con un determinato fatturato medio (superiore a cinquecento milioni di euro negli ultimi tre anni di attività) che offrono servizi al pubblico attraverso siti web o applicazioni mobili.

2.2. L'accessibilità nei corporate website: lo standard del W3C

Tra gli strumenti maggiormente utilizzati dalle organizzazioni, un ruolo particolarmente rilevante è assunto dal website, che garantisce un'esplicitazione più diretta e immediata degli statement valoriali e delle attività dell'impresa (Castelo Branco *et al.*, 2014; Sanil and Ramakrishnan, 2015; Siano *et al.*, 2016). L'utilizzo del sito web offre, inoltre, alle organizzazioni una maggiore flessibilità nel gestire i contenuti sui temi di maggiore interesse, con la possibilità di effettuare aggiornamenti continui (Williams and Pei, 1999).

Al fine di garantire un'efficace comunicazione online con gli utenti con deficit di abilità, è di fondamentale importanza l'ergonomia del corporate website (Mich *et al.*, 2003; Chevalier and Kicka, 2006), il cui obiettivo è creare un'interfaccia di facile utilizzo e favorire un'adeguata fruizione dei contenuti. Come anticipato nel paragrafo precedente, il primo requisito da rispettare per consentire lo sviluppo di un processo digitale inclusivo è quello dell'accessibilità, ovvero la capacità dei sistemi informatici di erogare servizi e fornire informazioni fruibili da tutti gli utenti, senza discriminazioni (Nielsen, 2000). In particolare, l'accessibilità di un sito web esige che esso sia progettato in modo da garantire la sua consultazione da parte di individui affetti da disabilità fisiche o sensoriali. L'informazione in formato elettronico per molte persone disabili, infatti, è in linea di principio più accessibile rispetto alla forma tradizionale cartacea, proprio grazie alle nuove tecnologie assistive che permettono la traduzione dei contenuti in diverse modalità percettive mediante accorgimenti tecnici e configurazioni personalizzate (Silvestri & Ducci, 2004).

Realizzare un corporate website accessibile significa innanzitutto adeguarsi agli standard tecnici per l'accessibilità ai siti web. Il riferimento primario è costituito dalle già citate WCAG, emesse dal W3C. Tali direttive sono volte a consentire nel corporate website un'accessibilità universale, indipendentemente dal tipo di hardware o software utilizzato, dall'infrastruttura di rete, dalla lingua, dalla cultura, dalla localizzazione geografica e dal grado di disabilità (Picci, 2002; Polillo, 2006).

L'adozione delle linee guida del W3C è, quindi, intrinsecamente legata al rispetto dei principi di "web eQuality" (Blanck, 2014), che diventano prerequisiti essenziali per attivare e promuovere la partecipazione e l'inclusione sociale. In quest'ottica, un sito accessibile costituisce un ambiente multimediale finalizzato a garantire l'*e-participation*, cioè la rimozione delle barriere informatiche, poiché i contenuti informativi, le modalità di interazione, le procedure di navigazione e i servizi disponibili sono pienamente fruibili da qualsiasi tipo di utente. Il W3C, infatti, considera l'accessibilità un tema che, pur partendo dai bisogni espressi dalle persone disabili, va oltre le specificità delle richieste di tale categoria di utenti per estendersi ai principi universali di equità sociale (Baroni and Lazzari, 2013).

Nello specifico, le linee guida del W3C si basano su quattro principi che costituiscono i "pilastri dell'accessibilità nel web" (W3C, 2018): il contenuto deve essere percepibile (non può essere invisibile a tutti i sensi dell'utente), utilizzabile (le componenti e la navigazione dell'interfaccia non possono comportare un'interazione che l'utente non può attuare), comprensibile (l'utente deve essere in grado di comprendere l'informazione e le operazioni da compiere) e robusto (il contenuto deve rimanere accessibile da un'ampia varietà di tecnologie assistive). Le linee guida propongono precisi standard agli sviluppatori di contenuti web e stabiliscono criteri di accessibilità per ogni elemento presente in una pagina web, quali testo, fondo, colore, immagini, tabelle, ecc. (Silvestri and Ducci, 2004). A tal riguardo, le principali raccomandazioni sono state descritte in modo approfondito da Spellman *et al.* (2021):

- fornire alternative equivalenti al contenuto audio e visivo;
- non fare affidamento al solo colore;
- creare tabelle che si trasformino in maniera elegante;
- assicurarsi che l'utente possa tenere sotto controllo i cambiamenti di contenuto nel corso del tempo;
- assicurare l'accessibilità diretta delle interfacce utente incorporate;
- fornire informazione per la contestualizzazione e l'orientamento nella pagina web;
- fornire chiari meccanismi di navigazione;
- assicurarsi che i documenti siano chiari e semplici.

In particolare, tutti gli oggetti presenti nella pagina web devono essere visibili mediante le tecnologie assistive per le persone disabili e fornire un accesso alternativo. A tal riguardo, il W3C delinea i criteri del contenuto web equivalente, ovvero del "sostituto accettabile" che soddisfa la stessa funzione del contenuto originale al momento della presentazione. La possibilità di usare contenuti alternativi rimuove la dipendenza da un qualsiasi meccanismo cognitivo per la comprensione. Un esempio classico è rappresentato dal testo alternativo associato alle immagini: descrivere il contenuto di un'immagine consente a chi naviga con un browser vocale di accedere all'informazione visiva (Lazzari, 2012). L'equivalente testuale può essere presentato all'utente come sintesi vocale, braille e testo visualizzato sullo schermo. Ognuno di questi tre meccanismi utilizza uno dei cinque sensi - udito per la sintesi vocale, tatto per il braille e vista per il testo visualizzato sullo schermo - rendendo l'informazione accessibile a utenti con disabilità sensoriali.

Il W3C stabilisce i criteri anche per gli equivalenti non testuali, come le icone e i discorsi preregistrati, che possono rendere i documenti accessibili a persone con difficoltà ad accedere al testo scritto, inclusi individui con disabilità cognitive e difficoltà di apprendimento e sordità. Una descrizione sonora è un esempio di equivalente non testuale di informazione visiva.

La progettazione di un sito web accessibile, quindi, garantisce alle organizzazioni un sostanziale incremento del bacino di utenza potenzialmente raggiungibile, facilitando lo sviluppo di relazioni di lungo termine anche con persone con deficit di abilità. Inoltre, il rispetto degli standard del W3C costituisce un requisito fondamentale per dimostrare l'impegno dell'impresa nel garantire una comunicazione accessibile e inclusiva nei confronti dei propri pubblici. Di conseguenza, la conformità alle linee guida internazionali testimonia una condotta sostenibile da parte delle organizzazioni che possono ottenere ritorni in termini di immagine e reputazione.

3. Research Design per uno studio esplorativo

Lo studio esplorativo è stato finalizzato ad indagare il rispetto dei requisiti di accessibilità nei corporate website di imprese sostenibili. Il campione di analisi ha coinvolto i siti web di tutte le organizzazioni (311) classificate nel *Dow Jones Sustainability World Index* (DJSWI) 2018, ovvero un indice globale che individua le principali imprese sostenibili presenti in tutto il mondo. Il DJSWI recensisce ogni anno circa 2500 aziende quotate nel Dow Jones Global Total Stock Market Index, dalle quali seleziona le più performanti in termini di sostenibilità sulla base di criteri economici, ambientali e sociali. In particolare, l'indice include il dieci per cento delle aziende valutate che equivale a circa 300 aziende. L'indice riconosciuto a livello internazionale per la sua trasparenza e obiettività informativa ed è ampiamente utilizzato negli studi di CSR (Cheung, 2011; López *et al.*, 2007). Pertanto, il DJSWI fornisce un contesto empirico appropriato per indagare le pratiche di accessibilità da parte di organizzazioni altamente sostenibili.

Le organizzazioni prese in esame appartengono a diversi ambiti geografici (Europa, Nord e Sud America, Asia, Africa, Oceania) e a differenti *business activity*. In particolare, le imprese sono state raggruppate tenendo conto del *Global Industry Classification Standard* (GICS), criterio introdotto da MSCI in collaborazione con Standard & Poor's e accettato a livello mondiale per la classificazione settoriale delle *industry*, al fine di conferire maggior comparabilità alle ricerche in campo internazionale.

Nel dettaglio, i settori merceologici si distinguono in funzione del proprio *core business* in:

- *Energy Sector* (settore energetico);
- *Materials Sector* (settore manifatturiero);
- *Industrials Sector* (settore industriale);
- *Consumer Discretionary Sector* (imprese maggiormente sensibili ai cicli economici);
- *Consumer Staples Sector* (imprese meno sensibili ai cicli economici);
- *Health Care Sector* (settore farmaceutico e biotecnologico);
- *Financials Sector* (settore della finanza);
- *Information Technology Sector* (settori hardware, software e semiconduttori);
- *Telecommunications Services Sector* (settore delle telecomunicazioni);
- *Utilities Sector* (settore dei beni pubblici quali gas, energia elettrica, acqua, ecc.);
- *Real Estate Sector* (settore immobiliare).

Come specificato, l'unità di analisi nella presente indagine è composta dai siti web aziendali, in quanto rappresentano i principali canali di comunicazione mediante cui le organizzazioni informano i pubblici riguardo i loro impegni e le attività implementate. Inoltre, costituiscono degli strumenti che dovrebbero facilitare i processi di stakeholder engagement, anche con gli utenti con deficit di abilità, supportando l'accesso alle informazioni aziendali e favorendo la partecipazione dei pubblici nelle pratiche organizzative (Moreno and Capriotti, 2009; Illia *et al.*, 2017; Siano and Conte, 2018).

Ai fini della rilevazione dei requisiti di accessibilità nell'ambito dei siti web di organizzazioni sostenibili, è stata condotta una *content analysis* (Braun and Clarke, 2006; Smith, 2017), volta ad individuare il rispetto delle linee guida del W3C. L'item specifico è stato trattato come variabile dicotomica che presenta due modalità alternative: riscontro oppure assenza del riferimento specifico all'adozione dei criteri di accessibilità del W3C. La preferenza per la variabile dicotomica è giustificata dal fatto che essa comporta una minore difficoltà di operazionalizzazione, rispetto alle variabili rilevabili con tecniche di *scaling*. La semplificazione che si associa al trattamento di *dummy* se da un lato può apparire un punto di debolezza per la misurazione, dall'altro presenta il non trascurabile vantaggio di consentire una più agevole rilevazione, riducendo la soggettività e l'ambiguità insite in questo tipo di attività.

Inoltre, al fine di limitare le interpretazioni soggettive, la rilevazione dello specifico item è stata condotta da due codificatori indipendenti, raggiungendo un'affidabilità di codificazione (intercoder reliability) pari a 0,82 che può essere considerata soddisfacente (Krippendorff, 2012). La raccolta dei dati sui siti web aziendali è stata eseguita da luglio a dicembre 2019.

4. Risultati

Al fine di analizzare il rispetto dei requisiti stabiliti dalle linee guida del W3C, lo studio ha verificato la presenza o l'assenza di specifiche indicazioni dello standard internazionale nell'ambito dei corporate website delle organizzazioni del campione esaminato. La tab. 1 evidenzia che soltanto il 21,5% dei siti web rispetta i criteri di accessibilità definiti dal W3C. L'indagine rileva che la maggior parte delle organizzazioni (78,5%) non ha ancora acquisito nel proprio sito web gli standard di accessibilità fissati a livello internazionale.

Tab. 1: Presenza dei requisiti del W3C nei corporate website del campione analizzato

	v.a.	%
Assenza W3C	244	78,5
Presenza W3C	67	21,5
Totale	311	100,0

Fonte: ns. elaborazioni

Lo studio ha indagato il rispetto dei criteri del W3C tra le diverse *business activity* delle organizzazioni prese in esame dalla *content analysis*, al fine di verificare possibili trend nell'adozione degli standard di accessibilità da parte dei differenti settori merceologici.

Il confronto tra le percentuali di adozione di tali criteri mette in luce scenari diversi a seconda delle *business activity* (tab. 2).

Tab. 2: Confronto tra business activity riguardo al rispetto dei requisiti del W3C

Business Activity	N		W3C		Totale
			Assenza (non adozione)	Presenza (adozione)	
Consumer Discretionary	43	v.a. %	33 76,7%	10 23,3%	43 100,0%
Financials	55	v.a. %	43 78,2%	12 21,8%	55 100,0%
Industrials	48	v.a. %	44 91,7%	4 8,3%	48 100,0%
Energy Sector	22	v.a. %	17 77,3%	5 22,7%	22 100,0%
Consumer Staples	19	v.a. %	15 78,9%	4 21,1%	19 100,0%
Information Technology	30	v.a. %	21 70,0%	9 30,0%	30 100,0%
Health Care	25	v.a. %	21 84,0%	4 16,0%	25 100,0%
Materials	27	v.a. %	23 85,2%	4 14,8%	27 100,0%
Real Estate	18	v.a. %	15 83,3%	3 16,7%	18 100,0%
Telecommunications Services	9	v.a. %	6 66,7%	3 33,3%	9 100,0%
Utilities	15	v.a. %	6 40,0%	9 60,0%	15 100,0%
Totale	311	v.a. %	244 78,5%	67 21,5%	311 100,0%

Fonte: ns. elaborazioni.

I siti web delle imprese appartenenti al settore “utilities” mostrano un rispetto maggiore dei requisiti del W3C, se comparato agli altri settori. Infatti, il 60,0% dei corporate website presentano un chiaro riferimento alla conformità ai requisiti di accessibilità: tale percentuale è di gran lunga superiore rispetto alla percentuale media di adozione dei criteri del W3C tra i settori (21,5%). Anche i settori “telecommunications services” (33,3%) e “information technology” (30,0%) raggiungono un buon livello di accessibilità nei siti web. All’opposto, lo studio rileva una scarsa adozione degli standard del W3C da parte dei corporate website delle imprese appartenenti al settore “industrials” (8,3%). Raggiungono percentuali di adozioni discrete, al di sotto della percentuale media settoriale, anche i settori “materials” (14,8%), “health care” (16,0%), “real estate” (16,7%). Il test del chi-quadrato di Pearson, riportato dalla tab. 3, ha evidenziato che la relazione tra le due variabili (*business activity* e adozione W3C) è significativa ($p\text{-value} < 0,05$).

Tab. 3: Test chi-quadrato di Pearson

Test chi-quadrato di Pearson	
Chi-Square	21,619
df	10
P-value	,017

Fonte: ns. elaborazioni

Infine, l’indagine ha indagato la relazione tra grado di adozione dei requisiti del W3C e provenienza geografica delle imprese appartenenti al campione (tab. 4). Le differenze tra i continenti rispetto alla conformità ai criteri del W3C, se confrontate con la percentuale media (21,5%), rileva che i siti web delle organizzazioni Europee sono più attenti agli standard internazionali in tema di accessibilità (30,8%). Diversamente, i corporate website che risultano meno conformi al W3C sono quelli delle imprese del Sud America (7,7%).

Tab. 4: Confronto tra continenti riguardo al rispetto dei requisiti del W3C

Continenti	N.		W3C		Totale
			Assenza (non adozione)	Presenza (adozione)	
Africa	5	v.a. %	4 80,0%	1 20,0%	5 100,0%
Asia	58	v.a. %	52 89,7%	6 10,3%	58 100,0%
Europa	156	v.a. %	108 69,2%	48 30,8%	156 100,0%
Nord America	60	v.a. %	53 88,3%	7 11,7%	60 100,0%
Oceania	13	v.a. %	15 78,9%	4 21,1%	19 100,0%
Sud America	19	v.a. %	12 92,3%	1 7,7%	13 100,0%
Totale	311	v.a. %	244 78,5%	67 21,5%	311 100,0%

Fonte: ns. elaborazioni

Tab. 5: Test chi-quadrato di Pearson

Test chi-quadrato di Pearson	
Chi-Square	17,107
df	5
P-value	,004

Fonte: ns. elaborazioni

Il test del chi-quadrato di Pearson, presente nella tab. 5, conferma che la relazione tra le due variabili (appartenenza geografica e adozione W3C) è significativa ($p\text{-value} < 0,05$).

5. Discussione

L'obiettivo dello studio esplorativo è stato quello di mettere in luce i trend relativi all'adozione dei requisiti di accessibilità nell'ambito dei corporate website di organizzazioni sostenibili, classificate dal DJSWI. I risultati dimostrano che la maggior parte dei siti web delle imprese analizzate non rispetta gli standard del W3C, di conseguenza risulta essere poco conforme alle linee guida in materia di accessibilità. Il limitato utilizzo dei requisiti del W3C nella progettazione dei siti web sottolinea una scarsa attenzione da parte delle organizzazioni nel rispettare il principio universale di inclusione sociale, che è strettamente connesso alla sostenibilità aziendale (Gould *et al.*, 2020). In quest'ottica, lo studio evidenzia che l'impegno nelle azioni di sostenibilità delle imprese analizzate non garantisce un adeguato livello di adozione delle linee guida del W3C. Questo risultato è in linea con lo studio di Martínez *et al.* (2014) che mostrava un effetto di influenza contrario tra commitment in CSR e adozione degli standard di accessibilità: le imprese impegnate in CSR avevano i siti web meno accessibili. Ciò potrebbe essere giustificato dal fatto che i requisiti accessibilità sono ancora poco conosciuti in ambito aziendale e non sono "all'ordine del giorno" delle richieste da parte degli stakeholder (De Andrés *et al.*, 2010).

Le organizzazioni si dimostrano, quindi, ancora poco sensibili nel garantire agli utenti con disabilità il giusto accesso alle informazioni e l'adeguato coinvolgimento nelle pratiche aziendali. In questa prospettiva, il corporate website si configura come uno strumento che amplifica il *digital divide*, in quanto non consente un'uguaglianza tra gli utenti nel processo di accesso, esposizione, elaborazione ed interpretazione delle informazioni relative alla realtà aziendale (Van Dijk, 2020).

I risultati mostrano, inoltre, un'associazione tra l'adozione degli standard di accessibilità e l'appartenenza settoriale delle aziende. In particolare, lo studio evidenzia che il settore "utilities" è più impegnato nel rispetto delle linee guida internazionali. Ciò significa che tale settore, a prescindere dalle normative vigenti, ha iniziato prima ad implementare nei siti web pratiche volte al conseguimento di un processo digitale inclusivo, rispetto alle altre *business activity* esaminate. Questo trend potrebbe essere giustificato considerando le peculiarità di tale settore che si occupa dell'erogazione di beni e servizi di pubblica utilità (quali gas, energia elettrica, acqua) che avviene in genere sotto il controllo, diretto o indiretto, dello Stato. Pertanto, il *core business* delle imprese appartenenti al settore "utilities" è maggiormente orientato a soddisfare le esigenze della comunità e ad evitare discriminazioni sociali. Infatti, le utilities sono spinte, in un'ottica strategica, a creare delle relazioni solide con la globalità dei cittadini e a sviluppare politiche di sostenibilità che costituiscono un tratto distintivo di questo settore (Arena *et al.*, 2019). Tale tendenza può essere anche in parte dovuta al fatto che il settore delle *utilities* appartiene a quelle categorie etichettate come *controversial* dalla letteratura di CSR (Kilian and Hennings, 2014): dato il potenziale impatto negativo dei processi industriali, le imprese operanti in questi settori, per guadagnare legittimità agli occhi dell'opinione pubblica, potrebbero essere indotte a impegnarsi maggiormente in iniziative di sostenibilità. Il rafforzamento dell'accessibilità del sito web potrebbe inquadarsi proprio nel novero delle pratiche volte a curare la sostenibilità sociale, garantendo l'accesso a gruppi sociali svantaggiati.

Nel confronto tra le *business activity*, è interessante notare anche un'attenzione maggiore al rispetto dei criteri W3C da parte di imprese appartenenti ai settori "telecommunications services" e "information technology". Evidentemente, questi settori hanno più competenze in materia di tecnologie digitali e, di conseguenza, sono più predisposte ad integrare nei propri corporate web site i criteri di accessibilità online.

Diversamente, il settore "industrial", che include per la maggior parte imprese operanti nei *capital goods*, risulta essere quello meno attento alla conformità agli standard W3C. La scarsa attenzione ai temi dell'accessibilità trova spiegazione nella natura B2B di tale *business activity*,

volta principalmente allo sviluppo di relazioni orientate alle pratiche di vendita delle componenti dei processi produttivi nell'ambito della *supply chain*. Pertanto, tali aziende potrebbero essere poco interessate alla creazione di dinamiche digitali basate sul dialogo con i consumatori finali (Jarvinen *et al.*, 2012) e alla progettazione di un sito web "inclusivo" per gli utenti con deficit di abilità. È presumibile, comunque, che le recenti tendenze alla creazione di filiere produttive sempre più sostenibili (Seuring and Müller, 2008) possa favorire un graduale maggior allineamento alle esigenze degli utenti disabili a tutti i livelli della *supply chain*.

Interessante è anche rilevare un trend decisamente negativo per le organizzazioni dell'"health care" che dovrebbero essere, per la rilevanza sociale dei beni commercializzati, maggiormente sensibili e attente alle questioni relative all'inclusione dei disabili e ai processi di CSR e stakeholder engagement (Saviano *et al.*, 2018).

Inoltre, l'indagine rileva l'esistenza di un'associazione tra la conformità al W3C e l'appartenenza geografica delle organizzazioni coinvolte nell'analisi empirica. I risultati dimostrano che le imprese Europee sono più attive nell'adozione delle linee guida di accessibilità, rispetto agli altri continenti. Le organizzazioni europee hanno storicamente aderito per prime agli standard di sostenibilità aziendale; di conseguenza il numero maggiore di tali imprese nell'ambito dell'indice DJSWI dimostra un'aderenza più significativa ai principi di CSR stabiliti a livello internazionale. Si presume, infatti, che la CSR sia in gran parte un fenomeno culturale occidentale, in quanto la maggior parte delle norme e degli standard di rendicontazione di CSR è stata sviluppata e "istituzionalizzata" in Europa (Godfrey and Hatch, 2007; Kadyan, 2017). È ipotizzabile, quindi, che i fattori che giustificano questo trend siano la presenza di una corporate culture più sensibile ai valori di CSR, il contesto normativo più attivo e in fermento su tali tematiche e il maggiore stimolo all'emulazione delle *best practice* aziendali. Tali peculiarità risultano essere meno presenti, invece, nel contesto del Sud America che si caratterizza per una minore sensibilità verso le problematiche di inclusione sociale e per la presenza di limitate occasioni di dibattito e confronto, a livello aziendale, sui temi di sostenibilità (Dobers and Halme, 2009).

6. Implicazioni, limiti e future ricerche

La presente indagine consente di ampliare gli studi che trattano le pratiche di inclusione nei contesti digitali (Ball *et al.*, 2005). In particolare, contribuisce al dibattito sul tema dell'accessibilità online per gli utenti disabili, individuando elementi di misurazione nell'ambito dei siti web (requisiti W3C) e fornendo evidenze empiriche sull'adozione delle linee guide internazionali da parte delle organizzazioni sostenibili.

Lo studio presenta interessanti spunti di riflessione anche dal punto di vista manageriale. I risultati consentono ai professionisti di marketing e management d'impresa, nonché ai responsabili e consulenti della *digital communication*, di valutare e migliorare le performance aziendali relative alle pratiche di accessibilità nei siti web. Le criticità emerse, infatti, devono essere di stimolo alle aziende per impegnarsi più attivamente nel garantire agli utenti meno abili processi di democrazia e di partecipazione sociale negli ambiti digitali. L'accesso ai servizi e agli strumenti informativi presenti nei corporate website costituisce oggi un requisito indispensabile per attuare azioni di inclusione sociale che sono fondamentali per consentire lo sviluppo di un orientamento strategico volto al rispetto dei principi di sostenibilità.

L'adozione di un approccio di "*stakeholder inclusive*", ed in particolare di "*disable inclusive*", fin dalle prime fasi di progettazione di un sito web, supporta le aziende nello sviluppo di azioni di comunicazione per la sostenibilità, in grado di accrescere la legittimazione sociale (Fernando and Lawrence, 2014; Luo *et al.*, 2015). Infatti, le certificazioni di accessibilità influenzano positivamente la percezione di CSR che gli utenti hanno dei corporate website, per cui risulta necessario per le imprese investire nell'adozione dei requisiti internazionali (Katerattanaku *et al.*, 2018). Essenziale a questo scopo è un *financial commitment* che garantisca alle aziende di avvalersi di *web designer* o di un intero staff IT con una specifica educazione all'accessibilità, nonché di

società di consulenza focalizzate su tale tematica (Loiacono and Djamasbi, 2013). In tal modo, si riduce per le organizzazioni il rischio di subire danni alla propria immagine dovuti ad azioni di discriminazione e di *digital divide* nel contesto online (Van Dijk, 2020).

Inoltre, in ottica manageriale, prevedere modalità e soluzioni fruibili da persone disabili, nella prospettiva del “*design for all*” (Klironomos *et al.*, 2006; Persson *et al.*, 2015), consente alle imprese di ottenere vantaggi non solo in termini di immagine e di reputazione (Fombrun and van Riel, 2004), ma anche in termini economici, considerando l’aumento di potenziali clienti e, di conseguenza, anche delle quote di mercato e degli utili che ne possono conseguire.

Il vero nodo della questione resta, a nostro parere, l’effettiva convinzione, da parte della proprietà e del management delle organizzazioni for profit, a fare un decisivo “salto di qualità” nella direzione della maggior accessibilità ed inclusione sociale. Resta da capire se, ed entro quali limiti, ci si occupi di accessibilità ed inclusione solo per emulazione dei competitor o, comunque, per seguire tendenze in atto che spesso si traducono, purtroppo, in superficiali tatticismi e in pratiche di *greenwashing*, oppure per convinto e profondo orientamento strategico dei vertici aziendali e, a cascata, dei membri dell’organizzazione a tutti i livelli, nella consapevolezza che il capitale reputazionale, e dunque il successo aziendale, dipende in misura crescente da coerenti cambiamenti culturali e valoriali di questo tipo. Anche su questo piano, si rendono utili futuri studi e ricerche che mirino a far emergere in modo evidente i suddetti cambiamenti, facendo ricorso ad indicatori di controllo *ad hoc*, in grado di rilevare in modo scientificamente valido ed affidabile l’eventuale presenza di indizi ed elementi convincenti, che mostrino che sia in atto quel salto di qualità di cui poc’anzi si parlava.

Lo studio presenta alcuni limiti che potrebbero essere affrontati in future ricerche. Innanzitutto, il campione di aziende esaminate nello studio pilota necessita di sviluppi futuri al fine di ampliare l’indagine, prestando attenzione all’equa distribuzione delle imprese nei settori merceologici e nelle aree geografiche, ai fini di una corretta analisi comparativa. Inoltre, l’adozione del metodo della content analysis implica i tipici limiti connessi alla valutazione soggettiva dei ricercatori (Beattie *et al.*, 2004). Oltre ai settori merceologici e alle aree geografiche di appartenenza, la ricerca potrebbe essere arricchita includendo altri potenziali fattori che influenzano l’adesione ai requisiti di accessibilità dei siti web, a partire dalla dimensione dell’impresa (*large/small firms*) o la durata della presenza sul mercato (*established/start-up firms*) fino a caratteristiche più *firm-specific*. D’altra parte, anche l’effetto dell’introduzione delle nuove norme in ambito europeo sui livelli di accessibilità e, in generale, sul consolidamento in Europa di una corporate culture basata sull’inclusività potrebbe rappresentare un’interessante linea di ricerca.

L’indagine, infine, non ha la pretesa di essere esaustiva, in quanto si focalizza su un numero limitato di fattori, ovvero sulla rilevazione o meno dei requisiti del W3C nei siti web. Pertanto, ai fini delle ricerche future, sarebbe interessante approfondire un insieme più ampio di elementi connessi alle dinamiche di inclusione sociale, cercando di estendere l’indagine anche ad altri strumenti digitali, tra cui i social media aziendali.

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La probabilità di automazione delle professioni in Italia

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Abstract

Obiettivi. *L'obiettivo paper è comprendere le conseguenze che i cambiamenti tecnologici hanno sulle professioni, sulla loro automazione e sul livello di occupazione.*

Metodologia. *A tal fine è stata stimata la probabilità di automazione delle professioni applicando sia l'occupation-based approach che il task-based approach.*

Risultati. *Per la maggior parte delle professioni le probabilità di automazione in base ai due approcci differiscono del 10-20% circa. Inoltre, mentre applicando l'occupation-based approach il 33,2% (pari a 7,12 milioni) dei lavoratori italiani presenta un rischio alto, questa percentuale scende al 18,1% (pari a 3,8 milioni) in base al task-based approach.*

Limiti della ricerca. *Solo i progressi tecnologici di breve termine e le capacità attuali della tecnologia sono considerati nella stima della probabilità di automazione delle professioni; non sono considerati i fattori che determinano il livello di automazione reale e non sono state fatte delle considerazioni sul tempo necessario per superare i limiti tecnici all'automazione.*

Implicazioni pratiche. *I risultati dello studio possono guidare la definizione di politiche che incoraggino l'adozione di nuove tecnologie limitandone gli effetti negativi sui lavoratori. Dal punto di vista manageriale, le imprese possono identificare le categorie di lavoratori sono minacciati in misura maggiore dall'automazione.*

Originalità del lavoro. *La stima della probabilità di automazione delle professioni viene effettuata per l'Italia, per la prima volta. Si tratta di un contesto caratterizzato da una struttura produttiva e da un livello di diffusione delle tecnologie avanzate che sembra proteggere i lavoratori dal rischio di sostituzione da parte delle macchine.*

Parole chiave: *cambiamento tecnologico; disoccupazione tecnologica; occupazione; automazione*

Objectives. *The aim of the paper is to understand the consequences that technological changes have on occupations, their automation and the level of employment.*

Methodology. *To this end, the probability of automation has been estimated following both the occupation-based approach and the task-based approach.*

Findings. *For most occupations, the probabilities of automation following the two approaches differ by about 10-20%. Moreover, while applying the occupation-based approach 33.2% (or 7.12 million) of Italian workers face a high risk, this percentage drops to 18.1% (or 3.8 million) following the task-based approach.*

Research limits. *Only short-term technological advances and current technology capabilities are considered in estimating the probability of automation of occupations; factors that determine the actual level of automation are not considered, nor are considerations made about the time required to overcome technical limitations to automation.*

Practical implications. *The results of the study could guide the design of policies that encourage the adoption of new technologies while limiting their negative effects on workers. From a managerial perspective, firms can identify the categories of workers are most threatened by automation.*

Originality of the study. *The estimate of the probability of automation of occupations is made for Italy, a context characterized by a production structure and by a level of diffusion of advanced technologies that seems to protect workers from the risk of substitution by machines.*

Key words: *technological change; technological unemployment; occupation; automation*

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1. Introduzione

Il tema della sostituzione dei lavoratori da parte delle macchine è tornato di attualità in seguito a due cambiamenti: l'avanzamento delle tecnologie di automazione e la polarizzazione del mercato del lavoro (la crescita dell'occupazione e dei salari nelle professioni low-skill/low-wage e high-skill/high-wage e la diminuzione in quelle middle-skill/middle-wage nei principali Paesi; si veda per esempio, Acemoglu e Autor, 2010; Autor, 2010).

Negli ultimi decenni i robot industriali e le altre tecnologie di automazione sono migliorati considerevolmente. Un progresso simile è previsto anche in futuro (Brynjolfsson e McAfee, 2014; Manyika, Lund, *et al.*, 2017), tanto che Ford (2016) non esclude che in futuro le macchine siano estremamente intelligenti dando inizio a un'«esplosione di intelligenza», mentre Kurzweil (2006) ritiene che si potrà raggiungere la cosiddetta «singolarità», cioè la fine dell'era umana e il dominio delle macchine sull'uomo. Le tecnologie stanno infatti acquisendo nuove skills che permettono l'esecuzione di compiti manuali e cognitivi complessi e non di routine, compiti che fino a pochi anni fa erano considerati di esclusiva competenza umana (Arntz *et al.*, 2020; Frey e Osborne, 2013, 2017). Diventa perciò possibile impiegare la tecnologia per sostituire i lavoratori in molte professioni (Blanas *et al.*, 2019).

I cambiamenti recenti hanno indotto molti studiosi a interrogarsi su come sarà il futuro. Mentre gli esperti *massimalisti* (Brynjolfsson e McAfee, 2011, 2014; Manyika *et al.*, 2013) pongono grande attenzione alle innovazioni recenti, sono ottimisti sul grado di progresso tecnologico e prevedono grandi aumenti nella produttività a fronte di una disoccupazione elevata e una disuguaglianza crescente, gli esperti *minimalisti* (Gordon, 2017) prevedono cambiamenti futuri minimi, sostenendo che il progresso tecnologico sarà minore, che la crescita economica non dipenderà dalla tecnologia e che i lavoratori affronteranno un rischio di sostituzione minore.

Di fronte agli enormi cambiamenti in corso, alcuni studiosi (Arntz *et al.*, 2016; Frey e Osborne, 2013, 2017; Nedelkoska e Quintini, 2018) hanno provato a quantificare il numero di lavoratori a rischio di sostituzione a partire dalla stima della probabilità di automazione delle professioni. A tal fine è possibile applicare due approcci principali: l'*occupation-based approach*, secondo cui intere professioni sono automatizzabili, e il *task-based approach*, in base al quale solo le attività lavorative (non intere professioni) possono esserlo.

In questo paper si cercherà di comprendere le conseguenze che i cambiamenti tecnologici hanno sulle professioni, sulla loro automazione e sul livello di occupazione in Italia. In letteratura vi sono alcuni studi a livello internazionale che considerano anche l'Italia. Da questi studi emergono risultati contrastanti: secondo una serie di studi (Chui *et al.* 2015, 2016; Manyika, 2017a, 2017b; Manyika, Chui, *et al.* 2017) il 50% delle attività lavorative eseguite in Italia sono automatizzabili; secondo Arntz *et al.* (2016) il 10% dei lavoratori italiani è ad alto rischio di sostituzione; infine, secondo Nedelkoska and Quintini (2018) il 49,5% dei lavoratori italiani presenta un rischio di sostituzione basso (inferiore a 0,30), il 35,4% un rischio medio (0,5-0,7) e il 15,2% un rischio alto (superiore a 0,70). I risultati contrastanti ottenuti potrebbero essere dovuti ad approssimazioni riguardanti le caratteristiche delle professioni nei diversi Paesi considerati nelle analisi, con la conseguenza che le specificità delle professioni in ogni Paese potrebbe essere state perse pur essendo rilevanti per questa analisi. Inoltre, l'assenza di stime sulla probabilità di automazione di ogni professione italiana comporta la necessità di analisi ulteriori al fine di conoscere il rischio di sostituzione affrontato dal singolo lavoratore piuttosto che dalla forza lavoro italiana nel suo complesso.

Al fine di comprendere l'impatto dei cambiamenti tecnologici sulle professioni italiane, si stimerà la probabilità di automazione delle professioni italiane in base all'*occupation-based approach* e al *task-based approach* seguendo le metodologie di Frey e Osborne (2013, 2017) e Nedelkoska e Quintini (2018). Le probabilità di automazione così ottenute saranno applicate ai dati occupazionali per stimare il numero di lavoratori italiani a rischio di sostituzione. Dall'analisi emerge che mentre applicando l'*occupation-based approach* il 33,2% (pari a 7,12 milioni) dei

lavoratori italiani presenta un rischio alto, questa percentuale scende al 18,1% (pari a 3,8 milioni) in base al task-based approach.

L'Italia rappresenta un caso di analisi interessante. Le imprese italiane sono in ritardo nell'innovazione e nell'adozione delle nuove tecnologie di produzione a causa di numerosi fattori tra cui la struttura produttiva italiana, l'alta percentuale di imprese di piccole e medie dimensioni (a cui si associa una bassa capacità di investimento, una minore propensione ad innovare e una bassa produttività; Bruno e Polli, 2017; Codogno, 2009), la struttura familiare (Bugamelli *et al.*, 2012) e il contesto istituzionale (tra cui il funzionamento della pubblica amministrazione) (Sestito e Torrini, 2019). Nello specifico, la diffusione delle tecnologie quali big data, internet of things, realtà aumentata e robotica è molto disomogenea: l'adozione di queste tecnologie risulta essere più frequente nelle imprese di dimensioni maggiori e in quelle situate nel Nord Italia (Cirillo *et al.*, 2020). Inoltre l'adozione si focalizza su una singola tecnologia piuttosto che sull'impiego di più tecnologie tra loro complementari (Cirillo *et al.*, 2020). La mancanza di una diffusa adozione di tecnologie avanzate ha comportato che in Italia la polarizzazione dell'occupazione e dei salari risulta meno evidente rispetto ad altri Paesi tecnologicamente all'avanguardia (Basso, 2019).

Lo studio contribuisce alla letteratura sul cambiamento tecnologico e i suoi effetti sulle professioni e sull'occupazione in quanto stima la probabilità di automazione delle professioni in un contesto caratterizzato da una struttura produttiva e da un livello di diffusione delle tecnologie avanzate che sembra proteggere i lavoratori dal rischio di sostituzione da parte delle macchine.

Come contributo empirico, lo studio fornisce una stima della probabilità di automazione per ognuna delle 800 unità professionali individuate in Italia.

Lo studio ha importanti implicazioni di policy e manageriali. I risultati e le implicazioni di questo paper possono guidare la formulazione di politiche che da un lato incoraggino l'adozione di nuove tecnologie, ma dall'altro minimizzino i loro effetti negativi sui lavoratori, favorendo per esempio un training della forza lavoro o una riallocazione dei lavoratori dislocati verso professioni a minor rischio di automazione. Dal punto di vista manageriale, le imprese possono identificare le categorie di lavoratori sono minacciati in misura maggiore dall'automazione e capire come intervenire per proteggerli, per esempio con attività di formazione o una riorganizzazione delle attività lavorative.

2. Literature review

2.1 La SBTC hypothesis e la RBTC hypothesis

I cambiamenti nel mercato del lavoro avvenuti dopo gli anni Cinquanta sono stati spiegati inizialmente con la *skill biased technological change (SBTC) hypothesis*, cioè con l'idea che le nuove tecnologie sono skill biased e nello specifico complementari ai lavoratori high-skill. Come conseguenza, per questa categoria di lavoratori ci si attende un aumento dell'occupazione, mentre i lavoratori low-skilled subiscono una riduzione (Acemoglu e Autor, 2010; Adams, 2018; Biagi e Sebastian, 2020). La *SBTC hypothesis* non è però adeguata nell'esame dei cambiamenti nel mercato del lavoro avvenuti recentemente, tra cui la polarizzazione, la disuguaglianza di salario, la crescita dei posti di lavoro low-wage e il miglioramento dell'istruzione (si veda, per esempio, Acemoglu and Autor, 2010; Autor *et al.*, 2006; Autor *et al.*, 2008; Goos *et al.*, 2009, 2014; Goos e Manning, 2007; Spitz-Oener, 2006).

La polarizzazione del mercato del lavoro può essere invece spiegata con la *routine-biased technological change (RBTC)*¹, una versione modificata della *SBTC hypothesis* avanzata da Autor *et al.* (2003). Secondo questa ipotesi, la tecnologia impatta sulle professioni a seconda del tipo di attività lavorativa eseguita dal lavoratore e non del livello delle sue skills (Biagi e Sebastian, 2020). Le tecnologie sono in grado di svolgere compiti di routine, la cui automazione impatta anche sui

¹ La *routine-biased technological change (RBTC)* è anche chiamata *task-biased technological change (TBTC) hypothesis*.

compiti non di routine: la domanda di lavoro per compiti di routine diminuisce a danno delle professioni middle-skill (Autor *et al.*, 2003), mentre quella per compiti non di routine aumenta a vantaggio delle professioni low-skill e high-skill dove il lavoratore ha un vantaggio comparato (Autor, 2015).

2.2 *Le conseguenze dei cambiamenti tecnologici sulle professioni e sull'occupazione: la stima della probabilità di automazione delle professioni*

In linea con la *RBTC hypothesis*, alcuni studiosi hanno cercato di comprendere le conseguenze dei cambiamenti tecnologici sulle professioni e l'occupazione e quindi hanno stimato la probabilità di automazione delle professioni e il numero di lavoratori che potrebbero essere dislocati dalla tecnologia (Chiacchio *et al.*, 2018; Pouliakas, 2018).

Lo studio di Frey e Osborne (2013), il primo che si è occupato di questo tema, si basa sul presupposto che le tecnologie recenti sono in grado di svolgere anche alcuni compiti non di routine. Tuttavia alcuni limiti tecnici impediscono un livello di automazione maggiore. Essi sono legati a tre capacità: la percezione e la manipolazione (i.e., la capacità di orientarsi e maneggiare oggetti), l'intelligenza creativa (i.e., la capacità di produrre idee nuove e di valore) e l'intelligenza sociale (i.e., la capacità di rispondere a una persona con empatia ed intelligenza) (Arntz *et al.*, 2016; Frey e Osborne, 2013, 2017). Per quanto riguarda la percezione e la manipolazione, i robot possiedono capacità di identificazione di base grazie allo sviluppo di sensori e laser sofisticati, ma non la profondità e l'ampiezza della percezione umana. Di conseguenza non è possibile automatizzare i compiti che richiedono un livello di percezione più elevato e che devono essere svolti in ambienti di lavoro non strutturati (Frey e Osborne, 2013, 2017). Riguardo ai compiti di intelligenza creativa, la produzione di nuove combinazioni di idee già esistenti è in parte automatizzabile, ma poiché le idee devono anche essere preziose potrebbe persistere un disaccordo sulla possibilità di considerare creativo un computer (Frey e Osborne, 2013, 2017). Infine i compiti di intelligenza sociale, importanti in molte professioni, sono solo in parte automatizzabili dai computer (Arntz *et al.*, 2016). Sulla base di queste considerazioni, la probabilità di automazione delle professioni può essere calcolata in funzione del livello richiesto per queste capacità (Frey e Osborne, 2013, 2017). La probabilità di automazione può essere interpretata come il tempo necessario per automatizzare la professione corrispondente; in particolare, le professioni con una probabilità elevata (superiore al 70%) potrebbero essere automatizzate in 10-20 anni (Frey e Osborne, 2013, 2017).

In seguito allo studio di Frey e Osborne (2013) focalizzato sugli Stati Uniti, la stima della probabilità di automazione delle professioni è stata effettuata anche per altri contesti (Paesi europei e Giappone) seguendo metodologie diverse. Alcuni autori (Bowles, 2014; Brzeski e Burk, 2015; Haldane, 2015; Pajarinen e Rouvinen, 2014) hanno applicato le probabilità di automazione delle professioni statunitensi stimate da Frey e Osborne (2013, 2017) ai dati occupazionali del Paese considerato.

Alcuni autori criticano l'*occupation-based approach* osservando due aspetti: sono le attività lavorative e non le professioni a poter essere automatizzabili (Arntz *et al.*, 2016); all'interno della stessa professione, i lavoratori svolgono attività lavorative diverse e quindi fronteggiano un rischio di sostituzione diverso (Arntz *et al.*, 2016; Autor and Handel, 2013).

Al fine di tenere in considerazione i due aspetti descritti, sono state proposte metodologie diverse. La prima è basata sull'*occupation-based approach*, ma a differenza degli studi citati in precedenza, viene suggerito di applicare la metodologia di Frey and Osborne (2013, 2017) considerando le caratteristiche delle professioni del Paese considerato (David, 2017). In alternativa è possibile adottare il *task-based approach* seguendo varie metodologie: (1) stimare la relazione tra le caratteristiche delle professioni negli Stati Uniti e la loro probabilità di automazione calcolata da Frey e Osborne (2013, 2017) e applicare poi tale relazione ai dati riguardanti altri Paesi (Arntz *et al.*, 2016); (2) stimare la probabilità di automazione della professione come media ponderata delle probabilità di automazione delle singole attività lavorative e del tempo dedicato alla loro esecuzione (Chui *et al.*, 2015, 2016; Manyika, 2017a, 2017b; Manyika, Chui, *et al.*, 2017); infine (3) applicare

la metodologia proposta da Frey e Osborne (2013, 2017) alle caratteristiche dei posti di lavoro al posto di quelle della professione (Nedelkoska e Quintini, 2018).

L'*occupation-based* e il *task-based approach* differiscono per due aspetti. Primo, le probabilità di automazione ottenute con il *task-based approach* sono inferiori a quelle stimate applicando l'*occupation-based approach* perché con il primo approccio si tiene in considerazione l'esistenza di attività lavorative difficilmente automatizzabili anche in professioni che complessivamente presentano una probabilità di automazione alta. Secondo, l'applicazione dei due approcci comporta una diversa distribuzione delle professioni in base alla probabilità di automazione: mentre in base all'*occupation-based approach* molte professioni presentano una probabilità di automazione alta o bassa, adottando il *task-based approach* le stime sono più omogenee (Arntz *et al.*, 2016).

Focalizzandosi sull'Italia, vi sono delle stime sulla percentuale di lavoratori a rischio di sostituzione. Applicando il *task-based approach*, secondo una serie di studi (Chui *et al.* 2015, 2016; Manyika, 2017a, 2017b; Manyika, Chui, *et al.* 2017) il 50% delle attività lavorative sono automatizzabili; secondo Arntz *et al.* (2016) il 10% dei lavoratori italiani è ad alto rischio di sostituzione; infine, secondo Nedelkoska and Quintini (2018) il 49,5% dei lavoratori italiani presenta un rischio di sostituzione basso (inferiore a 0,30), il 35,4% un rischio medio (0,5-0,7) e il 15,2% un rischio alto (superiore a 0,70). Tuttavia la differenza tra queste stime riguardo alla distribuzione dei lavoratori italiani in base al rischio, così come l'assenza di stime sulla probabilità di automazione di ogni professione italiana, comportano la necessità di analisi ulteriori.

3. Analisi empirica

3.1 Dati

Per questa analisi i dati provengono da tre fonti.

La stima della probabilità di automazione secondo l'*occupation-based approach* si basa sul database denominato Sistema informativo sulle professioni relativo all'anno 2012. Si tratta di un database promosso congiuntamente da ISFOL (Istituto per lo sviluppo della formazione professionale dei lavoratori) e ISTAT e che fornisce informazioni riguardanti le 800 unità professionali individuate in Italia, descrivendole con oltre 300 variabili.

La stima *task-based approach* si basa sui dati PIAAC (Programme for the International Assessment of Adult Competencies) per l'Italia. Il PIAAC è un programma dell'OECD per la valutazione e l'analisi delle skills degli adulti, che esamina anche lo stato educativo e occupazionale degli individui.

Infine, il numero di lavoratori impiegati in ogni professione è ricavato dall'ISTAT (Sezione Indagine continua sulle forze di lavoro). I dati riguardano la forza lavoro totale, la percentuale di lavoratori e lavoratrici e la percentuale di lavoratori sopra e sotto i 40 anni e consistono nella media del periodo 2014-2016. Per alcune professioni l'ISTAT non fornisce i dati occupazionali; in questi casi i dati sono stati ottenuti da altre fonti, quali gli studi di settore e i siti internet degli ordini professionali².

A chiusura di questa sezione, vogliamo sottolineare quanto segue. Siamo consapevoli che le fonti utilizzate in questo studio si riferiscono a periodi temporali leggermente diversi a causa delle diverse periodicità con cui questi database vengono aggiornati. Riteniamo comunque che l'impatto sui nostri risultati sia trascurabile visto che i periodi temporali a cui ci riferiamo sono comunque ristretti e non sufficienti affinché la tecnologia possa progredire e impattare sulla probabilità di automazione in modo sensibilmente differente.

² Per alcune professioni non è stato tuttavia possibile ricavare tutti o parte dei dati sopra citati. La forza lavoro considerata nell'analisi è pari all'84% di quella totale, all'81% nel caso dei lavoratori e al 79% nel caso delle lavoratrici. Nel caso dei lavoratori e delle lavoratrici la forza lavoro considerata è inferiore rispetto a quota considerata sul totale della forza lavoro in quanto per alcune professioni (quelle per cui l'Istat non fornisce i dati) non è stato possibile reperire la suddivisione tra lavoratori e lavoratrici.

3.2 Metodo

Per stimare la probabilità di automazione delle professioni, sono stati applicati l'*occupation-based approach* e il *task-based approach* seguendo le metodologie di Frey e Osborne (2013, 2017) e Nedelkoska e Quintini (2018). Le metodologie proposte da questi autori sono state seguite fedelmente; gli unici aggiustamenti che si sono rivelati necessari sono legati all'utilizzo di database diversi seppur molto simili (o uguali) a quelli utilizzati dagli autori citati.

In entrambi i casi, nella prima fase è stato costruito un training set assegnando una dummy che assume valore «1» nel caso di professioni automatizzabili e «0» per quelle che non lo sono. Le professioni così descritte nella tabella in Appendice, corrispondono a quelle giudicate automatizzabili o no da Frey e Osborne (2013, 2017) e sono state identificate sulla base delle tabelle di conversione. Il procedimento di assegnazione delle etichette è descritto nella Tabella 1.

Tab. 1: Procedimento di assegnazione delle dummy alle professioni con relativi esempi

1. Identificazione delle dummy assegnate alle professioni statunitensi da Frey e Osborne (2013, 2017)
2. Assegnazione delle dummy alle professioni contenute nel database PIAAC
Nota: Nedelkoska and Quintini (2018) forniscono la conversione tra professioni statunitensi e professioni basate sulla classificazione internazionale
3. Assegnazione delle dummy alle professioni contenute nel database Sistema informativo sulle professioni
Nota: l'ISTAT fornisce la conversione tra professioni basate sulla classificazione internazionale e quelle basate sulla classificazione italiana



Professioni non automatizzabili	Professioni automatizzabili
Fisici	Analisti di mercato
Specialisti in terapie chirurgiche	Contabili
Dentisti e odontostomatologi	Centralinisti
Avvocati	Cassieri di esercizi commerciali
Magistrati	Addetti alla preparazione, alla cottura e alla vendita di cibi in fast food, tavole calde, rosticcerie ed esercizi assimilati
Disegnatori di moda	Autisti di taxi, conduttori di automobili, furgoni e altri veicoli
Professori di scuola pre-primaria	Lettori di contatori, collettori di monete e professioni assimilate
Organizzatori di convegni e ricevimenti	Addetti alle consegne
Atleti	Personale non qualificato addetto ai servizi di custodia di edifici
Cuochi in alberghi e ristoranti	Addetti a funzioni di segreteria
Camerieri di albergo	Addetti alla gestione dei magazzini e professioni assimilate
Assistenti di volo	Addetti alle buste paga
Acconciatori	Sarti
Cacciatori	
Uscieri e professioni assimilate	
Medici di medicina generale	
Professioni sanitarie ostetriche	
Estetisti e truccatori	

Per entrambi i database, sono state identificate le variabili che determinano la probabilità di automazione delle professioni, cioè che descrivono le attività lavorative che richiedono le capacità corrispondenti ai limiti tecnici che impediscono un livello di automazione maggiore (i.e., percezione e manipolazione, intelligenza creativa e intelligenza sociale). Le variabili selezionate e la relativa descrizione sono mostrate nella Tabella 2.

Tab. 2: Variabili dei database ISFOL e PIAAC corrispondenti ai colli di bottiglia

Limiti tecnici all'automazione	Variabile nel Sistema informativo sulle professioni e descrizione	Variabile nel database PIAAC e descrizione
Percezione e manipolazione	Identificare oggetti, azioni ed eventi <i>Identificare informazioni catalogando, valutando e riconoscendo differenze e similarità e individuando cambiamenti di circostanze o di eventi</i>	Finger (dexterity) <i>How often does your job involve using skill or accuracy with your hands or fingers?</i>
	Maneggiare e muovere oggetti <i>Usare mani e braccia per maneggiare, installare, posizionare e muovere materiali o per manipolare oggetti</i>	
Intelligenza creativa	Prendere decisioni e risolvere problemi <i>Analizzare informazioni e valutare risultati per scegliere la soluzione migliore e per risolvere problemi</i>	Problem solving, simple <i>How often does your job involve relatively simple problems that take no more than 5 minutes to find a good solution?</i>
	Pensare in modo creativo <i>Sviluppare, progettare o creare nuove applicazioni, idee, relazioni e nuovi sistemi e prodotti (compresi i contributi artistici)</i>	Problem-solving, complex <i>Are you often confronted with more complex problems that take at least 30 minutes thinking time to find a good solution?</i>
Intelligenza sociale	Assistere e prendersi cura di altri <i>Fornire assistenza personale, attenzione medica, supporto emotivo o altre cure personali ad altri (colleghi, clienti, pazienti)</i>	Teaching <i>How often does your job involve instructing, training or teaching people, individually or in groups?</i>
	Vendere merci o influenzare altri <i>Convincere altre persone ad acquistare merci o beni o far loro cambiare idea o comportamenti</i>	Advise <i>How often does your job involve advising people?</i>
	Risolvere controversie e negoziare con altre persone <i>Gestire lamentele, negoziare, calmare dispute e risolvere conflitti</i>	Plan for others <i>How often does your job involve planning the activities of others?</i>
	Fornire consulenze e suggerimenti ad altre persone <i>Fornire linee guida e suggerimenti qualificati alla dirigenza o ad altri gruppi su questioni tecniche o relative a sistemi o processi</i>	Communication <i>How often does your job involve sharing work-related information with co-workers?</i>
		Negotiate <i>How often does your job involve negotiating with people either inside or outside your firm or organisation?</i>
		Influence <i>How often does your job involve persuading or influencing people?</i>
		Sell <i>How often does your job involve selling a product or selling a service?</i>

Fonte: ns. elaborazioni su Sistema informativo sulle professioni e PIAAC

Nella seconda fase è stato costruito un modello di classificazione probabilistico, dove la variabile dipendente è data dalla probabilità di automazione e le variabili esplicative sono le variabili dei database selezionate come descritto in precedenza. Al fine di stimare la probabilità di automazione di ogni professione è stato costruito un modello sulla base della variabile dummy precedentemente definita e assegnata alle professioni contenute del training set; questo modello è stato poi applicato per stimare la probabilità di automazione di tutte le professioni italiane. Nella stima è stato utilizzato un algoritmo di tipo random forest (David, 2017).

Infine, le probabilità di automazione ottenute applicando l'*occupation-based* e il *task-based approach* sono state applicate ai dati riguardanti il numero di lavoratori impiegati in ogni professione.

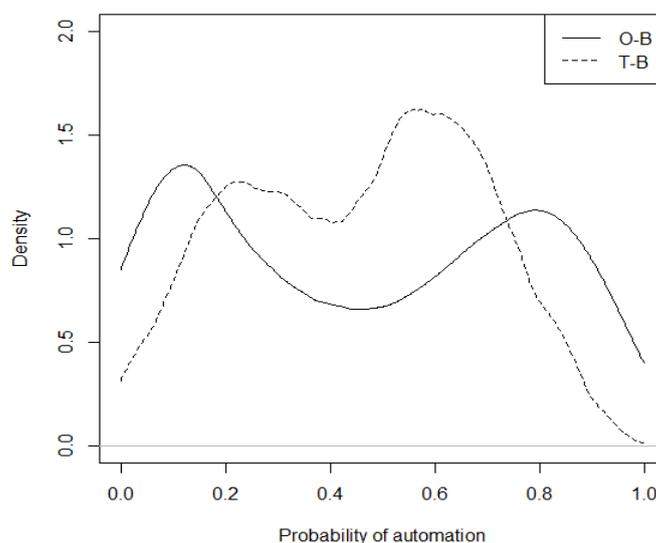
4. Risultati

4.1 La probabilità di automazione delle professioni

Le probabilità di automazione delle professioni italiane, ottenute applicando l'*occupation-based approach* (O-B) (Frey e Osborne, 2013, 2017) e il *task-based approach* (T-B) (Nedelkoska e Quintini, 2018), sono mostrate nella Tabella in Appendice. Per la maggior parte delle professioni le probabilità di automazione in base ai due approcci differiscono del 10-20% circa; tuttavia per alcune professioni la differenza è più rilevante.

La Figura 1 mostra la distribuzione delle probabilità di automazione delle professioni. I risultati ottenuti confermano quanto affermato dalla teoria. Applicando l'*occupation-based approach* si ottiene infatti una struttura bipolare: molte professioni presentano una probabilità di automazione alta o bassa mentre poche rientrano nella categoria intermedia. Invece i risultati ottenuti con il *task-based approach* mostrano valori più omogenei: un numero inferiore di professioni presenta una probabilità di automazione bassa o alta, mentre la maggior parte ha un livello di automazione medio.

Fig. 1: Distribuzione della probabilità di automazione delle professioni italiane applicando l'*occupation-based approach* (O-B) e il *task-based approach* (T-B)



Fonte: ns. elaborazioni

Le professioni che presentano una probabilità di automazione alta prevedono la realizzazione di un numero elevato di attività di routine (automatizzabili), tra cui lo svolgimento di calcoli, lo scambio di informazioni e l'assemblaggio. Queste professioni riguardano il settore dei trasporti e logistica (e.g., autisti, addetti alle consegne), il supporto d'ufficio e amministrativo (e.g., contabili), la produzione. Presentano una probabilità di automazione elevata anche professioni che apparentemente sembrano essere immuni, come quelle nel settore dei servizi (e.g., addetti alla preparazione di pasti) e quelle riguardanti la vendita (e.g., commessi, cassieri).

Le professioni con una probabilità di automazione bassa prevedono lo svolgimento di attività tra cui la collaborazione e l'interazione con altre persone e la risoluzione di problemi; di conseguenza richiedono capacità di percezione, manipolazione, intelligenza creativa e intelligenza sociale. Queste professioni riguardano i settori del management e finanza (e.g., imprenditori), l'ambito legale (e.g., avvocati), l'istruzione (e.g., professori di scuola pre-primaria), l'assistenza sanitaria (e.g., dentisti, medici), arte (e.g., fotografi).

Infine, le professioni con una probabilità di automazione media riguardano i settori della logistica (e.g., addetti alla gestione dei magazzini), artigianale (e.g., tecnici restauratori, panettieri, pasticceri) e mediatico (e.g., specialisti nelle pubbliche relazioni, giornalisti).

Poiché, come affermato in precedenza, la probabilità di automazione di una professione può essere interpretata come il tempo necessario per automatizzarla (Frey e Osborne, 2013, 2017), in futuro le professioni nel settore dei trasporti, dell'amministrazione e della manifattura saranno automatizzate per prime vista la loro alta probabilità di automazione. Dopo aver risolto i limiti tecnici all'automazione legati alla percezione e alla manipolazione, saranno automatizzate le professioni con una probabilità di automazione media, tra cui quelle nel settore dell'installazione e della manutenzione. Infine, dopo aver superato i limiti tecnici all'automazione legati all'intelligenza creativa e a quella sociale, saranno automatizzate le professioni nel settore manageriale, dell'istruzione e della sanità, le cui professioni presentano una probabilità di automazione bassa.

4.2 La distribuzione dei lavoratori in base al rischio di sostituzione

La distribuzione dei lavoratori italiani per categoria di rischio di sostituzione è mostrata nella Tabella 3. Seguendo Frey e Osborne (2013, 2017), la probabilità di automazione è stata distinta in tre livelli: bassa (0-0,3), media (0,3-0,7) e alta (0,7-1), dove il livello alto indica che la professione associata è potenzialmente automatizzabile dal computer in un numero indefinito di anni, forse 10 o 20 (Frey e Osborne, 2013, 2017).

Tab. 3: Distribuzione dei lavoratori italiani per categoria di rischio di sostituzione

Rischio di sostituzione (Probabilità di automazione)	Percentuale di lavoratori (uomini e donne) a rischio (Numero di lavoratori)		Percentuale di lavoratori a rischio (Numero di lavoratori)		Percentuale di lavoratrici a rischio (Numero di lavoratori)	
	M o F		M		F	
	O-B approach	T-B approach	O-B approach	T-B approach	O-B approach	T-B approach
Rischio basso (0 - 0,30)	30,2% (6,48mil)	26,4% (5,67mil)	20,8% (2,48mil)	20,0% (2,38mil)	39,5% (3,38mil)	30,5% (2,61mil)
Rischio medio (0,31 - 0,70)	36,6% (7,86mil)	55,5% (11,90mil)	37,9% (4,52mil)	59,8% (7,12mil)	35,7% (3,05mil)	52,8% (4,52mil)
Rischio alto (0,71 - 1)	33,2% (7,12mil)	18,1% (3,87mil)	41,2% (4,92mil)	20,2% (2,40mil)	24,8% (2,13mil)	16,7% (1,43mil)

Fonte: ns. elaborazioni

La Tabella 3 mostra come i due approcci applicati producano risultati diversi riguardo alla distribuzione della forza lavoro in base al rischio di sostituzione da parte delle macchine: mentre applicando l'*occupation-based approach* il 33,2% (pari a 7,12 milioni) dei lavoratori italiani presenta un rischio alto, questa percentuale scende al 18,1% (pari a 3,8 milioni) in base al *task-based approach*. Nonostante la struttura produttiva italiana sia caratterizzata dalla presenza diffusa di piccole e medie dimensioni con ridotta capacità di investimento e dalla bassa adozione di tecnologie avanzate, il numero di lavoratori a rischio di sostituzione rimane elevato.

Se consideriamo le stesse analisi in base al genere, risulta che i lavoratori affrontano un rischio di sostituzione maggiore rispetto alle lavoratrici. Questa differenza è dovuta alla diversa distribuzione dei lavoratori e delle lavoratrici nelle professioni che presentano probabilità di automazione più o meno elevate. Per esempio, di solito le donne svolgono professioni che prevedono lo svolgimento di attività di collaborazione, pianificazione e comunicazione (Pouliakas, 2018), cosa che le protegge dal rischio di sostituzione.

5. Conclusioni

5.1 Limiti metodologici della ricerca

Le alte percentuali di lavoratori ad alto rischio di sostituzione ottenute fanno temere la disoccupazione tecnologica. Tuttavia, occorre notare i seguenti aspetti. Primo, raramente l'automazione riguarda e quindi elimina intere professioni, ma coinvolge piuttosto alcune attività lavorative (Arntz *et al.*, 2016; Bessen *et al.*, 2020). Secondo, l'elevata varietà di attività lavorative svolte in una professione (Autor e Handel, 2013), alcune delle quali automatizzabili mentre altre no, è anche il risultato dell'aggiustamento avvenuto in seguito agli avanzamenti tecnologici passati (Arntz *et al.*, 2016). Infine, l'automazione reale (e quindi la vera perdita di posti di lavoro) sarà minore di quella potenziale (Arntz *et al.*, 2016): infatti la possibilità tecnica di automatizzare alcune professioni non implica che tale automazione abbia luogo (Arntz *et al.*, 2016; Bessen *et al.*, 2020; Nedelkoska and Quintini, 2018).

Molti fattori incidono sull'automazione potenziale e reale (Arntz *et al.*, 2016; Bessen *et al.*, 2020; Bruno e Polli, 2017; David, 2017; Frey e Osborne, 2015; Manyika, 2017a). Il requisito della fattibilità tecnica è l'aspetto più importante da considerare ed implica la necessità di progettare e adattare una tecnologia che svolga l'attività lavorativa al livello di performance richiesto. Inoltre, come osservato da Nedelkoska e Quintini (2018), l'esistenza di una tecnologia di automazione non implica necessariamente la sua diffusione e la conseguente dislocazione dei lavoratori.

Nelle scelte di automazione delle imprese molti aspetti strategici devono essere tenuti in considerazione: il costo dell'investimento, i benefici economici, la domanda e l'offerta di lavoro, le skills dei lavoratori. Le imprese di grandi dimensioni potrebbero affrontare difficoltà minori nell'introduzione dell'automazione (Nedelkoska e Quintini, 2018), mentre nelle imprese di piccole dimensioni, caratterizzate dalle ridotte capacità di investimento, l'adozione di tecnologie di automazione è più difficile e potrebbe portare alla ridefinizione dei posti di lavoro piuttosto che al licenziamento di lavoratori (Bruno e Polli, 2017).

Ai fattori sopra citati si aggiungono altri aspetti che possono scoraggiare la decisione di automazione delle imprese. Si pensi per esempio ai casi in cui la figura del lavoratore è considerata essenziale e insostituibile dalle macchine (e.g., all'erogazione del servizio si accompagna un gusto estetico che le macchine non possiedono). In alternativa, si pensi ai casi in cui i lavoratori, al fine di ridurre il loro rischio di sostituzione, aggiornano le proprie skills con corsi di formazione.

All'introduzione di una tecnologia devono inoltre accompagnarsi cambiamenti nella struttura e nella gestione dell'impresa, tra cui la ridefinizione dei ruoli e dei processi. Non tutte le imprese sono in grado di apportare tali modifiche con successo.

Infine, occorre tenere presente che la tecnologia può creare nuovi posti di lavoro attraverso quattro meccanismi principali: (1) la produzione e le attività legate all'utilizzo delle macchine creano posti di lavoro, a volte in nuovi settori; (2) la riduzione dei costi di produzione consentita dall'uso della tecnologia può portare alla riduzione del prezzo di vendita, con conseguente aumento della domanda dei beni e di lavoro (cd. effetto compensazione); (3) l'aumento della produttività dei lavoratori consentita dall'utilizzo della tecnologia favorisce un aumento dei salari o dell'occupazione, con conseguente aumento del reddito dei lavoratori e della domanda di lavoro; infine (4) le tecnologie possono favorire la creazione di nuovi prodotti, settori e professioni (crescita che però potrebbe essere ridotta) (Arntz *et al.*, 2016; Frey and Osborne, 2015).

Poiché prevedere i cambiamenti tecnologici è estremamente difficile (Armstrong e Sotala, 2015) e molti fattori incidono sull'automazione reale, questo studio presenta dei limiti. Solo i progressi tecnologici di breve termine e le capacità attuali della tecnologia sono considerati nella stima della probabilità di automazione delle professioni. Non sono stati invece considerati i quattro fattori descritti in precedenza che determinano il livello di automazione reale e gli aggiustamenti delle attività lavorative all'interno delle professioni, così come non sono state fatte delle considerazioni sul tempo necessario per superare i limiti tecnici all'automazione.

5.2 *Futuri ambiti di ricerca*

Come discusso nel Paragrafo 5.1, nella stima della probabilità di automazione delle professioni italiane sono stati considerate solo le capacità attuali della tecnologia e non altri fattori che influiscono sul livello di automazione reale (descritti nel Paragrafo 5.1). Studi futuri potrebbero stimare la probabilità di automazione delle professioni italiane considerando questi aspetti.

Inoltre sarebbe interessante stimare le probabilità di automazione considerando diversi ambiti temporali tra loro comparabili, per esempio confrontando il rischio di sostituzione affrontato dai lavoratori vent'anni fa e quello affrontato oggi. Ciò potrebbe essere particolarmente utile per due ragioni principali. Si potrebbe facilmente esaminare se il rischio di sostituzione esistente in passato si è poi tradotto in una dislocazione effettiva dei lavoratori o, in alcuni casi, nella scomparsa di una professione. Si potrebbero inoltre individuare eventuali tendenze di accelerazione o decelerazione del rischio di sostituzione affrontato dai lavoratori.

La considerazione degli aspetti esposti potrebbe dare una visione più ampia del fenomeno di sostituzione dei lavoratori da parte delle macchine.

5.3 *Implicazioni manageriali e di policy*

Questo studio ha implicazioni manageriali e di policy.

Riguardo al primo aspetto, i risultati di questo studio possono aiutare le imprese sia nella fase di decisione di introduzione di una nuova tecnologia sia nelle fasi successive di programmazione dell'utilizzo della forza lavoro. Nella fase di decisione, sulla base dei risultati di questo studio le imprese possono valutare la portata della dislocazione dei lavoratori e identificare le categorie di lavoratori a maggior rischio di sostituzione da parte delle macchine. Successivamente, nella fase di aggiustamento in seguito all'introduzione della tecnologia, sulla base dei risultati di questo studio le imprese possono capire come assegnare la forza lavoro verso professioni con una probabilità di automazione minore e quindi verso attività lavorative non di routine, ovvero non sostituibili dalla tecnologia. Ciò consentirà ai lavoratori coinvolti da un lato di sentirsi salvaguardati dall'impresa contro un possibile licenziamento, dall'altro di essere maggiormente protetti a fronte di un'eventuale introduzione di tecnologie di automazione più evolute e in grado di svolgere più attività lavorative di quelle adottate in precedenza.

Per quanto riguarda le implicazioni di policy, occorre notare che anche se l'automazione reale potrebbe essere minore di quella potenziale, è necessario adottare alcune politiche mirate ad ottenere i benefici offerti dalle nuove tecnologie e limitare gli effetti negativi riguardanti i lavoratori. Tre politiche particolarmente importanti riguardano la creazione di posti di lavoro, la formazione dei lavoratori, il sostegno ai salari e ai redditi.

La creazione di posti di lavoro è molto importante perché la tecnologia consente di automatizzare un numero sempre maggiore di attività lavorative. Tuttavia la creazione di posti di lavoro deve avere queste due caratteristiche: i posti di lavoro creati dovranno essere in numero sufficiente e prevedere lo svolgimento di molte attività lavorative non automatizzabili. La creazione di posti di lavoro dovrà perciò riguardare per esempio i servizi alla persona, il turismo, la sanità e l'istruzione.

La creazione di posti di lavoro può essere ottenuta o favorita con varie misure, adottabili anche congiuntamente. È per esempio possibile intervenire sulla regolamentazione del lavoro al fine di raggiungere la flessibilità ideale. Infatti, se da un lato una regolamentazione eccessiva del lavoro aumenta il costo del lavoro e riduce il numero di posti di lavoro di qualità, dall'altro una minore regolamentazione potrebbe ridurre i posti di lavoro di qualità (Bourguignon e Detieux, 2006). È inoltre possibile favorire la creazione di posti di lavoro sostenendo la crescita economica tramite la costituzione di start-up, il sostegno agli investimenti, la promozione di nuove forme di imprenditorialità basate sulle tecnologie recenti, la promozione del lavoro autonomo, il sostegno alla ricerca e la riduzione della tassazione sul lavoro.

Per quanto riguarda l'istruzione e la formazione dei lavoratori, in passato gli ingenti investimenti in istruzione hanno aumentato il livello educativo medio dei lavoratori, impedito un aumento della disuguaglianza economica e consentito ai lavoratori di proteggersi contro il rischio di sostituzione (Brynjolfsson e McAfee, 2011). Oggi l'istruzione e la formazione dei lavoratori rimangono importanti (Brynjolfsson e McAfee, 2014; Frey e Osborne, 2015), ma non assicurano contro la sostituzione da parte delle macchine vista la possibilità di automatizzare anche alcune attività lavorative non di routine (Ford, 2016). In ogni caso è necessario intervenire sull'istruzione e la formazione dei lavoratori, trasmettendo loro capacità quali la creatività, la leadership, le capacità di problem solving e le capacità sociali. Inoltre i sistemi di istruzione dovranno intensificare la relazione con il mondo del lavoro, adattarsi velocemente ai cambiamenti tecnologici e favorire un apprendimento continuo durante la vita lavorativa. L'apprendimento continuo sarà essenziale per proteggersi contro il rischio di sostituzione; tuttavia i lavoratori che affrontano un rischio di sostituzione più elevato sembrano avere opportunità minori di partecipare a corsi di formazione on-the-job o fuori dal lavoro (Nedelkoska e Quintini, 2018).

L'ultimo intervento auspicabile riguarda il sostegno ai salari e ai redditi con l'obiettivo di ridurre la disuguaglianza economica causata dalla tecnologia. È possibile introdurre un sistema di previdenza sociale adatto alle nuove condizioni del mercato del lavoro, effettuare una distribuzione dei redditi o erogare un reddito di base universale o un reddito minimo garantito. È però necessario accompagnare le politiche di sostegno ai salari e ai redditi ad altre misure poiché non consentono di risolvere il problema alla radice.

6. Appendice

Tab.: Probabilità di automazione delle professioni italiane

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
1.1.1.1	Membri di organismi di governo e di assemblee con potestà legislativa e regolamentare a livello nazionale		0,1746	0,4788
1.1.1.2	Membri di organismi di governo e di assemblee con potestà legislativa e regolamentare a livello regionale e di Province autonome		0,6892	0,4788
1.1.1.3	Membri di organismi di governo e di assemblee con potestà regolamentare a livello provinciale		0,2421	0,4788
1.1.1.4	Membri di organismi di governo e di assemblee con potestà regolamentare a livello comunale e sub-provinciale		0,1481	0,4788
1.1.2.1	Ambasciatori, ministri plenipotenziari ed altri dirigenti della carriera diplomatica		0,3563	0,4788
1.1.2.2	Commissari di governo, prefetti e vice prefetti, capi e vice capi della polizia di stato, questori, segretari generali e professioni assimilate		0,2999	0,4788
1.1.2.3	Direttori degli uffici scolastici territoriali, sovrintendenti al patrimonio culturale nazionale ed equiparati	0	0,1012	0,2515
1.1.2.4	Direttori generali, dipartimentali ed equiparati delle amministrazioni dello Stato, degli enti pubblici non economici, degli enti locali, delle università, degli enti di ricerca e nella sanità	0	0,0746	0,2525
1.1.2.5	Dirigenti scolastici ed equiparati	0	0,0039	0,2544
1.1.2.6	Dirigenti ed equiparati delle amministrazioni dello Stato, degli enti pubblici non economici, degli enti locali, delle università, degli enti di ricerca e nella sanità	0	0,0531	0,2525
1.1.3.1	Dirigenti della magistratura ordinaria (Preture, Tribunali, Corti di Appello, Corte di Cassazione)		0,4004	0,4788
1.1.3.2	Dirigenti della magistratura amministrativa e delle giurisdizioni speciali (Tribunali Amministrativi Regionali, Consiglio di Stato, Corte dei Conti e Corte costituzionale)		0,6889	0,4788
1.1.4.1	Dirigenti di organizzazioni di interesse nazionale e sovranazionale per la rappresentanza di interessi collettivi (partiti e movimenti politici, sindacati delle imprese e dei lavoratori, associazioni per la tutela dell'ambiente e dei consumatori)		0,1133	0,4788
1.1.4.2	Dirigenti di associazioni umanitarie, culturali, scientifiche e sportive di interesse nazionale o sovranazionale		0,0175	0,4788
1.2.1.1	Imprenditori e amministratori di grandi aziende che operano nell'agricoltura, nell'allevamento, nella silvicoltura, nella caccia e nella pesca		0,2980	0,2081
1.2.1.2	Imprenditori e amministratori di grandi aziende che operano nell'estrazione dei minerali, nella manifattura, nella produzione e distribuzione di energia elettrica, gas, acqua e nelle attività di gestione dei rifiuti	0	0,0931	0,2486
1.2.1.3	Imprenditori e amministratori di grandi aziende di costruzioni	0	0,1032	0,2486
1.2.1.4	Imprenditori e amministratori di grandi aziende nel commercio	0	0,0641	0,2486
1.2.1.5	Imprenditori e amministratori di grandi aziende nei servizi di alloggio e ristorazione	0	0,0502	0,2486
1.2.1.6	Imprenditori e amministratori di grandi aziende nel settore dei trasporti e magazzinaggio e nei servizi di informazione e comunicazione	0	0,0779	0,2486
1.2.1.7	Imprenditori e amministratori di grandi banche, assicurazioni, agenzie immobiliari e di intermediazione finanziaria	0	0,2728	0,2486
1.2.1.8	Imprenditori e amministratori di grandi aziende nei servizi alle imprese e alle persone	0	0,0580	0,2486
1.2.1.9	Imprenditori e amministratori di grandi aziende private nei servizi di istruzione, sanità, assistenza sociale e nelle attività artistiche, sportive, di intrattenimento e divertimento	0	0,0714	0,2590
1.2.2.1	Direttori e dirigenti generali di aziende che operano nell'agricoltura, nell'allevamento, nella silvicoltura, nella caccia e nella pesca		0,1591	0,2081
1.2.2.2	Direttori e dirigenti generali di aziende che operano nell'estrazione dei minerali, nella manifattura, nella produzione e distribuzione di energia elettrica, gas, acqua e nelle attività di gestione dei rifiuti	0	0,1259	0,1300
1.2.2.3	Direttori e dirigenti generali di aziende nelle costruzioni	0	0,1055	0,1300
1.2.2.4	Direttori e dirigenti generali di aziende nel commercio		0,3651	0,5702
1.2.2.5	Direttori e dirigenti generali di aziende nel settore dei servizi di alloggio e ristorazione		0,1731	0,1421
1.2.2.6	Direttori e dirigenti generali di aziende nel settore dei trasporti e magazzinaggio e nei servizi di informazione e comunicazione	0	0,1075	0,2501
1.2.2.7	Direttori e dirigenti generali di banche, assicurazioni, agenzie immobiliari e di intermediazione finanziaria	0	0,1600	0,2544
1.2.2.8	Direttori e dirigenti generali di aziende di servizi alle imprese e alle persone	0	0,0327	0,2544
1.2.2.9	Direttori e dirigenti generali di aziende nel settore delle attività artistiche, sportive, di intrattenimento e di divertimento		0,0289	0,2683
1.2.3.1	Direttori e dirigenti del dipartimento finanza ed amministrazione		0,4944	0,6551
1.2.3.2	Direttori e dirigenti del dipartimento organizzazione, gestione delle risorse		0,3540	0,6551

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
	umane e delle relazioni industriali			
1.2.3.3	Direttori e dirigenti del dipartimento vendite e commercializzazione		0,2084	0,2740
1.2.3.4	Direttori e dirigenti del dipartimento comunicazione, pubblicità e pubbliche relazioni		0,2587	0,2740
1.2.3.5	Direttori e dirigenti del dipartimento approvvigionamento e distribuzione	0	0,0776	0,1300
1.2.3.6	Direttori e dirigenti del dipartimento servizi informatici		0,1950	0,3101
1.2.3.7	Direttori e dirigenti del dipartimento ricerca e sviluppo		0,1276	0,2740
1.2.3.9	Altri direttori e dirigenti di dipartimento non altrove classificati	0	0,1874	0,2544
1.3.1.1	Imprenditori e responsabili di piccole aziende che operano nell'agricoltura, nell'allevamento, nella silvicoltura, nella caccia e nella pesca		0,6336	0,5134
1.3.1.2	Imprenditori e responsabili di piccole aziende che operano nell'estrazione di minerali, nella manifattura, nella produzione e distribuzione di energia elettrica, gas e acqua e nelle attività di gestione dei rifiuti	0	0,0574	0,1300
1.3.1.3	Imprenditori e responsabili di piccole aziende nelle costruzioni	0	0,0374	0,1300
1.3.1.4	Imprenditori e responsabili di piccole aziende nel commercio		0,5440	0,5702
1.3.1.5	Imprenditori e responsabili di piccole aziende nei servizi di alloggio e ristorazione		0,6109	0,1421
1.3.1.6	Imprenditori e responsabili di piccole aziende nei trasporti, magazzinaggio e nei servizi di informazione e comunicazione	0	0,2192	0,2501
1.3.1.7	Imprenditori e responsabili di piccoli istituti di credito e di intermediazione finanziaria, assicurativa e immobiliare	0	0,2071	0,2544
1.3.1.8	Imprenditori e responsabili di piccole aziende nei servizi alle imprese e alle persone		0,2863	0,2683
1.3.1.9	Imprenditori e responsabili di piccole aziende nei servizi di istruzione, formazione, ricerca, sanità, assistenza sociale e nelle attività artistiche, sportive, di intrattenimento e divertimento	0	0,0289	0,2590
2.1.1.1	Fisici e astronomi	0	0,1318	0,2266
2.1.1.2	Chimici e professioni assimilate	0	0,1476	0,2266
2.1.1.3	Matematici, statistici e professioni assimilate		0,2771	0,5542
2.1.1.4	Analisti e progettisti di software		0,1964	0,1627
2.1.1.5	Progettisti e amministratori di sistemi		0,3012	0,2488
2.1.1.6	Geologi, meteorologi, geofisici e professioni assimilate	0	0,1402	0,2266
2.2.1.1	Ingegneri energetici e meccanici	0	0,0906	0,0858
2.2.1.2	Ingegneri metallurgico-minerari	0	0,1342	0,0858
2.2.1.3	Ingegneri elettrotecnici	0	0,1651	0,0384
2.2.1.4	Ingegneri elettronici e in telecomunicazioni	0	0,0906	0,0384
2.2.1.5	Ingegneri chimici, petroliferi e dei materiali	0	0,0957	0,0858
2.2.1.6	Ingegneri civili e professioni assimilate	0	0,1149	0,0858
2.2.1.7	Ingegneri industriali e gestionali	0	0,2057	0,0858
2.2.1.8	Ingegneri biomedici e bioingegneri	0	0,0986	0,0858
2.2.2.1	Architetti, pianificatori, paesaggisti e specialisti del recupero e della conservazione del territorio	0	0,0687	0,1116
2.2.2.2	Cartografi e fotogrammetristi	0	0,3033	0,1116
2.3.1.1	Biologi, botanici, zoologi e professioni assimilate	0	0,1000	0,1059
2.3.1.2	Farmacologi, batteriologi e professioni assimilate	0	0,1531	0,1059
2.3.1.3	Agronomi e forestali	0	0,0836	0,1059
2.3.1.4	Veterinari		0,0994	0,5460
2.3.1.5	Farmacisti	0	0,0320	0,2159
2.4.1.1	Medici di medicina generale	0	0,0460	0,2142
2.4.1.2	Specialisti in terapie mediche	0	0,0410	0,2142
2.4.1.3	Specialisti in terapie chirurgiche	0	0,0199	0,2142
2.4.1.4	Laboratoristi e patologi clinici	0	0,2551	0,2142
2.4.1.5	Dentisti e odontostomatologi	0	0,0186	0,2159
2.4.1.6	Specialisti in diagnostica per immagini e radioterapia	0	0,0204	0,2142
2.4.1.7	Specialisti in igiene, epidemiologia e sanità pubblica	0	0,1062	0,2159
2.4.1.8	Anestesisti e rianimatori	0	0,0133	0,2142
2.5.1.1	Specialisti della gestione e del controllo nella pubblica amministrazione		0,4661	0,4130
2.5.1.2	Specialisti della gestione e del controllo nelle imprese private		0,3052	0,4130
2.5.1.3	Specialisti di gestione e sviluppo del personale e dell'organizzazione del lavoro		0,2507	0,4130
2.5.1.4	Specialisti in contabilità e problemi finanziari	1	0,8092	0,6652
2.5.1.5	Specialisti nei rapporti con il mercato	1	0,6907	0,6665
2.5.1.6	Specialisti nelle pubbliche relazioni, dell'immagine e simili	1	0,5993	0,6665
2.5.2.1	Procuratori legali ed avvocati	0	0,2105	0,0504
2.5.2.2	Esperti legali in imprese o enti pubblici	0	0,1351	0,0504
2.5.2.3	Notai	0	0,2910	0,0504
2.5.2.4	Magistrati	0	0,1979	0,0504
2.5.3.1	Specialisti in scienze economiche	0	0,0643	0,1401
2.5.3.2	Specialisti in scienze sociologiche e antropologiche	0	0,0954	0,1401
2.5.3.3	Specialisti in scienze psicologiche e psicoterapeutiche	0	0,0579	0,1401
2.5.3.4	Specialisti in scienze storiche, artistiche, politiche e filosofiche	0	0,0715	0,1401

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
2.5.4.1	Scrittori e professioni assimilate		0,4093	0,4467
2.5.4.2	Giornalisti		0,5548	0,4467
2.5.4.3	Interpreti e traduttori a livello elevato		0,8977	0,4467
2.5.4.4	Linguisti e filologi		0,3274	0,4467
2.5.4.5	Archivisti, bibliotecari, conservatori di musei e professioni assimilate		0,3047	0,1246
2.5.5.1	Pittori, scultori, disegnatori e restauratori di beni culturali	0	0,4471	0,1672
2.5.5.2	Registi, direttori artistici, attori, sceneggiatori e scenografi		0,2409	0,2528
2.5.5.3	Coreografi e ballerini		0,2893	0,2043
2.5.5.4	Compositori, musicisti e cantanti		0,4224	0,2043
2.5.5.5	Artisti delle forme di cultura popolare, di varietà e acrobati		0,5696	0,2043
2.5.6.1	Specialisti in discipline religiose e teologiche	0	0,0000	0,1401
2.6.1.1	Docenti universitari in scienze matematiche e dell'informazione, fisiche, chimiche e della terra		0,1695	0,6310
2.6.1.2	Docenti universitari in scienze della vita e della salute		0,1148	0,6310
2.6.1.3	Docenti universitari in scienze ingegneristiche e dell'architettura		0,2200	0,6310
2.6.1.4	Docenti universitari in scienze dell'antichità, filologico-letterarie e storico-artistiche		0,0731	0,6310
2.6.1.5	Docenti universitari in scienze storiche, filosofiche, pedagogiche e psicologiche		0,0539	0,6310
2.6.1.6	Docenti universitari in scienze economiche e statistiche		0,2387	0,6310
2.6.1.7	Docenti universitari in scienze giuridiche, politiche e sociali		0,1070	0,6310
2.6.2.1	Ricercatori e tecnici laureati nelle scienze matematiche e dell'informazione, fisiche, chimiche, della terra		0,1927	0,6310
2.6.2.2	Ricercatori e tecnici laureati nelle scienze della vita e della salute		0,1508	0,6310
2.6.2.3	Ricercatori e tecnici laureati nelle scienze ingegneristiche e dell'architettura		0,1587	0,6310
2.6.2.4	Ricercatori e tecnici laureati nelle scienze dell'antichità, filologico-letterarie e storico-artistiche		0,1275	0,6310
2.6.2.5	Ricercatori e tecnici laureati nelle scienze storiche, filosofiche, pedagogiche e psicologiche		0,3095	0,6310
2.6.2.6	Ricercatori e tecnici laureati nelle scienze economiche e statistiche		0,1602	0,6310
2.6.2.7	Ricercatori e tecnici laureati nelle scienze giuridiche, politiche e sociali		0,1151	0,6310
2.6.3.1	Professori delle accademie, dei conservatori e delle istituzioni scolastiche assimilate		0,1092	0,6310
2.6.3.2	Professori di scuola secondaria superiore		0,3988	0,4008
2.6.3.3	Professori di scuola secondaria inferiore		0,0129	0,4008
2.6.4.1	Professori di scuola primaria	0	0,0719	0,2073
2.6.4.2	Professori di scuola pre-primaria	0	0,0076	0,2073
2.6.5.1	Specialisti nell'educazione e nella formazione di soggetti diversamente abili		0,0817	0,7420
2.6.5.2	Ispettori scolastici e professioni assimilate		0,3083	0,7420
2.6.5.3	Docenti ed esperti nella progettazione formativa e curricolare		0,2560	0,6594
2.6.5.4	Consiglieri dell'orientamento	0	0,0020	0,1401
2.6.5.5	Insegnanti di discipline artistiche e letterarie		0,3160	0,7420
3.1.1.1	Tecnici fisici e geologici	1	0,6930	0,6565
3.1.1.2	Tecnici chimici	1	0,7201	0,6565
3.1.1.3	Tecnici statistici	1	0,7518	0,7403
3.1.2.1	Tecnici programmatori		0,2358	0,4050
3.1.2.2	Tecnici esperti in applicazioni		0,3214	0,4050
3.1.2.3	Tecnici web		0,3771	0,4050
3.1.2.4	Tecnici gestori di basi di dati		0,4746	0,4050
3.1.2.5	Tecnici gestori di reti e di sistemi telematici		0,0487	0,4050
3.1.2.6	Tecnici per la trasmissione radio-televisiva e per le telecomunicazioni	1	0,8147	0,6934
3.1.3.1	Tecnici meccanici	1	0,6256	0,6565
3.1.3.2	Tecnici metallurgico-minerari e della ceramica	1	0,5887	0,6565
3.1.3.3	Elettrotecnici	1	0,5199	0,6565
3.1.3.4	Tecnici elettronici	1	0,6989	0,6565
3.1.3.5	Tecnici delle costruzioni civili e professioni assimilate	1	0,8077	0,6565
3.1.3.6	Tecnici del risparmio energetico e delle energie rinnovabili	1	0,8521	0,6565
3.1.3.7	Disegnatori industriali e professioni assimilate	1	0,7174	0,6565
3.1.4.1	Tecnici della conduzione di impianti produttivi in continuo	0	0,1426	0,3720
3.1.4.2	Tecnici dell'esercizio di reti idriche ed energetiche	0	0,2618	0,3720
3.1.5.1	Tecnici di produzione in miniere e cave		0,6072	0,6423
3.1.5.2	Tecnici della gestione di cantieri edili		0,2014	0,6423
3.1.5.3	Tecnici della produzione manifatturiera		0,3297	0,6423
3.1.5.4	Tecnici della produzione e preparazione alimentare	0	0,1634	0,4377
3.1.5.5	Tecnici della produzione di servizi	1	0,8533	0,8785
3.1.6.1	Comandanti e ufficiali di bordo	1	0,7912	0,5201
3.1.6.2	Comandanti e piloti di aereo	1	0,7228	0,5201
3.1.6.3	Tecnici dell'aviazione civile	1	0,7847	0,5201
3.1.6.4	Tecnici dell'organizzazione del traffico ferroviario		0,5783	0,4881
3.1.6.5	Tecnici dell'organizzazione del traffico portuale		0,3541	0,4881
3.1.7.1	Fotografi e professioni assimilate	0	0,1390	0,2331

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
3.1.7.2	Operatori di apparecchi per la ripresa e la produzione audio-video	1	0,8501	0,6934
3.1.7.3	Tecnici di apparati medicali e per la diagnostica medica		0,2822	0,5146
3.1.8.1	Tecnici della sicurezza di impianti	0	0,1240	0,3239
3.1.8.2	Tecnici della sicurezza sul lavoro	0	0,2173	0,3239
3.1.8.3	Tecnici del controllo e della bonifica ambientale	0	0,2548	0,3239
3.2.1.1	Professioni sanitarie infermieristiche ed ostetriche	0	0,0159	0,3660
3.2.1.2	Professioni sanitarie riabilitative	0	0,0301	0,3239
3.2.1.3	Professioni tecnico sanitarie - area tecnico diagnostica	0	0,2642	0,4669
3.2.1.4	Professioni tecnico sanitarie - area tecnico assistenziale	0	0,0520	0,4002
3.2.1.5	Professioni tecniche della prevenzione	0	0,1454	0,3239
3.2.1.6	Altre professioni tecniche della salute	0	0,2712	0,4193
3.2.1.7	Tecnici della medicina popolare	0	0,0430	0,3239
3.2.2.1	Tecnici agronomi e forestali		0,6214	0,5033
3.2.2.2	Zootecnici		0,4350	0,5033
3.2.2.3	Tecnici biochimici e professioni assimilate	0	0,4566	0,4136
3.3.1.1	Segretari amministrativi, archivisti, tecnici degli affari generali e professioni assimilate	0	0,5765	0,5558
3.3.1.2	Contabili e professioni assimilate	1	0,8061	0,7403
3.3.1.3	Tecnici del trasferimento e del trattamento delle informazioni	1	0,7684	0,1083
3.3.1.4	Corrispondenti in lingue estere e professioni assimilate	1	0,7783	0,8785
3.3.1.5	Tecnici dell'organizzazione e della gestione dei fattori produttivi	1	0,6338	0,8785
3.3.2.1	Tecnici della gestione finanziaria	1	0,7693	0,7403
3.3.2.2	Tecnici del lavoro bancario	1	0,8148	0,7403
3.3.2.3	Agenti assicurativi	1	0,8110	0,8070
3.3.2.4	Periti, valutatori di rischio, liquidatori e professioni assimilate	1	0,9641	0,7403
3.3.2.5	Agenti di borsa e cambio, tecnici dell'intermediazione titoli e professioni assimilate	1	0,7154	0,8070
3.3.2.6	Tecnici della locazione finanziaria e dei contratti di scambio	1	0,7525	0,8070
3.3.3.1	Approvvigionatori e responsabili acquisti	1	0,7100	0,8070
3.3.3.2	Responsabili di magazzino e della distribuzione interna	0	0,3708	0,2163
3.3.3.3	Commissari, stimatori e aggiudicatori d'asta commerciali	0	0,5033	0,4783
3.3.3.4	Tecnici della vendita e della distribuzione	1	0,6493	0,8070
3.3.3.5	Tecnici del marketing	0	0,0987	0,2163
3.3.3.6	Tecnici della pubblicità e delle pubbliche relazioni	0	0,0209	0,2163
3.3.4.1	Spedizionieri e tecnici della distribuzione	0	0,1791	0,2163
3.3.4.2	Agenti di commercio	1	0,8315	0,8070
3.3.4.3	Agenti concessionari	0	0,1825	0,2163
3.3.4.4	Agenti di pubblicità	0	0,0544	0,2163
3.3.4.5	Agenti immobiliari	0	0,3141	0,2163
3.3.4.6	Rappresentanti di commercio	1	0,8515	0,8070
3.3.4.7	Agenti e rappresentanti di artisti ed atleti	0	0,0558	0,2163
3.4.1.1	Tecnici delle attività ricettive e professioni assimilate	0	0,3113	0,2163
3.4.1.2	Tecnici dell'organizzazione di fiere, convegni ed eventi culturali	0	0,0372	0,2163
3.4.1.3	Animatori turistici e professioni assimilate	0	0,0173	0,2582
3.4.1.4	Agenti di viaggio	1	0,7616	0,1083
3.4.1.5	Guide ed accompagnatori specializzati	0	0,0815	0,2153
3.4.2.1	Istruttori di guida	0	0,6221	0,3684
3.4.2.2	Insegnanti nella formazione professionale		0,3192	0,5767
3.4.2.3	Istruttori di tecniche in campo artistico		0,0711	0,7420
3.4.2.4	Istruttori di discipline sportive non agonistiche	0	0,0032	0,2582
3.4.2.5	Professioni organizzative nel campo dell'educazione fisica e dello sport	0	0,1270	0,2582
3.4.2.6	Allenatori e tecnici di discipline sportive agonistiche	0	0,1397	0,2582
3.4.2.7	Atleti	0	0,4344	0,2582
3.4.3.1	Annunciatori e presentatori della radio, della televisione e di altri spettacoli		0,6006	0,2043
3.4.3.2	Tecnici dell'organizzazione della produzione radiotelevisiva, cinematografica e teatrale		0,0443	0,2043
3.4.3.3	Intrattenitori	0	0,1114	0,2331
3.4.4.1	Grafici, disegnatori e allestitori di scena	0	0,1357	0,1724
3.4.4.2	Tecnici dei musei, delle biblioteche e professioni assimilate	0	0,1420	0,2331
3.4.4.3	Periti, stimatori d'arte e professioni assimilate	1	0,7963	0,7403
3.4.4.4	Tecnici restauratori		0,3356	0,2043
3.4.5.1	Assistenti sociali	0	0,0151	0,2173
3.4.5.2	Tecnici del reinserimento e dell'integrazione sociale	0	0,0000	0,2173
3.4.5.3	Tecnici dei servizi per l'impiego	0	0,3067	0,2163
3.4.5.4	Tecnici dei servizi di sicurezza privati e professioni assimilate		0,1488	0,2745
3.4.5.5	Tecnici delle attività religiose e di culto	0	0,0398	0,2173
3.4.6.1	Tecnici dei servizi giudiziari	0	0,2101	0,2173
3.4.6.2	Ufficiali della polizia di stato	1	0,8522	0,7518
3.4.6.3	Comandanti dei vigili urbani e dei vigili del fuoco e del corpo forestale	1	0,8055	0,7518
3.4.6.4	Ufficiali di finanza	1	0,7018	0,7518

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
3.4.6.5	Controllori fiscali	1	0,8389	0,7518
3.4.6.6	Tecnici dei servizi pubblici di concessioni licenze e professioni assimilate	1	0,8970	0,7518
4.1.1.1	Addetti a funzioni di segreteria		0,5391	0,5614
4.1.1.2	Addetti agli affari generali		0,4411	0,4762
4.1.1.3	Addetti al protocollo e allo smistamento di documenti		0,8548	0,4762
4.1.1.4	Addetti alla gestione del personale	1	0,8198	0,7145
4.1.2.1	Addetti alla videoscrittura, dattilografi, stenografi e professioni assimilate		0,7967	0,8260
4.1.2.2	Addetti all'immissione dati	1	0,8945	0,8260
4.1.2.3	Addetti alle macchine per la riproduzione e l'invio di materiali e documenti	1	0,7766	0,7145
4.2.1.1	Addetti agli sportelli assicurativi, bancari e di altri intermediari finanziari		0,5739	0,5860
4.2.1.2	Addetti agli sportelli dei servizi postali		0,7962	0,5860
4.2.1.3	Addetti agli sportelli per l'esazione di imposte e contributi e al recupero crediti		0,5312	0,5860
4.2.1.4	Addetti agli sportelli delle agenzie di pegno e professioni assimilate		0,6896	0,5860
4.2.1.5	Addetti alla vendita di biglietti	1	0,8400	0,8359
4.2.1.6	Addetti agli sportelli delle agenzie di viaggio	1	0,8056	0,1083
4.2.2.1	Addetti all'accoglienza e all'informazione nelle imprese e negli enti pubblici	1	0,8605	0,1083
4.2.2.2	Addetti all'accoglienza nei servizi di alloggio e ristorazione	1	0,8996	0,1083
4.2.2.3	Centralinisti	1	0,9367	0,1083
4.2.2.4	Addetti all'informazione nei Call Center (senza funzioni di vendita)	1	0,9015	0,1083
4.3.1.1	Addetti alla gestione degli acquisti		0,7029	0,4881
4.3.1.2	Addetti alla gestione dei magazzini e e professioni assimilate		0,4486	0,4881
4.3.1.3	Addetti alla gestione amministrativa dei trasporti merci		0,7453	0,4881
4.3.2.1	Addetti alla contabilità		0,8047	0,5600
4.3.2.2	Addetti alle buste paga		0,6215	0,5600
4.3.2.3	Addetti alle operazioni finanziarie per conto dell'impresa o dell'organizzazione		0,6045	0,5600
4.3.2.4	Addetti ai servizi statistici		0,5367	0,5600
4.3.2.5	Addetti agli uffici interni di cassa		0,7179	0,5860
4.4.1.1	Personale addetto a compiti di controllo, verifica e professioni assimilate		0,4115	0,4762
4.4.1.2	Addetti al controllo della documentazione di viaggio		0,5358	0,4881
4.4.1.3	Addetti allo smistamento e al recapito della posta	1	0,9031	0,7145
4.4.2.1	Addetti ad archivi, schedari e professioni assimilate	1	0,9014	0,7145
4.4.2.2	Addetti a biblioteche e professioni assimilate	1	0,6879	0,7145
5.1.1.1	Esercenti delle vendite all'ingrosso		0,5071	0,5702
5.1.1.2	Esercenti delle vendite al minuto		0,3562	0,4161
5.1.1.3	Esercenti di distributori di carburanti ed assimilati		0,6150	0,4192
5.1.2.1	Commessi delle vendite all'ingrosso		0,6716	0,4192
5.1.2.2	Commessi delle vendite al minuto		0,6043	0,4192
5.1.2.3	Addetti ad attività organizzative delle vendite		0,4055	0,4192
5.1.2.4	Cassieri di esercizi commerciali	1	0,8321	0,8359
5.1.2.5	Venditori a domicilio, a distanza e professioni assimilate		0,6136	0,6423
5.1.2.6	Addetti ai distributori di carburanti ed assimilati		0,3212	0,6423
5.1.3.1	Indossatori, modelli e professioni assimilate		0,6466	0,6423
5.1.3.2	Dimostratori e professioni assimilate		0,4483	0,6423
5.1.3.3	Vetrinisti e professioni assimilate		0,7161	0,4192
5.1.3.4	Addetti all'informazione e all'assistenza dei clienti	1	0,8583	0,1083
5.2.1.1	Esercenti nelle attività ricettive	0	0,2424	0,1307
5.2.2.1	Cuochi in alberghi e ristoranti	1	0,8701	0,8189
5.2.2.2	Addetti alla preparazione, alla cottura e alla distribuzione di cibi	1	0,7493	0,7310
5.2.2.3	Camerieri e professioni assimilate	0	0,2712	0,0466
5.2.2.4	Baristi e professioni assimilate	0	0,1400	0,0466
5.2.2.5	Esercenti nelle attività di ristorazione		0,4010	0,1421
5.2.3.1	Hostess, steward e professioni assimilate	0	0,1394	0,1724
5.2.3.2	Accompagnatori turistici	0	0,0390	0,1724
5.3.1.1	Professioni qualificate nei servizi sanitari e sociali		0,0599	0,2956
5.4.1.1	Maestri di arti e mestieri		0,2778	0,7420
5.4.2.1	Esercenti di cinema, teatri e attività sportive e ricreative		0,4335	0,2683
5.4.2.2	Allibratori, croupiers e professioni assimilate		0,7643	0,5860
5.4.2.3	Astrologi, preveggenti, chiromanti e professioni assimilate		0,0896	0,3270
5.4.3.1	Acconciatori	0	0,1635	0,0781
5.4.3.2	Estetisti e truccatori	0	0,1098	0,0781
5.4.3.3	Massaggiatori ed operatori termali	0	0,0526	0,0781
5.4.4.1	Personale di compagnia e personale qualificato di servizio alle famiglie		0,0893	0,3270
5.4.4.2	Addetti alla sorveglianza di bambini e professioni assimilate	0	0,0095	0,1636
5.4.4.3	Addetti all'assistenza personale		0,0415	0,2956
5.4.5.1	Addestratori di animali		0,0941	0,3270
5.4.5.2	Custodi e allevatori di animali domestici e da esposizione		0,1113	0,3270
5.4.6.1	Esercenti di agenzie per il disbrigo di pratiche ed assimilate		0,6298	0,2683
5.4.6.2	Addetti di agenzie per il disbrigo di pratiche ed assimilate	1	0,7522	0,7145
5.4.7.1	Esercenti di agenzie di pompe funebri		0,4104	0,2683
5.4.7.2	Addetti alle agenzie di pompe funebri		0,6400	0,3270

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
5.4.8.1	Personale di guardiania territoriale		0,6488	0,2745
5.4.8.2	Vigili urbani		0,4202	0,2745
5.4.8.3	Agenti della polizia di stato e professioni assimilate		0,4887	0,2745
5.4.8.4	Vigili del fuoco e professioni assimilate		0,1766	0,2745
5.4.8.5	Agenti di istituti di pena e rieducazione		0,0768	0,2745
5.4.8.6	Guardie private di sicurezza		0,7888	0,2745
5.4.8.7	Bagnini e professioni assimilate		0,0856	0,2745
5.4.8.8	Esercenti di garage ed autorimesse		0,9103	0,2683
6.1.1.1	Brillatori (addetti alle esplosioni)		0,9313	0,6199
6.1.1.2	Tagliatori di pietre, scalpellini e marmisti		0,5838	0,4200
6.1.1.3	Coltivatori di saline		0,9365	0,6304
6.1.2.1	Muratori in pietra, mattoni, refrattari		0,8302	0,4200
6.1.2.2	Muratori in cemento armato		0,9396	0,4200
6.1.2.3	Carpentieri e falegnami nell'edilizia (esclusi i parchettisti)		0,8059	0,4200
6.1.2.4	Ponteggiatori		0,8059	0,4200
6.1.2.5	Armatori di gallerie, addetti all'armamento ferroviario e professioni assimilate		0,7096	0,4200
6.1.2.6	Pavimentatori stradali e professioni assimilate		0,7441	0,4200
6.1.2.7	Montatori di manufatti prefabbricati e di preformati		0,7748	0,4200
6.1.3.1	Copritetti e professioni assimilate	0	0,2004	0,0444
6.1.3.2	Pavimentatori e posatori di rivestimenti	0	0,2757	0,0444
6.1.3.3	Intonacatori	0	0,3473	0,0444
6.1.3.4	Installatori di impianti di isolamento e insonorizzazione	0	0,2060	0,0444
6.1.3.5	Vetrai	0	0,1920	0,0444
6.1.3.6	Idraulici e posatori di tubazioni idrauliche e di gas	0	0,1915	0,0444
6.1.3.7	Elettricisti nelle costruzioni civili e professioni assimilate		0,3639	0,4845
6.1.3.8	Installatori di infissi e serramenta	0	0,1405	0,0444
6.1.4.1	Pittori, stuccatori, laccatori e decoratori		0,6497	0,3414
6.1.4.2	Pulitori di facciate		0,4887	0,3414
6.1.5.1	Operai addetti ai servizi di igiene e pulizia		0,1790	0,6199
6.1.5.2	Operai addetti alla manutenzione degli impianti fognari e professioni assimilate		0,4806	0,3414
6.2.1.1	Fonditori e animisti di fonderia	1	0,7985	0,7443
6.2.1.2	Saldatori e tagliatori a fiamma	1	0,8132	0,7443
6.2.1.3	Lattonieri e calderai, compresi i tracciatori	1	0,9645	0,7443
6.2.1.4	Montatori di carpenteria metallica	1	0,9082	0,7443
6.2.1.5	Attrezzatori e montatori di cavi metallici per uso industriale e di trasporto	1	0,7665	0,7443
6.2.1.6	Sommozzatori e lavoratori subacquei		0,2418	0,6199
6.2.1.7	Specialisti di saldatura elettrica ed a norme ASME	1	0,7328	0,7443
6.2.1.8	Lastroferratori	1	0,9017	0,7443
6.2.2.1	Fabbri, lingottai e operatori di presse per forgiare		0,7044	0,4848
6.2.2.2	Costruttori di utensili modellatori e tracciatori meccanici		0,8057	0,4848
6.2.2.3	Attrezzisti di macchine utensili e professioni assimilate		0,9210	0,4848
6.2.3.1	Meccanici artigianali, riparatori e manutentori di automobili e professioni assimilate		0,4543	0,4330
6.2.3.2	Meccanici e riparatori di motori di aerei		0,7160	0,4330
6.2.3.3	Meccanici e montatori di macchinari industriali ed assimilati		0,5810	0,4330
6.2.3.4	Frigoristi		0,3363	0,4330
6.2.3.5	Meccanici e montatori di apparecchi industriali termici, idraulici e di condizionamento	0	0,2606	0,0444
6.2.3.6	Meccanici collaudatori		0,4184	0,4330
6.2.3.7	Verniciatori artigianali ed industriali		0,7362	0,3414
6.2.3.8	Meccanici e attrezzisti navali		0,7412	0,4330
6.2.4.1	Installatori e riparatori di apparati elettrici ed elettromeccanici		0,5257	0,4845
6.2.4.2	Manutentori e riparatori di apparati elettronici industriali e di misura		0,3548	0,2858
6.2.4.3	Riparatori di apparecchi radio, televisivi e assimilati		0,4040	0,2858
6.2.4.4	Installatori e riparatori di apparati di telecomunicazione		0,2999	0,2858
6.2.4.5	Installatori di linee elettriche, riparatori e cavisti		0,7073	0,4845
6.2.4.6	Installatori, manutentori e riparatori di apparecchiature informatiche		0,1980	0,2858
6.3.1.1	Meccanici di precisione		0,8799	0,5715
6.3.1.2	Meccanici e riparatori di protesi (dentali ed ortopediche)		0,4250	0,5715
6.3.1.3	Artigiani ed operai addetti alla costruzione, al montaggio e all'accordatura di strumenti musicali		0,5476	0,5715
6.3.1.4	Addetti alla costruzione e riparazione di orologi		0,2912	0,5715
6.3.1.5	Costruttori di strumenti ottici e lenti		0,3792	0,5715
6.3.1.6	Orafi, gioiellieri e professioni assimilate		0,5054	0,5715
6.3.2.1	Vasai e professioni assimilate (prodotti in ceramica ed abrasivi)		0,5967	0,5715
6.3.2.2	Soffiatori, modellatori, tagliatori, molatori e levigatori di vetro		0,5923	0,5715
6.3.2.3	Incisori ed acquafortisti su vetro		0,6157	0,5715
6.3.2.4	Pittori e decoratori su vetro e ceramica		0,6059	0,5715
6.3.3.1	Artigiani delle lavorazioni artistiche del legno e di materiali assimilati		0,4864	0,5715
6.3.3.2	Artigiani delle lavorazioni artistiche a mano di tessuti, cuoio e simili		0,3796	0,5715

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
6.3.4.1	Operatori delle attività poligrafiche di pre-stampa		0,5800	0,5224
6.3.4.2	Stampatori offset e alla rotativa		0,8625	0,5224
6.3.4.3	Zincografi, stereotipisti ed elettrotipisti		0,5705	0,5224
6.3.4.4	Artigiani incisori, acquafortisti, serigrafisti e professioni assimilate		0,3964	0,5224
6.3.4.5	Rilegatori e professioni assimilate		0,9492	0,5224
6.4.1.1	Agricoltori e operai agricoli specializzati di colture in pieno campo		0,4715	0,5134
6.4.1.2	Agricoltori e operai agricoli specializzati di coltivazioni legnose agrarie (vite, olivo, agrumi e alberi da frutta)		0,3248	0,5134
6.4.1.3	Agricoltori e operai agricoli specializzati di giardini e vivai, di coltivazioni di fiori e piante ornamentali, di ortive protette o di orti stabili		0,4394	0,5134
6.4.1.4	Agricoltori e operai agricoli specializzati di colture miste		0,4848	0,5134
6.4.2.1	Allevatori e operai specializzati degli allevamenti di bovini ed equini		0,4463	0,4535
6.4.2.2	Allevatori e operai specializzati degli allevamenti di ovini e caprini		0,6850	0,4535
6.4.2.3	Allevatori e operai specializzati degli allevamenti di suini		0,5306	0,4535
6.4.2.4	Allevatori e operai specializzati degli allevamenti avicoli		0,5419	0,4535
6.4.2.5	Allevatori e operai specializzati degli allevamenti misti		0,4493	0,4535
6.4.2.6	Allevatori e operai specializzati degli allevamenti di insetti		0,6480	0,4535
6.4.2.9	Altri allevatori e operai specializzati della zootecnia		0,5541	0,4535
6.4.3.1	Allevatori e agricoltori		0,3498	0,2070
6.4.4.1	Lavoratori forestali specializzati		0,4729	#DIV/0!
6.4.5.1	Acquacoltori e professioni assimilate	0	0,1333	0,3120
6.4.5.2	Pescatori della pesca costiera ed in acque interne	0	0,2308	0,3120
6.4.5.3	Pescatori d'alto mare	0	0,2622	0,3120
6.4.5.4	Cacciatori	0	0,1656	0,3120
6.5.1.1	Macellai, pesciaioli e professioni assimilate		0,6109	0,7657
6.5.1.2	Panettieri e pastai artigianali		0,4607	0,7657
6.5.1.3	Pasticcieri, gelatai e conservieri artigianali		0,6036	0,7657
6.5.1.4	Degustatori e classificatori di prodotti alimentari e di bevande		0,3696	0,7657
6.5.1.5	Artigiani ed operai specializzati delle lavorazioni artigianali casearie		0,3859	0,7657
6.5.1.6	Operai della preparazione e della lavorazione delle foglie di tabacco		0,9447	0,7657
6.5.2.1	Artigiani ed operai specializzati del trattamento del legno (curvature a vapore, stagionatura artificiale, trattamenti chimici)		0,7320	0,5500
6.5.2.2	Falegnami ed attrezzisti di macchine per la lavorazione del legno		0,6649	0,5500
6.5.2.3	Impagliatori, cestai, spazzolai, sugherai e professioni assimilate		0,6443	0,5715
6.5.3.1	Preparatori di fibre		0,7750	0,5715
6.5.3.2	Tessitori e maglieristi a mano e su telai manuali		0,6506	0,5715
6.5.3.3	Sarti e tagliatori artigianali, modellisti e cappellai		0,6359	0,5911
6.5.3.4	Pellicciai, modellatori di pellicceria e professioni assimilate		0,6150	0,5911
6.5.3.5	Biancheristi, ricamatori a mano e professioni assimilate		0,6005	0,5911
6.5.3.6	Tappezzieri e materassai		0,5609	0,5911
6.5.3.7	Artigiani e addetti alle tintolavanderie	1	0,9558	0,8338
6.5.4.1	Conciatori di pelli e di pellicce		0,7260	0,5911
6.5.4.2	Artigiani ed operai specializzati delle calzature ed assimilati		0,6901	0,5911
6.5.4.3	Valigia, borsettieri e professioni assimilate (anche su articoli di similpelle e stoffa)		0,5976	0,5911
6.5.5.1	Macchinisti ed attrezzisti di scena		0,2764	0,4330
7.1.1.1	Conduttori di macchinari in miniere e cave		0,7356	0,6304
7.1.1.2	Conduttori di impianti per il primo trattamento di minerali e di pietre		0,8821	0,6304
7.1.1.3	Trivellatori e sondatori di pozzi petroliferi, di gas naturale, operatori di prospezione e professioni assimilate		0,6588	0,6304
7.1.2.1	Fonditori, operatori di altoforno, di convertitori e di forni di raffinazione (siderurgia)		0,6520	0,5952
7.1.2.2	Operatori di forni di seconda fusione, colatori di metalli e leghe e operatori di laminatoi		0,6524	0,5952
7.1.2.3	Operatori di impianti per il trattamento termico dei metalli		0,4049	0,5952
7.1.2.4	Trafilatori ed estrusori di metalli		0,9307	0,5952
7.1.2.5	Operatori di impianti per la produzione e la raffinazione di metalli non ferrosi		0,6647	0,5952
7.1.3.1	Conduttori di impianti per dosare, miscelare ed impastare materiali per la produzione del vetro, della ceramica e dei laterizi	1	0,9847	0,7957
7.1.3.2	Conduttori di forni e di altri impianti per la lavorazione del vetro	1	0,8803	0,7957
7.1.3.3	Conduttori di impianti per la formatura di articoli in ceramica e terracotta	1	0,7693	0,7957
7.1.3.4	Conduttori di forni e di altri impianti per la produzione di laterizi, tegole e assimilati	1	0,9458	0,7957
7.1.4.1	Conduttori di impianti per la fabbricazione in serie di pannelli in legno (compensati, truciolati ed assimilati)		0,6840	0,5738
7.1.4.2	Operatori di impianti per la preparazione della pasta di legno e di altri materiali per cartiera		0,3900	0,5738
7.1.4.3	Operatori di impianti per la fabbricazione della carta		0,9032	0,5738
7.1.5.1	Conduttori di impianti per la raffinazione dei prodotti petroliferi		0,7617	0,4831
7.1.5.2	Operatori di macchinari e di impianti per la chimica di base e la chimica fine		0,8556	0,4831

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
7.1.5.3	Operatori di macchinari per la fabbricazione di prodotti derivati dalla chimica		0,8497	0,4831
7.1.6.1	Conduttori di caldaie a vapore e di motori termici in impianti industriali	1	0,9009	0,7957
7.1.6.2	Operatori di impianti di recupero e riciclaggio dei rifiuti e di trattamento e distribuzione delle acque	0	0,3918	0,3720
7.1.7.1	Operatori di catene di montaggio automatizzate	0	0,1969	0,3720
7.1.8.1	Conduttori di mulini e impastatrici		0,8071	0,4831
7.1.8.2	Conduttori di forni e di analoghi impianti per il trattamento termico dei minerali		0,5080	0,4831
7.2.1.1	Operai addetti a macchine utensili automatiche e semiautomatiche industriali		0,7407	0,4848
7.2.1.2	Operai addetti a macchinari per la produzione di manufatti in cemento e assimilati		0,6390	0,6304
7.2.1.3	Conduttori di macchinari per la produzione di abrasivi e manufatti abrasivi minerali		0,9216	0,6304
7.2.2.1	Finitori, operai dei rivestimenti metallici, della galvanoplastica e assimilati		0,6331	0,5952
7.2.2.2	Operai addetti a macchinari per la fabbricazione di prodotti fotografici (film, pellicole e assimilati)		#DIV/0!	#DIV/0!
7.2.3.1	Conduttori di macchinari per la confezione e vulcanizzazione dei pneumatici		0,7959	0,3727
7.2.3.2	Conduttori di macchinari per la fabbricazione di altri articoli in gomma		0,7758	0,3727
7.2.3.3	Conduttori di macchinari per la fabbricazione di articoli in plastica e assimilati		0,9491	0,3727
7.2.4.1	Operai addetti a macchinari in impianti per la produzione in serie di mobili e di articoli in legno		0,6910	0,5500
7.2.5.1	Conduttori di macchinari per tipografia e stampa su carta e cartone		0,7487	0,5224
7.2.5.2	Conduttori di macchinari per la fabbricazione di prodotti in carta e cartone		0,8938	0,3727
7.2.5.3	Conduttori di macchinari per rilegatura di libri e assimilati		0,8185	0,5224
7.2.6.1	Operai addetti a macchinari per la filatura e la bobinatura	1	0,9080	0,8338
7.2.6.2	Operai addetti a telai meccanici per la tessitura e la maglieria	1	0,9192	0,8338
7.2.6.3	Operai addetti a macchinari industriali per confezioni di abbigliamento in stoffa e assimilati	1	0,9933	0,8338
7.2.6.4	Operai addetti a macchinari per il trattamento di filati e tessuti industriali	1	0,8811	0,8338
7.2.6.5	Operai addetti a macchinari per la stampa dei tessuti	1	0,9582	0,8338
7.2.6.6	Addetti a macchinari industriali per la preparazione e produzione in serie di articoli in pelli e pellicce	1	0,9499	0,8338
7.2.6.7	Addetti a macchinari per la produzione in serie di calzature	1	0,9033	0,8338
7.2.6.9	Altri operai addetti a macchinari dell'industria tessile, delle confezioni ed assimilati	1	0,9193	0,8338
7.2.7.1	Assemblatori in serie di parti di macchine	1	0,9788	0,8596
7.2.7.2	Assemblatori e cablatori di apparecchiature elettriche	1	0,9808	0,8596
7.2.7.3	Assemblatori e cablatori di apparecchiature elettroniche e di telecomunicazioni	1	0,9787	0,8596
7.2.7.4	Assemblatori in serie di articoli vari in metallo, in gomma e in materie plastiche	1	0,9054	0,8596
7.2.7.5	Assemblatori in serie di articoli in legno e in materiali assimilati	1	0,7949	0,8596
7.2.7.6	Assemblatori in serie di articoli in cartone, in tessuto e materie assimilate	1	0,8919	0,8596
7.2.7.9	Altri operai addetti all'assemblaggio ed alla produzione in serie di articoli industriali	1	0,8568	0,8596
7.2.8.1	Operai addetti a macchine confezionatrici di prodotti industriali	1	0,8511	0,7957
7.3.1.1	Operai addetti agli impianti fissi in agricoltura e nell'allevamento	1	0,8481	0,7457
7.3.1.2	Operai addetti agli impianti per la trasformazione delle olive		0,6926	0,6446
7.3.1.3	Operai addetti alla refrigerazione, trattamento igienico e prima trasformazione del latte		0,7874	0,6446
7.3.2.1	Conduttori di macchinari per la lavorazione e la conservazione della carne e del pesce		0,9557	0,6446
7.3.2.2	Conduttori di apparecchi per la lavorazione industriale di prodotti lattiero-caseari		0,9352	0,6446
7.3.2.3	Conduttori di macchinari industriali per la lavorazione dei cereali e delle spezie e per prodotti a base di cereali (pasta e assimilati)		0,7238	0,6446
7.3.2.4	Conduttori di macchinari per il trattamento e la conservazione della frutta, delle mandorle, delle verdure, dei legumi e del riso		0,7912	0,6446
7.3.2.5	Conduttori di macchinari per la produzione e la raffinazione dello zucchero		0,8812	0,6446
7.3.2.6	Conduttori di macchinari per la preparazione e la produzione del the, del caffè, del cacao e della cioccolata		0,5329	0,6446
7.3.2.7	Conduttori di macchinari per la lavorazione dei prodotti del tabacco		0,7712	0,6446
7.3.2.8	Vinificatori industriali, birrai ed operai addetti a macchinari per la preparazione di liquori e bevande analcoliche e gassate		0,8431	0,6446
7.3.2.9	Conduttori di macchinari per la produzione di pasticceria e prodotti da forno		0,8361	0,6446
7.4.1.1	Conduttori di convogli ferroviari		0,7796	0,6241
7.4.1.2	Operatori di verifica, circolazione e formazione treni		0,9058	0,6241
7.4.1.3	Manovratori di impianti a fune	1	0,8143	0,7457
7.4.2.1	Autisti di taxi, conduttori di automobili, furgoni e altri veicoli	1	0,9165	0,6376
7.4.2.2	Conduttori di autobus, di tram e di filobus	1	0,8410	0,8082
7.4.2.3	Conduttori di mezzi pesanti e camion	1	0,9375	0,8082
7.4.2.4	Conduttori di veicoli a trazione animale		0,3156	0,6013
7.4.3.1	Conduttori di trattori agricoli	1	0,9659	0,7457
7.4.3.2	Conduttori di macchine raccogliatrici, mietitrici, trinciatrici e pressatrici agricole	1	0,7604	0,7457
7.4.3.3	Conduttori di macchine forestali	1	0,7358	0,7457

Codice professione	Denominazione professione	Professioni automatizzabili	Probabilità automazione Occupation-based approach	Probabilità automazione Task-based approach
7.4.4.1	Conduttori di macchinari per il movimento terra	1	0,8883	0,7457
7.4.4.2	Conduttori di macchinari mobili per la perforazione nelle costruzioni	1	0,9232	0,7457
7.4.4.3	Conduttori di gru e di apparecchi di sollevamento	1	0,8717	0,7457
7.4.4.4	Conduttori di carrelli elevatori	1	0,9764	0,7457
7.4.5.1	Marinai di coperta		0,8710	0,5766
7.4.5.2	Conduttori di caldaie ed altre attrezzature navali	1	0,8361	0,7957
7.4.5.3	Conduttori di barche e battelli a motore		0,5357	0,5766
8.1.1.1	Venditori ambulanti di beni		0,4570	0,4126
8.1.1.2	Venditori ambulanti di servizi		0,6228	0,4606
8.1.2.1	Uscieri e professioni assimilate	1	0,9050	0,6393
8.1.2.2	Lettori di contatori, collettori di monete e professioni assimilate	1	0,8373	0,6393
8.1.3.1	Facchini, addetti allo spostamento merci ed assimilati	1	0,8358	0,6393
8.1.3.2	Personale non qualificato addetto all'imballaggio e al magazzino		0,9696	0,6013
8.1.3.3	Addetti alle consegne	1	0,8225	0,6393
8.1.4.1	Personale non qualificato addetto alla pulizia nei servizi di alloggio e nelle navi	0	0,3657	0,3077
8.1.4.2	Personale non qualificato nei servizi di ristorazione		0,6762	0,7317
8.1.4.3	Personale non qualificato addetto ai servizi di pulizia di uffici ed esercizi commerciali	0	0,1964	0,3077
8.1.4.4	Addetti al lavaggio veicoli		0,8515	0,4162
8.1.4.5	Operatori ecologici e altri raccoglitori e separatori di rifiuti		0,6369	0,3891
8.1.5.1	Bidelli e professioni assimilate	0	0,2934	0,3077
8.1.5.2	Portantini e professioni assimilate	0	0,1129	0,3077
8.1.6.1	Personale non qualificato addetto ai servizi di custodia di edifici, attrezzature e beni	1	0,8497	0,6393
8.2.1.1	Personale non qualificato nei servizi ricreativi e culturali	1	0,6950	0,6393
8.2.2.1	Collaboratori domestici e professioni assimilate	0	0,0968	0,3077
8.3.1.1	Braccianti agricoli		0,8506	0,6441
8.3.1.2	Personale non qualificato addetto alla manutenzione del verde		0,4483	0,6441
8.3.2.1	Personale forestale non qualificato		0,1489	0,6441
8.3.2.2	Personale non qualificato addetto alla cura degli animali		0,8321	0,6441
8.3.2.3	Personale non qualificato addetto alla pesca ed alla caccia		0,4054	0,6441
8.4.1.1	Manovali ed altro personale non qualificato delle miniere e delle cave		0,7184	0,4959
8.4.2.1	Manovali e personale non qualificato dell'edilizia civile e professioni assimilate		0,8874	0,4959
8.4.2.2	Manovali e personale non qualificato della costruzione e manutenzione di strade, dighe e altre opere pubbliche		0,8207	0,4959
8.4.3.1	Personale non qualificato delle attività industriali e professioni assimilate		0,5934	0,6241
9.1.1.1	Ufficiali delle forze armate	-	-	-
9.2.1.1	Sergenti, sovrintendenti e marescialli delle forze armate	-	-	-
9.3.1.1	Truppa delle forze armate	-	-	-

Fonte: ns. elaborazioni

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Sostenibilità ambientale e diversità di genere nelle imprese quotate. Quale impatto sul paradosso dell'innovazione?

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Abstract

Obiettivi. Lo studio intende esaminare la relazione tra i concetti di sostenibilità ambientale e innovazione ambidestra, analizzando contestualmente il ruolo che la diversità di genere nel Consiglio di Amministrazione svolge nel moderare la relazione anzidetta. A tal fine, un modello di ricerca viene sviluppato alla luce della teoria dell'impresa basata sulle risorse naturali.

Metodologia. Un'inchiesta campionaria viene condotta su 111 imprese italiane quotate alla Borsa di Milano. Le ipotesi di ricerca vengono testate mediante un'analisi di regressione gerarchica moderata.

Risultati. La sostenibilità ambientale influenza positivamente l'innovazione sfruttativa ed esplorativa. Inoltre, la diversità di genere nel Consiglio di Amministrazione rafforza l'effetto esercitato dalla sostenibilità ambientale sull'innovazione ambidestra.

Limiti della ricerca. La dimensione del campione e la sua natura richiedono cautela nella generalizzazione dei risultati alle imprese italiane non quotate.

Implicazioni pratiche. La sostenibilità ambientale rappresenta una valida soluzione al paradosso dell'innovazione in quanto contribuisce al bilanciamento delle attività di sfruttamento ed esplorazione. Inoltre, un numero più consistente di presenze femminili dovrebbe essere accolto nel Consiglio di Amministrazione delle imprese che intendono migliorare la sostenibilità ambientale promuovendo l'innovazione ambidestra.

Originalità del lavoro. Lo studio è tra i primi lavori a produrre risultati empirici sull'inesplorata relazione tra sostenibilità ambientale, innovazione ambidestra e diversità di genere nei board. Si giunge, pertanto, ad una comprensione più granulare dei suddetti concetti attraverso un modello di ricerca derivato teoricamente ed esaminato empiricamente.

Parole chiave: sostenibilità ambientale; diversità di genere nel Consiglio di Amministrazione; innovazione ambidestra; innovazione sfruttativa; innovazione esplorativa; paradosso dell'innovazione

Objectives. This study aims to investigate the relationship between environmental sustainability and innovation ambidexterity, also considering the role of board gender diversity in moderating this relationship. To this end, a research model is developed by drawing on both the natural resource-based view theory and agency theory.

Methodology. A survey is conducted on 111 Italian companies listed on the Milan Stock Exchange. A moderated hierarchical regression is employed to test the research hypotheses.

Findings. Environmental sustainability positively influences exploitation innovation and exploration innovation. Moreover, board gender diversity strengthens the effect of environmental sustainability on innovation ambidexterity.

Research limits. The size of the sample and its nature require prudence in generalizing the results to unlisted Italian companies.

Practical implications. Environmental sustainability is a valuable solution to address the innovation paradox since it contributes to balance between exploitation and exploration activities. Moreover, a higher number of female directors should be present in the boards of firms that look for improvement of environmental sustainability by fostering innovation ambidexterity.

Originality of the study. Environmental sustainability, innovation ambidexterity, and board gender diversity are contextually investigated for the first time. Thus, the study adds a more granular understanding of these concepts through a model that is theoretically derived and empirically examined.

Key words: environmental sustainability; board gender diversity; innovation ambidexterity; exploitation innovation; exploration innovation; innovation paradox

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1. Introduzione

Fenomeni quali il riscaldamento globale e il cambiamento climatico stanno mutando il volto del Pianeta, causando disastri naturali e sociali, spesso irreversibili, di cui le organizzazioni imprenditoriali sono ritenute le principali artefici (Burritt, 2018). Tale situazione ha alimentato un dibattito scientifico e culturale divenuto ormai globale ed orientato alla richiesta di comportamenti imprenditoriali lungimiranti, tesi a privilegiare la sostenibilità ambientale sui ritorni economici a breve termine ed avendo in considerazione l'intera catena del valore (Eide *et al.*, 2020). Pertanto, le aziende di tutto il mondo sono chiamate ad affrontare crescenti pressioni per riconfigurare il loro orientamento imprenditoriale mediante l'articolazione di strategie e l'attuazione di azioni tese al rinnovamento delle risorse, alla riduzione dell'inquinamento e all'eliminazione di processi produttivi pericolosi per l'uomo e l'ambiente (Bakos *et al.*, 2020).

Insieme all'imperativo della sostenibilità, le organizzazioni devono prontamente fronteggiare le emergenti sfide legate ad un'innovazione continua capace di sostenere ed alimentare il proprio vantaggio competitivo ed entrambe svolgendo un ruolo cruciale per la sopravvivenza aziendale (Pisano, 2015; Ciasullo *et al.*, 2020). In particolare, in arene competitive caratterizzate da forte concorrenza, rapido sviluppo tecnologico e continua evoluzione dei mercati, le organizzazioni necessitano di un'innovazione ambidestra consistente nell'innovare sia sfruttando le proprie conoscenze consolidate sia, al contempo, rinnovando il proprio portafoglio di conoscenze alla ricerca di nuove opportunità (Levinthal e March, 1993; Jansen *et al.*, 2006).

In questo contesto, il *board* delle imprese qualificato quale Consiglio di Amministrazione (CdA) rappresenta l'organo di governo chiave tanto nell'affrontare le questioni di sostenibilità mosse dagli azionisti e da altri *stakeholder* (Shaukat *et al.*, 2016) quanto nel dare avvio a progetti di innovazione (Berraies e Rejeb, 2019). Il contributo del CdA alla sostenibilità e all'innovazione è legato alle sue caratteristiche, inclusa la composizione dei diversi membri. In particolare, il genere degli amministratori - legato alla presenza femminile nella "stanza dei bottoni" - è il tratto di diversità più frequentemente attribuito alla composizione del CdA (Cucari *et al.*, 2018).

Pertanto, i temi di *governance* aziendale, sostenibilità e innovazione hanno attirato l'attenzione di studiosi, professionisti e decisori politici. Tuttavia, pochi studi catturano questi aspetti in modo congiunto: tra gli altri, Galia *et al.* (2015) hanno dimostrato empiricamente che la composizione del CdA influenza l'innovazione ambientale, mentre Scherer e Voegtlin (2020) hanno dibattuto a livello concettuale sulle innovazioni responsabili abilitate dalla *governance* aziendale. Al contrario, nell'ambito della ricerca sul CdA e sulla *corporate governance* possono essere individuati due distinti filoni di studio. Un primo filone è incentrato sul legame tra composizione del CdA e sostenibilità/responsabilità sociale d'impresa (Zhang *et al.*, 2013; Shaukat *et al.*, 2016; Endrikat *et al.*, 2020). Al suo interno, oggetto di analisi è stata sia la relazione tra le caratteristiche del CdA e i risultati ambientali conseguiti dalle imprese (Ortiz-de-Mandojana e Aragón-Correa, 2015; Haque e Ntim, 2018), così come la responsabilità della *disclosure* ambientale in capo al CdA (Ben-Amar e McIlkenny, 2015; Baalouch *et al.*, 2019). Tuttavia, rimane non indagato il ruolo giocato dalla struttura del CdA nel rispondere alle questioni di sostenibilità sollevate dagli azionisti e da altri *stakeholder* (Naciti, 2019). Un secondo filone di studi è basato sulla connessione tra CdA e innovazione (Galia e Zenou, 2012; Balsmeier *et al.*, 2017). Al suo interno, studi precedenti hanno esaminato gli effetti del *top* e *middle management* sull'innovazione ambidestra (Cantarello *et al.*, 2012; Berraies e Bchini, 2019). Ad ogni modo, un'importante domanda sul contributo del CdA all'equilibrio tra innovazione sfruttativa ed esplorativa attende ancora adeguata risposta in letteratura (Oehmichen *et al.*, 2017; Wong *et al.*, 2017; Rejeb *et al.*, 2020).

Alla luce delle anzidette considerazioni, il presente lavoro intende sviluppare la comprensione del nesso tra diversità di genere nel *board*-sostenibilità ambientale-innovazione ambidestra. Una migliore conoscenza di queste relazioni rappresenta un passaggio fondamentale nella ricerca di risposte efficaci alle pressioni globali per posizioni strategiche che uniscano responsabilità e competitività delle imprese. Nello specifico, obiettivo del presente lavoro è esplorare i legami tra sostenibilità ambientale ed innovazione ambidestra, considerando anche il ruolo che la diversità di

genere nel board svolge nel moderare il suddetto rapporto. A tal fine, vengono formulate le seguenti domande di ricerca:

RQ1: *Esiste una relazione tra sostenibilità ambientale ed innovazione ambidestra?*

RQ2: *La diversità di genere nel board influisce sulla relazione tra sostenibilità ambientale ed innovazione ambidestra?*

Attingendo alla teoria dell'impresa basata sulle risorse naturali (NRBV), viene sviluppato un modello di ricerca che evidenzia i collegamenti tra le variabili sostenibilità ambientale, innovazione ambidestra e diversità di genere nel *board*. In particolare, lo studio propone che la sostenibilità ambientale assume una relazione positiva con riferimento all'innovazione ambidestra e che la diversità di genere nel *board* moderi questa relazione. Il modello di ricerca è testato con osservazioni empiriche raccolte da un campione di 111 imprese quotate italiane, impiegando una moderata regressione gerarchica (Baron e Kenny, 1986).

Lo studio contribuisce alla recente letteratura su sostenibilità ambientale, innovazione ambidestra e diversità di genere nel *board* in almeno tre modi. In primo luogo, per la prima volta le anzidette variabili vengono investigate in simultanea attraverso un modello derivato teoricamente e validato empiricamente. In secondo luogo, vengono fornite importanti evidenze a dimostrazione che la sostenibilità ambientale svolge il ruolo di antecedente al bilanciamento tra innovazione sfruttativa ed esplorativa. In terzo luogo, la ricerca rivela che, agendo sulla diversità di genere nel *board*, l'effetto della sostenibilità ambientale sull'innovazione ambidestra aumenta in termini di migliore integrazione tra innovazione sfruttativa ed esplorativa delle imprese.

Il lavoro è strutturato come segue. Il secondo paragrafo approfondisce l'analisi della letteratura a supporto della formulazione delle ipotesi di ricerca. Nel paragrafo successivo è descritta la metodologia seguita per condurre l'analisi empirica. Nel quarto paragrafo vengono presentati i risultati emersi. Questi ultimi vengono discussi nel quinto paragrafo in cui vengono altresì sviluppate riflessioni in termini di implicazioni teoriche e manageriali.

2. Analisi della letteratura e formulazione delle ipotesi

2.1 Sostenibilità ambientale ed innovazione ambidestra

Lo sviluppo sostenibile è originariamente descritto come lo sviluppo che “*soddisfa i bisogni del presente senza compromettere la capacità delle generazioni future di soddisfare i propri bisogni*” (WCED, 1987). Questa definizione è integrata dall'introduzione di pilastri sociali, ambientali ed economici (UN, 2002). Pertanto, lo sviluppo sostenibile è inteso come sviluppo sociale ed economico che dovrebbe essere anche sostenibile sul piano ambientale (Moldan *et al.*, 2012). Tali pilastri possono essere contraddittori o complementari, nonché abbracciare obiettivi in apparenza ugualmente desiderabili (Mollenkopf *et al.*, 2010; Purvis *et al.*, 2019). Per esempio, il consumo incontrollato di risorse ha compromesso la situazione ambientale globale, rendendo la conservazione e la protezione della natura una priorità per governi e imprese (Ji e Zhang, 2019). Pertanto, la sostenibilità ambientale ha acquisito un'importanza crescente come presupposto per il raggiungimento della sostenibilità economica e sociale (Bilgili e Ulucak, 2018).

Il concetto di sostenibilità ambientale è stato sviluppato da Goodland (1995) che ha trasformato i termini esistenti “sviluppo responsabile dal punto di vista ambientale” (World Bank, 1992) e “sviluppo sostenibile dal punto di vista ambientale” (Serageldin e Streeter, 1993). Il concetto, nella sua essenza, mira a migliorare il benessere umano salvaguardando l'utilizzo di fonti di materie prime, riducendo al minimo gli sprechi e prevenendo danni alla collettività (Goodland, 1995). Da un punto di vista biofisico, la sostenibilità ambientale sostiene l'integrità dei sistemi di supporto alla vita sulla Terra (es. terrestre, acquatico, sistemi climatici, etc.) mediante la conservazione e l'uso corretto di aria, acqua e risorse del suolo (Holdren *et al.*, 1995). A livello di impresa, la sostenibilità

ambientale è nota come dimensione chiave della sopravvivenza aziendale insieme alla dimensione sociale ed economica nella prospettiva della Triple Bottom Line (TBL) (Elkington, 1998, 2006).

I principi di base della sostenibilità ambientale comprendono la rigenerazione di risorse rinnovabili, la sostituibilità di risorse non rinnovabili, il rispetto della capacità di assimilazione di sostanze pericolose o inquinanti e l'evitare l'irreversibilità (OCSE, 2001). Questi principi di solito creano vantaggi per le aziende, sia in termini di incremento dell'efficienza delle prestazioni operative (risparmio sui costi di utilizzo di energia / acqua, riduzione degli sprechi), sia di risultati sociali in termini di miglioramento del consenso (soddisfazione e fiducia degli stakeholder) e, non da ultimo, vantaggi strategici (flessibilità e maggiore competitività) (Parboteeah *et al.*, 2012; Akhtar *et al.*, 2020). Tuttavia, la letteratura non manca di evidenziare elementi problematici che investono le aziende nel loro percorso di *green sustainability*; in particolare svantaggi in termini di *timing* (es. tempo aggiuntivo per sbloccare ulteriori procedure burocratiche), nonché di costi relativi all'*audit* e *assurance* ambientale e/o all'adozione di nuove tecnologie (Nidumolu *et al.*, 2009; Collins *et al.*, 2010).

L'innovazione ambidestra è una capacità dinamica chiave che consente alle organizzazioni di perseguire simultaneamente strategie contraddittorie di sfruttamento ed esplorazione, capaci di perseguire l'innovazione (Tushman e O'Reilly, 1996; Kortmann, 2015; Wong *et al.*, 2017). Da una parte, l'innovazione sfruttativa si riferisce a miglioramenti incrementali di prodotti, servizi e/o processi facendo leva sul patrimonio di conoscenze esistenti per soddisfare le esigenze attuali dei clienti. Dall'altra parte, l'innovazione esplorativa riflette cambiamenti radicali nei prodotti, servizi e/o processi valorizzando nuove conoscenze che arricchiscono le capacità esistenti e gli *stock* di competenze per soddisfare le esigenze emergenti dei clienti (Benner e Tushman, 2003; Jansen *et al.*, 2006). Seguendo questo ragionamento, lo sfruttamento è associato all'incremento dell'efficienza nell'implementazione e nell'esecuzione dell'innovazione, mentre l'esplorazione è collegata all'apertura verso l'apprendimento e all'intreccio di conoscenze per cogliere nuove opportunità (March, 1991).

Le organizzazioni dovrebbero investire nell'innovazione sfruttativa ed esplorativa poiché entrambe sono cruciali per le loro prestazioni e il loro successo (Gupta *et al.*, 2006; Cao *et al.*, 2009). Infatti, un'enfasi eccessiva sull'innovazione sfruttativa rischia di ostacolare l'adattamento ai cambiamenti e causare l'obsolescenza della conoscenza, erodendo nel tempo la competitività aziendale (March, 1991). Al contempo, un'attenzione sbilanciata a favore dell'innovazione esplorativa può causare inefficienza operativa, aumento dei costi e rendimenti negativi nel breve termine soprattutto quando le imprese operano in contesti di maggiore incertezza (Tsai e Huang, 2008). Pertanto, evitare questi effetti dannosi noti come "trappola del successo" (generata da un eccessivo sfruttamento) e "trappola del fallimento" (generata da eccessiva esplorazione) (Levinthal e March, 1993) rappresenta una sfida per le organizzazioni che si concretizza nella necessità/opportunità di perseguire contemporaneamente un comportamento strategico capace di alimentare entrambi i tipi di innovazione. Ciò in quanto le innovazioni sfruttative ed esplorative si completano a vicenda e il loro bilanciamento consentirebbe una conciliazione tra i profitti a breve termine generati dall'innovazione sfruttativa e le evoluzioni del mercato nel lungo termine anticipate dall'innovazione esplorativa (Wang e Li, 2008; Schambergeret *et al.*, 2013).

Recentemente, la letteratura di management ha iniziato ad interrogarsi su come l'orientamento alla sostenibilità possa contribuire a generare diversi tipi di innovazione (come innovazioni tecnologiche, di servizio e dei modelli di business) (Rantala *et al.*, 2018); vari tipi di eco-innovazioni (come ad esempio eco-prodotti; eco-processi) (Triguero *et al.*, 2013) e forme di innovazione non tecnologica (Demirel e Kesidou, 2019). In generale, sebbene in letteratura sia evidenziato uno stretto legame tra gestione ambientale, pratiche verdi e innovatività aziendale (Pérez-Valls *et al.*, 2015; Albort-Morant *et al.*, 2016; Graafland, 2018), tuttavia, la relazione specifica tra sostenibilità ambientale e innovazione ambidestra ha ricevuto scarsa attenzione (Kortmann, 2015), offrendo quindi la possibilità di colmare questo gap nella ricerca.

Al fine di chiarire la relazione tra sostenibilità ambientale e innovazione ambidestra, il presente studio adotta la prospettiva teorica della Natural Resource Based View (NRBV) (Hart, 1995).

Quest'ultima, estendendo la teoria dell'impresa basata sulle risorse, suggerisce che la configurazione delle risorse aziendali in base ai vincoli ambientali può consentire di sostenere un vantaggio competitivo. I vincoli imposti dall'ambiente naturale vengono superati mediante strategie di gestione del prodotto, prevenzione dell'inquinamento e sviluppo sostenibile (Hart e Dowell, 2011). Queste strategie costituiscono la base per innovazioni che stimolano il miglioramento delle prestazioni ambientali delle imprese e il raggiungimento di un vantaggio competitivo (King e Lenox, 2002; De Stefano *et al.*, 2016).

In questa logica, gli aspetti centrali della sostenibilità ambientale (Galdeano-Gómez *et al.*, 2013) contribuiscono in modo significativo all'implementazione delle anzidette strategie. In particolare, una diminuzione dell'impatto dei prodotti sull'ambiente orienta verso la *stewardship* di prodotto; una gestione responsabile dei rifiuti e la riduzione delle emissioni garantiscono la prevenzione dell'inquinamento; la conservazione delle risorse naturali e rinnovabili consente una gestione orientata allo sviluppo sostenibile. Contribuendo a ciascuna di queste strategie, la sostenibilità ambientale promuove una serie di innovazioni che a loro volta configurano un *lever* al miglioramento della competitività dell'impresa. Di conseguenza, la sostenibilità ambientale è qui proposta come un antecedente - che unisce gestione del prodotto, prevenzione dell'inquinamento e sviluppo sostenibile - di innovazioni sfruttative ed esplorative in linea con la NRBV. Tenendo conto degli argomenti finora discussi, viene introdotta la seguente ipotesi:

HP1: La sostenibilità ambientale ha un impatto positivo e significativo sull'innovazione ambidestra.

2.2 L'effetto di moderazione della diversità di genere nel board

La letteratura sulla *corporate governance* ha variamente investigato il rapporto tra CdA e sostenibilità ambientale. Nello specifico, alcuni studiosi hanno indagato l'impegno del *board* nell'attività di *reporting* ambientale, mentre altri si sono concentrati sulle relazioni tra le caratteristiche del *board* e le prestazioni ambientali (Prado-Lorenzo e Garcia-Sanchez, 2010; Liao *et al.*, 2015; Ben-Amar *et al.*, 2017). A tal proposito, una caratteristica di primaria importanza della *governance* aziendale è rappresentata dall'eterogeneità del CdA in termini di genere dei membri del *board* (Anastasopoulos *et al.*, 2002; Martini *et al.*, 2012; Galia *et al.*, 2015). Indubbiamente, la rappresentatività delle donne nella stanza dei bottoni ha ricevuto crescente interesse negli ultimi anni nelle organizzazioni di tutto il mondo alla luce delle disuguaglianze di genere (Reguera-Alvarado *et al.*, 2017).

In simile contesto, alcuni studiosi hanno evidenziato che la presenza di amministratori di genere femminile rende il CdA più sensibile alle tematiche socio-ambientali (Post *et al.*, 2011; Ferrero-Ferrero *et al.*, 2015; Kassinis *et al.*, 2016). Ciò si deve sia al loro percorso formativo, tipicamente incentrato su discipline umanistiche, sia alla loro esperienza professionale, maturata per lo più in aziende con maggiore attenzione per la società e l'ambiente (Williams, 2003; Galbreath, 2011). Nella stessa direzione, Hussain *et al.* (2018b) sottolineano che la componente femminile nel CdA contribuisce al consolidamento delle relazioni con gli *stakeholder*, il che rafforza l'interesse per il conseguimento di obiettivi ambientali e sociali. Non a caso, i *board* maggiormente differenziati in termine di genere si focalizzano sulle esigenze dell'ampia platea di portatori di interesse, assecondando non solo le istanze degli azionisti, ma al contrario, impegnandosi su molteplici fronti (ambientale, sociale) creando valore per la società nel suo complesso (Gupta *et al.*, 2015). Recentemente, la letteratura approfondendo il contributo del gender al processo decisionale, ha evidenziato il significativo contributo degli amministratori donna all'efficacia del processo decisionale in seno al CdA giacchè i loro valori (cura, empatia) e le loro percezioni, essendo differenti da quelli maschili, arricchiscono il *decision-making* di diverse prospettive (Liao *et al.*, 2018). Infatti, i *board* che integrano al loro interno una significativa partecipazione femminile incorporano tratti tipici di *gender* - quali flessibilità, capacità di *problem solving*, abilità di *team building* - ritenuti essenziali per competere con successo in scenari incerti ed imprevedibili (Vieito, 2012; Liao *et al.*, 2015). In quest'ottica, la presenza di donne nel CdA supporta gli investimenti

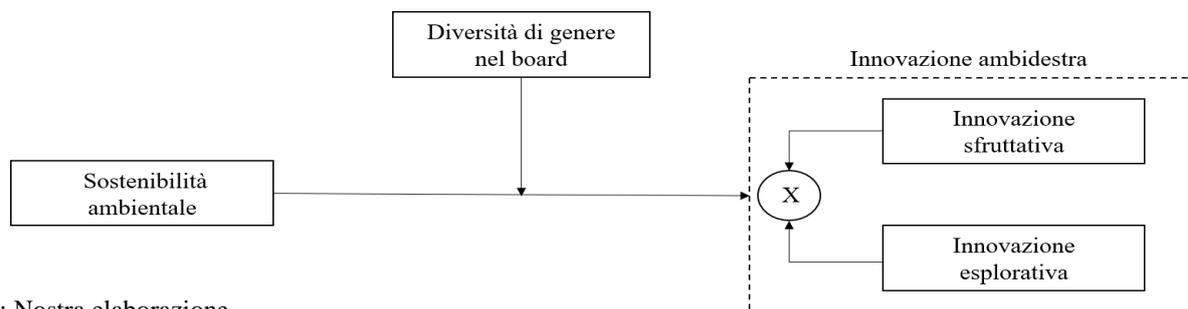
dell'impresa in innovazione proprio perché le attività tese ad innovare richiedono un alto livello di flessibilità e grande motivazione (Martini *et al.*, 2012). Pertanto, le donne nel *board* costituiscono un fattore chiave per l'innovazione dell'impresa (Torchia *et al.*, 2018). In particolare, l'atteggiamento supportivo della compagine femminile e il clima collaborativo che sono capaci di instaurare incoraggiano il *board* a non concentrarsi sullo sfruttamento a scapito dell'esplorazione, ma lo orientano verso l'apertura alla sperimentazione mediante la condivisione di conoscenza (Gul *et al.*, 2011; Arzubiaga *et al.*, 2018).

Alla luce dei contributi in seno all'analisi della letteratura internazionale, si propone pertanto la seguente ipotesi:

HP2: La diversità di genere nel *board* rafforza la relazione tra la sostenibilità ambientale e l'innovazione ambidestra.

Di seguito, la figura 1 presenta il modello di ricerca e le ipotesi dello studio.

Fig. 1: Il modello di ricerca



Fonte: Nostra elaborazione

3. Metodologia

3.1 Selezione del campione

Lo studio ha coinvolto le società italiane quotate alla Borsa di Milano. Tale scelta si deve al fatto che le imprese quotate rendono ampiamente accessibili le informazioni in materia di *corporate governance*. Inoltre, le società quotate che operano in Italia sono soggette a rating di sostenibilità (Cucari *et al.*, 2018; Clementino e Perkins, 2020). Nel complesso, si è ritenuto che le società quotate rappresentino un contesto di studio interessante per investigare il tema dell'innovazione in quanto dal mercato azionario provengono risorse finanziarie che alimentano una continua innovazione volta a preservare una *corporate image* positiva agli occhi degli investitori globali (Rejeb *et al.*, 2020). Lo studio è circoscritto all'Italia per rimuovere fonti di variabilità transnazionali che avrebbero complicato e reso poco generalizzabile la complessiva analisi.

Alla fine del 2019, sono state individuate 375 società italiane quotate in Borsa Italiana. La dimensione del campione è stata calcolata utilizzando la formula per una popolazione finita. In particolare, si è ritenuto soddisfacente fissare un livello di confidenza al 95% (valore standard di 1.96); una deviazione standard di 0.5 è risultata da un'indagine pilota condotta su un piccolo numero di unità; infine, il 5% è stato considerato un errore ammissibile. Pertanto, un campione composto da 231 unità è stato considerato rappresentativo della popolazione.

Il campione finale comprende principalmente imprese di grandi dimensioni (56.4%) appartenenti a differenti settori industriali, di cui il 54.9% del campione opera nel manifatturiero e il 45.1% nei servizi.

3.2 Raccolta e analisi dei dati

I dati sono stati raccolti tra dicembre 2019 e marzo 2020 mediante una *survey* appositamente costruita sull'obiettivo della ricerca. Il database Aida (Bureau van Dijk) e i siti web aziendali sono stati consultati per individuare i partecipanti all'indagine, identificati tra manager ambientali,

responsabili di ricerca e sviluppo, membri e segretari del CdA nel ruolo di dirigenti o controllori di gestione. Costoro sono stati contattati, inizialmente tramite LinkedIn e poi via e-mail, per fornire informazioni sul progetto di ricerca ed invitare alla compilazione di un questionario somministrato on-line.

Quest'ultimo, realizzato e gestito all'interno della piattaforma Qualtrics, è stato articolato in quattro sezioni e ventiquattro domande chiuse, ovviamente somministrate in lingua italiana. In particolare, nella prima sezione sono stati brevemente descritti lo scopo dell'indagine, l'identità dei ricercatori e il tempo medio necessario alla compilazione del questionario, specificando, altresì, le modalità di utilizzo dei dati raccolti e le garanzie della riservatezza delle risposte. La seconda sezione ha incluso 4 domande utili per definire il profilo del campione in termini di settore economico, dimensione dell'impresa in termini di numero di dipendenti (OCSE, 2020), dimensione del CdA e diversità di genere nel *board*. Nella terza sezione, sono state previste 8 domande sulla sostenibilità ambientale. Infine, la quarta sezione ha racchiuso 12 domande sull'innovazione ambidestra, di cui 6 domande per ciascuna tipologia di innovazione. Prima della somministrazione formale della *survey*, è stato condotto un test pilota coinvolgendo un campione di 20 dirigenti con l'obiettivo di valutare la latenza delle risposte e verificare la corretta comprensione delle domande (Lavrakas, 2008).

In totale, sono stati compilati 115 questionari, dei quali 4 sono stati scartati perché incompleti o con problemi di risposta. Pertanto, sono state utilizzate 111 risposte valide, le quali rappresentano un tasso di risposta effettivo del 48%.

I dati raccolti sono stati analizzati mediante una regressione gerarchica moderata utilizzando il software SPSS v 22.

3.3 *Misure*

Il questionario è stato costruito sfruttando costrutti validi e ben definiti nella letteratura scientifica di riferimento, come di seguito descritto.

La sostenibilità ambientale (SA) è considerata la variabile indipendente del modello. La scala della SA è stata adattata da Gupta e Gupta (2020) i quali utilizzano un'affidabile e valida scala di sostenibilità aziendale quale la Triple Bottom Line (TBL), sviluppata in precedenza da Aktin e Gergin (2016). La dimensione ambientale di TBL è stata quindi impiegata per determinare la variabile SA. Le misure considerate hanno fatto riferimento ad aspetti quali: contenimento dell'inquinamento attraverso la riduzione delle emissioni nocive e dell'impronta di carbonio, riciclaggio e gestione dei rifiuti, conformità alle linee guida ambientali (es. ISO-14001) (Tab. 1). Per misurare la variabile SA, è utilizzata una scala Likert che va da 1 (per niente) a 7 (in larga misura).

Tab. 1: *Gli item di misurazione*

<p>Sostenibilità ambientale (adattata da Gupta e Gupta, 2020)</p> <p>AS1 - Prendiamo precauzioni per ridurre le emissioni di CO2 dei nostri prodotti</p> <p>AS2 - Eseguiamo pratiche di riciclaggio e gestione dei rifiuti all'interno della nostra azienda</p> <p>AS3 - Abbiamo a cuore i livelli di consumo di acqua ed elettricità della nostra azienda</p> <p>AS4 - Preferiamo vendere prodotti ecologici</p> <p>AS5 - Le risorse utilizzate nel processo produttivo sono ecologicamente sicure e innocue per la salute umana</p> <p>AS6 - Siamo a conoscenza degli standard ambientali ISO14001</p> <p>AS7 - Serviamo i nostri clienti secondo gli standard ecologici</p> <p>AS8 - Disponiamo di certificati di conformità ambientale</p>
<p>Innovazione sfruttativa (adattata da Jansen <i>et al.</i>, 2006)</p> <p>EXPLO1 - Perfezioniamo spesso la fornitura di prodotti e servizi esistenti</p> <p>EXPLO2 - Implementiamo regolarmente piccoli adattamenti a prodotti e servizi esistenti</p> <p>EXPLO3 - Apportiamo miglioramenti a prodotti e servizi esistenti offerti al mercato locale</p> <p>EXPLO4 - Miglioriamo l'efficienza della nostra fornitura di prodotti e servizi</p> <p>EXPLO5 - Aumentiamo le economie di scala nei mercati esistenti</p> <p>EXPLO6 - Ampliamo i servizi per i clienti esistenti</p> <p>EXPLO7 - Importanza dell'innovazione di cui ai punti precedenti spinta da decisioni assunte dalla componente femminile del board</p>
<p>Innovazione esplorativa (adattata da Jansen <i>et al.</i>, 2006)</p> <p>EXPLOR1 - Accettiamo richieste che vanno oltre i prodotti e servizi esistenti</p> <p>EXPLOR2 - Inventiamo nuovi prodotti e servizi</p> <p>EXPLOR3 - Sperimentiamo nuovi prodotti e servizi nel mercato locale</p> <p>EXPLOR4 - Commercializziamo prodotti e servizi completamente nuovi per la nostra unità</p> <p>EXPLOR5 - Sfruttiamo spesso nuove opportunità in nuovi mercati</p> <p>EXPLOR6 - Ricorriamo regolarmente a nuovi canali di distribuzione</p> <p>EXPLOR7 - Importanza dell'innovazione di cui ai punti precedenti spinta da decisioni assunte dalla componente femminile del board</p>
<p>Diversità di genere nel board (adattata da Liao <i>et al.</i>, 2018)</p> <p>Rapporto tra amministratori donna e numero totale di amministratori nel CdA</p>

Fonte: Nostra elaborazione

L'innovazione ambidestra (IA) è considerata la variabile dipendente del modello. La scala dell'IA, distinta nelle dimensioni di innovazione sfruttativa (EXPLOI) ed innovazione esplorativa (EXPLOR), è stata adattata da Jansen *et al.* (2006). La misura dell'innovazione basata sullo sfruttamento valuta il grado in cui un'impresa si basa sulla conoscenza già acquisita e soddisfa le esigenze dei clienti esistenti. Diversamente, l'innovazione esplorativa determina il grado in cui un'impresa si discosta dalla conoscenza pregressa e persegue l'innovazione rivolgendosi a nuovi clienti e mercati emergenti. Tutte le dimensioni dell'IA sono state misurate utilizzando una scala Likert che va da 1 (per niente) a 7 (in larga misura).

La diversità di genere nel *board* (DG) è considerata la variabile moderatore del modello, misurata dal rapporto tra amministratori donna e numero totale di amministratori nel CdA (Liao *et al.*, 2018)

Per supportare la robustezza dei risultati della ricerca e migliorare la loro forza esplicativa, le dimensioni dell'azienda e le dimensioni del CdA sono prese in considerazione come variabili di controllo del modello giacché studi precedenti hanno considerato la loro influenza sull'innovazione ambidestra (Raisch e Birkinshaw, 2008; Berraies e Rejeb, 2019). In particolare, la dimensione dell'impresa è stata misurata dal logaritmo naturale del numero di dipendenti (Wong *et al.*, 2017), mentre la dimensione del CdA è determinata dal logaritmo del numero totale di amministratori (Duque-Grisales *et al.*, 2019).

3.3 Affidabilità e validità

Ciascuna variabile considerata mostra un'Alpha di Cronbach ben al di sopra del punto limite di 0.7, a conferma che i costrutti teorici impiegati nello studio mostrano una buona affidabilità interna (Nunnally, 1978). Inoltre, la validità convergente è garantita come dimostrato dai seguenti valori: i) l'affidabilità composita (CR) supera 0,7; ii) la varianza media estratta (AVE) per ogni costrutto supera 0.5; iii) la CR è maggiore dell'AVE per ogni costrutto (Hair *et al.*, 1998) (Tab. 2).

Tab. 2: Affidabilità e validità di costrutto

Variabili	α di Cronbach	AVE	CR
AS	0.86	0.59	0.90
DG	0.75	0.60	0.78
EXPLOI	0.78	0.66	0.81
EXPLOR	0.82	0.65	0.88

Note. AVE = varianza media estratta; CR = affidabilità composita

Fonte: Nostra elaborazione

4. Risultati

Le statistiche descrittive e le correlazioni per ciascuna delle variabili di studio sono riportate in Tabella 3. I modesti coefficienti di correlazione delle variabili suggeriscono la non problematicità di multicollinearità.

Tab. 3: Statistiche descrittive e matrice di correlazione

Variabili	M	SD	1	2	3	4
1. AS	4.29	0.54	1.00			
2. DG	3.92	1.35	0.32**	1.00		
3. EXPLOI	3.13	1.02	-0.05	0.01	1.00	
4. EXPLOR	5.16	0.99	0.24*	0.11	0.47**	1.00

**p < 0.01; *p < 0.05.

Note. M = media; SD = deviazione standard

Fonte: Nostra elaborazione

Prima di effettuare l'analisi di regressione, la variabile indipendente e il moderatore sono stati centrati sulla media (Aiken e West, 1991). Al fine di testare le ipotesi di ricerca precedentemente formulate, è stata condotta un'analisi di regressione gerarchica moderata (Baron e Kenny, 1986). La tabella 4 riporta i risultati di quattro modelli analizzati per ciascuna dimensione (innovazione sfruttativa e innovazione esplorativa) della variabile dipendente (innovazione ambidestra).

Tab. 4: Risultati delle analisi di regressione

Variabili	EXPLOI				EXPLOR			
	Modello 1	Modello 2	Modello 3	Modello 4	Modello 5	Modello 6	Modello 7	Modello 8
<i>Variabili di controllo</i>								
Dimensione dell'impresa	0.05	0.30	0.43	0.02	0.51	0.18	0.21	0.17
Dimensione del CdA	0.24 **	0.18 ***	0.12 **	0.11 **	0.39 **	0.36 ***	0.31 *	0.22 ***
<i>Effetti principali</i>								
AS		0.32 ***	0.25 *	0.14 **		0.38 ***	0.33 **	0.27 *
DG			0.21 **	0.17 *			0.26 **	0.20 *
<i>Interazione</i>								
AS x BI				0.57*				0.70*
<i>Metriche del modello</i>								
F	2.76 *	5.82 *	5.19 ***	4.22 ***	3.12 **	11.29 ***	7.50 ***	9.91 ***
R ²	0.11	0.18	0.26	0.30	0.14	0.24	0.27	0.33
Δ R ²		0.07 *	0.08 **	0.04 ***		0.01 **	0.03 ***	0.06 *

*p < 0.10. **p < 0.05. ***p < 0.01.

Note. Si riportano i coefficienti standardizzati

Fonte: Nostra elaborazione

Specificando che le variabili di controllo sono state inserite come variabili predittive solo nei modelli 1 e 5, i risultati indicano che la dimensione dell'impresa ha una relazione positiva e significativa con EXPLOI ($\beta = 0.24$, $p < 0.05$) ed EXPLOR ($\beta = 0.39$, $p < 0.05$).

I modelli 2 e 6 includono AS e mostrano un'associazione positiva e significativa con EXPLOI ($\beta = 0.32$, $p < 0.01$) e EXPLOR ($\beta = 0.38$, $p < 0.01$). Inoltre, la variazione di R² rispetto al modello 1 ($\Delta R^2 = 0.07$, $p < 0.10$) e al modello 6 ($\Delta R^2 = 0.01$, $p < 0.05$) è significativa. Pertanto, HP1 è risultata verificata.

Aggiungendo il moderatore DG nei modelli 3 e 7, si osserva una variazione significativa di R² se confrontata ai valori assunti dalla stessa nel modello 2 ($\Delta R^2 = 0.08$, $p < 0.05$) e nel modello 6 ($\Delta R^2 = 0.03$, $p < 0.01$).

I modelli 4 e 8 contengono il termine di interazione di AS e DG, mostrando un cambiamento significativo di R² quando la si confronta con il modello 3 ($\Delta R^2 = 0.04$, $p < 0.01$) e il modello 7 ($\Delta R^2 = 0.06$, $p < 0.10$). Infine, in presenza di un termine di interazione positivo e significativo nella predizione sia di EXPLOI ($\beta = 0.57$, $p < 0.10$) che di EXPLOR ($\beta = 0.70$, $p < 0.10$), anche HP2 risulta verificata.

5. Discussioni e conclusioni

Il presente lavoro si interroga sul legame, finora inesplorato, tra sostenibilità ambientale e innovazione ambidestra, soffermandosi altresì sul ruolo di moderatore ricoperto dalla diversità di genere dei membri del CdA nella suddetta relazione. L'originalità della ricerca è da rintracciare proprio nella trattazione di questi temi specifici, i quali vengono indagati contestualmente colmando un gap della letteratura e rispondendo altresì alla chiamata di ricerca empirica sulla relazione tra sostenibilità e innovazione ambidestra (Sulphrey e Alkathani, 2017).

Lo studio giunge, pertanto, ad una comprensione più granulare di sostenibilità ambientale, innovazione ambidestra e diversità di genere nel *board* attraverso un modello di ricerca che viene derivato teoricamente ed esaminato empiricamente.

Attingendo dalle basi teoriche offerte dalla NRBV, il presente lavoro dimostra con evidenze empiriche che la sostenibilità ambientale influenza positivamente l'innovazione ambidestra. Interpretando i risultati della ricerca, pertanto, si evince che la sostenibilità ambientale rappresenta un nuovo antecedente del bilanciamento tra innovazione sfruttativa ed esplorativa. Pertanto, se interpretata in chiave strategica, la sostenibilità ambientale contribuisce significativamente alla risoluzione delle tensioni connesse al paradosso dell'innovazione (Zeng *et al.*, 2017), consentendo alle imprese di perseguire congiuntamente sfruttamento ed esplorazione. Tale equilibrio non rappresenta un blando compromesso, ma un'integrazione davvero eccellente di due contraddittorie attività tese ad innovare (Andriopoulos e Lewis, 2009).

Inoltre, nel bilanciare le due dimensioni dell'innovazione ambidestra la diversità di genere può rappresentare il punto di svolta nel dirimere conflitti di interesse e visioni contrapposte all'interno dei *top management team* alimentando un processo decisionale più fluido caratterizzato da una maggiore condivisione di informazioni e un accresciuto spirito comunitario. Pertanto, l'indagine empirica ha supportato l'idea che l'effetto della sostenibilità ambientale sull'innovazione ambidestra aumenti insieme alla diversità di genere. In altre parole, i risultati hanno evidenziato che con un aumento della diversità di genere nei *board*, la relazione tra sostenibilità ambientale ed innovazione ambidestra si rafforza. In linea con gli studi precedenti, la diversità di genere nel *board* è un *pool* di risorse, nel senso che la maggiore eterogeneità si traduce in un accresciuto apporto di maggiori conoscenze, competenze e abilità (Amran *et al.*, 2014; Cucari *et al.*, 2018) al servizio della sostenibilità ambientale e dell'innovazione ambidestra. Pertanto, un avanzamento della ricerca in tal senso, consente di qualificare gli amministratori donna quali *'eco-influencer'* di altri membri del CdA, in quanto più spiccatamente capaci di sostenere la creatività, la promozione di nuove idee, incoraggiando in tal modo l'assunzione di decisioni in linea con la protezione ambientale e la sostenibilità.

Non da ultimo, i risultati della ricerca rivelano che la dimensione strutturale del processo decisionale impatta significativamente sull'innovazione ambidestra. Ciò è in linea con gli studiosi che hanno sottolineato che un CdA più ampio e vario contribuisce a migliorare l'innovatività di un'impresa (Zahra *et al.*, 2000; Rejeb *et al.*, 2020).

Dal punto di vista teorico, lo studio offre almeno tre implicazioni per il mondo accademico. In primo luogo, il presente studio propone di utilizzare quale prospettiva di analisi strategica orientata alla sostenibilità il NRBV estendendolo al campo dell'innovazione ambidestra. In tal modo, viene offerta una prospettiva di analisi più ampia attraverso cui spiegare la relazione tra vincoli ambientali naturali ed innovazione sfruttativa ed esplorativa. In secondo luogo, la ricerca contribuisce alla letteratura sulla *corporate governance* rafforzando l'importanza della *board gender diversity* come prezioso meccanismo di *governance* che modera l'effetto della sostenibilità ambientale sull'innovazione ambidestra. In tal senso, come mostrato dai risultati empirici, in presenza di una percentuale maggiore di amministratori donna migliora il contributo che la sostenibilità ambientale offre all'implementazione dei due tipi di innovazione. In terzo luogo, lo studio arricchisce il corpo di conoscenza relativo alle capacità dinamiche per la competitività perché l'evidenza empirica mostra la sostenibilità ambientale come nuovo antecedente dell'innovazione ambidestra, e dunque supportando la tesi che la sostenibilità ambientale sia da intendersi quale capacità dinamica chiave per l'impresa. In questo modo, si accoglie l'invito della letteratura ad identificare nuovi possibili *driver* di innovazione ambidestra (Raisch e Birkinshaw, 2008; Lavie *et al.*, 2010; Turner *et al.*, 2013).

Oltre alle implicazioni teoriche, lo studio offre interessanti implicazioni manageriali. Lo studio suggerisce di prestare attenzione alla composizione del CdA alle imprese che intendono migliorare l'efficacia delle decisioni che impattano sull'ambiente e, in sintesi, promuovono l'innovazione ambidestra. In particolare, la stanza dei bottoni dovrebbe accogliere un numero più consistente di presenze femminili. I loro punti di vista alternativi e rinnovate prospettive strategiche sulla

sostenibilità ambientale aggiungono valore in termini di supporto agli amministratori di genere maschile nell'impegnarsi in progetti esplorativi piuttosto che esclusivamente sfruttativi dell'innovazione. In tal modo, le donne ai vertici promuovono un processo decisionale tale da alimentare nuove e più attuali forme di vantaggio competitivo dell'organizzazione. Tale prospettiva enfatizza la contemporanea visione della strategia che pone l'accento sulla necessità dell'agilità dei consigli di amministrazione nel processo decisionale strategico. Pertanto, come la ricerca suggerisce i manager devono unire nelle loro scelte strategiche e allocazione delle risorse, adattabilità e sostenibilità, attraverso tattiche di adattamento ed impegni a lungo termine.

Questa ricerca è soggetta ad alcune limitazioni. Innanzitutto, la dimensione del campione e la sua natura richiedono cautela riguardo alla generalizzazione dei risultati alle imprese italiane non quotate. Inoltre, il modello di ricerca include un solo moderatore, laddove altre variabili potrebbero moderare il legame tra sostenibilità ambientale e innovazione ambidestra. Pertanto, età, nazionalità e *background* degli amministratori potrebbero ulteriormente arricchire successive indagini esplorative. Non da ultimo, studi *cross-country* potrebbero alimentare il confronto nella relazione tra sostenibilità ambientale, innovazione ambidestra e diversità di genere nel *board* in differenti contesti culturali e istituzionali.

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Il contributo delle metodologie sistemico-vitali all'analisi degli aspetti socio-tecnici della simbiosi industriale

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Abstract

Obiettivi. L'obiettivo principale del presente lavoro consiste nell'inquadramento dei fenomeni di simbiosi industriale e delle loro concretizzazioni in termini di parchi eco-industriali nell'ambito degli approcci sistemico-vitali.

Metodologia. Viene proposta un'analisi bibliometrica della letteratura al fine di offrire una visione olistica dei principali ambiti scientifici (mapping) e del loro raggruppamento omogeneo in termini di argomenti trattati attraverso parole chiave, età media dei contributi, istituzioni di ricerca nelle quali hanno origine, principali riferimenti storici (clustering).

Risultati. Relativamente allo studio delle iniziative simbiotiche nell'ambito delle teorie dei sistemi, in particolare dei parchi eco-industriali esistenti o in divenire, viene evidenziata la necessità di definire categorie omogenee al fine di costruire quadri teorici di riferimento che consentano agli organi di governo di selezionare le strategie idonee alla conservazione delle condizioni di equilibrio nel rispetto dei principi di autopoiesi e di omeostasi in modo da garantire la sopravvivenza dei sistemi.

Limiti della ricerca. Viene evidenziata la necessità di un rafforzamento delle interpretazioni sistemiche della simbiosi industriale con la modellazione dei principali processi sociali, economici ed ambientali.

Implicazioni pratiche. Le implicazioni manageriali si declinano essenzialmente lungo le linee dello stile di leadership e dell'orientamento culturale alla tutela dell'ambiente e consistono nella capacità dei manager di sviluppare rapporti basati sul principio sistemico-vitale della consonanza.

Originalità del lavoro. L'originalità del lavoro risiede nella constatazione della presenza solo sporadica, nella letteratura scientifica, delle analisi sulla simbiosi industriale e delle sue concretizzazioni in termini di parchi eco-industriali mediante le metodologie di analisi dei sistemi.

Parole chiave: simbiosi industriale; parchi eco-industriali; aSv; bibliometria; sostenibilità; teoria dei sistemi

Objectives. The main objective of this work consists of framing the phenomena of industrial symbiosis and their concretization in terms of eco-industrial parks within the context of viable systems approaches.

Methodology. A bibliometric analysis of the literature is proposed to offer a holistic view of the main scientific fields (mapping) and their homogeneous grouping in terms of topics covered through keywords, the average age of contributions, research institutions in which they originate, main historical references (clustering).

Findings. Concerning the study of symbiotic initiatives in the field of systems theories, in particular of existing or developing eco-industrial parks, the need to define homogeneous categories to build theoretical reference frameworks that allow the governing bodies to select strategies suitable for maintaining equilibrium conditions in compliance with the principles of autopoiesis and homeostasis to guarantee the survival of the systems.

Research limits. The need for strengthening the systemic interpretations of industrial symbiosis with the modeling of the main social, economic and environmental processes is highlighted.

Practical implications. The managerial implications are essentially declined along the lines of leadership style and cultural orientation towards environmental protection and consist in the ability of managers to develop relationships based on the viable systems principle of consonance.

Originality of the study. The originality of the work lies in the observation of the only sporadic presence, in the scientific literature, of the analyzes on industrial symbiosis and its concretizations in terms of eco-industrial parks through systems analysis methodologies.

Key words: industrial symbiosis; eco-industrial parks; viable Systems approach; bibliometrics; sustainability; systems theory

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1. Introduzione

La crescente consapevolezza della necessità di salvaguardare le risorse del Pianeta sta dando luogo, con sempre maggiore frequenza, ad iniziative volte alla riduzione dell'inquinamento ed al contenimento degli sprechi ispirate ai principi della sostenibilità e dello sviluppo sostenibile. Nel mondo delle imprese, queste iniziative si concretizzano su molteplici livelli, che includono imprese assai diverse tra loro per dimensione, settore di appartenenza e tipologia di processo produttivo e vanno dai complessi sistemi di scambi (di energia, di materie prime, di rifiuti, di sottoprodotti) tra imprese di grandi dimensioni, generalmente di processo co-locate nei parchi eco-industriali, fino ai semplici scambi commerciali di rifiuti e/o sottoprodotti tra due o più imprese. Non sono, inoltre, estranei a tali iniziative grandi e medi agglomerati urbani che con le imprese e gli eventuali parchi industriali nelle loro vicinanze ricercano sinergie generalmente finalizzate allo smaltimento dei rifiuti ed all'approvvigionamento di energia elettrica e riscaldamento. In questo contesto giocano un ruolo centrale le iniziative di simbiosi industriale, definibili come quelle pratiche e fenomeni di collaborazione tra imprese, istituzioni e comunità locali finalizzati allo scambio di energia, informazioni, materie prime o residui attraverso il networking, la localizzazione delle unità produttive in prossimità tra loro, la gestione condivisa dei siti (Frosch e Gallopoulos, 1989; Christensen, 1992; Ehrenfeld e Gertler, 1997; Lowe, 1997; Schwarz e Steininger, 1997). Tali iniziative si basano sull'assunto che le imprese, lavorando in modo coordinato e scambiando tra loro risorse di vario tipo, possono conseguire un vantaggio collettivo maggiore della somma dei vantaggi individuali ottenibili agendo da sole (Viladecans-Marsal, 2004; Wood e Parr, 2005; Chertow e Lombardi, 2005). Non a caso, i Paesi europei che dispongono di una riserva ecologica, cioè quelli la cui bio-capacità risulta maggiore dell'impronta ecologica¹, sono i Paesi Bassi e quelli Scandinavi, che risultano all'avanguardia nelle iniziative di ecologia industriale/economia circolare e che riescono a concretizzarle, tra l'altro, in una serie di parchi eco-industriali, come il Kalundborg Eco-industrial Park e il Lidköping Industrial Symbiosis Network.

Le imprese partecipanti ad iniziative di simbiosi industriale affrontano dunque le problematiche relative all'esaurimento delle risorse, alla gestione dei rifiuti e all'inquinamento costituendo sistemi interconnessi e caratterizzati da forti interdipendenze reciproche, attraverso lo scambio di energia, rifiuti, sottoprodotti, finalizzati a conseguire benefici economici derivanti anche dalle economie di agglomerazione e a generare benefici ambientali e sociali per le comunità coinvolte.

Dal punto di vista scientifico, la simbiosi industriale si può considerare appartenente, sebbene in modo non esclusivo, ai due grandi ambiti disciplinari dell'economia circolare e dell'ecologia industriale. Sebbene le due aree scientifiche si siano sviluppate in tempi e su radici concettuali diverse, ad entrambe possono riferirsi gli studi sulla simbiosi industriale: nell'ambito dell'ecologia industriale, essi riguardano principalmente lo studio dei flussi di risorse e di energia che avvengono nei sistemi socio-tecnici costituiti dagli aggregati di imprese interagenti e dagli altri soggetti partecipanti alle iniziative simbiotiche ed i loro effetti sull'ambiente (Sokka *et al.*, 2011; Jacobsen, 2006; Zhang *et al.*, 2013); nell'ambito dell'economia circolare gli studi propongono e descrivono modelli di business ispirati ai principi della sostenibilità (Geissdoerfer *et al.*, 2017; Ghisellini *et al.*, 2015; Chertow, 2007). In aggiunta, allo studio dei principi e dei fenomeni della simbiosi industriale concorrono anche, per l'interesse generale sui temi, oltre all'ingegneria e all'economia, la geografia per le tematiche di localizzazione delle imprese, il management negli aspetti della gestione delle reti e dei siti, la ricerca operativa ed altre.

Dal punto di vista modellistico, le imprese coinvolte in iniziative di simbiosi industriale costituiscono un insieme di processi di produzione strettamente interconnessi, configurando dunque

¹ L'impronta ecologica misura la velocità con la quale vengono consumate risorse e generati rifiuti; la biocapacità misura la velocità con la quale l'ambiente assorbe rifiuti e genera nuove risorse. Nella determinazione dell'Overshoot Day (il giorno a partire dal quale la capacità annuale di rigenerazione delle risorse del Pianeta si esaurisce), l'impronta ecologica di ogni entità considerata viene messa a confronto con la relativa biocapacità: se l'impronta ecologica supera la biocapacità, tale entità ha un "deficit ecologico" con la conseguente necessità di sovrasfruttamento delle risorse proprie e di importazione di altre; viceversa, essa presenta una "riserva ecologica" (Global Footprint Network alla pagina web <http://data.footprintnetwork.org>).

un sistema input-output finalizzato alla produzione di specifici beni limitando al massimo il consumo di risorse e la generazione di rifiuti e sottoprodotti (Lowe, 1997; Chertow, 2000). Considerata la numerosità degli Stakeholder coinvolti nelle iniziative di simbiosi industriale, il loro sviluppo è pertanto legato: alle politiche di sviluppo regionale incluse le regolamentazioni fiscali e quelle relative agli incentivi eventualmente disponibili per favorire la localizzazione delle imprese in specifici ambiti territoriali; all'auto-organizzazione di due o più imprese; alle esigenze di innovazione in parchi industriali esistenti. Da tali circostanze deriva che le applicazioni pratiche dei principi simbiotici assumono molteplici forme, che vanno dal semplice (scambio di rifiuti tra due imprese) al complesso (parchi eco-industriali), tanto da configurare ciascuna delle iniziative come un caso a sé stante. Ciononostante, l'esigenza di una sistematizzazione teorico-concettuale è molto avvertita in letteratura, sia dal lato dell'ecologia industriale che da quello dell'economia circolare, tanto da dare luogo -oltre ad una vasta letteratura di natura empirica basata sullo studio di singoli casi- ad una messe di contributi dedicati a categorizzare le iniziative simbiotiche in definite tassonomie, a classificarne drivers, barriere, benefici attesi o conseguiti, a profilare prospettive di sviluppo, ecc. (Chertow, 2000; Boons *et al.*, 2015; Domenech *et al.*, 2019; Zhang *et al.*, 2016; Massard *et al.*, 2014).

Il presente lavoro contribuisce alla citata esigenza, proponendo una prospettiva di analisi del fenomeno della simbiosi industriale basta sul contributo del pensiero sistemico.

A tal fine, il lavoro parte dall'analisi della letteratura scientifica in tema di simbiosi industriale, proponendone un inquadramento nell'ambito dei domini scientifici di riferimento. Successivamente, evidenzia il gap consistente nella ridotta presenza di analisi sulla simbiosi industriale e delle sue concretizzazioni nei parchi eco-industriali mediante una prospettiva sistemica. Quest'ultima si manifesta nella generale qualificazione dei fenomeni di simbiosi industriale, in cui sono presenti un attore focale (o un insieme di attori di rilevante importanza) che ha la funzione di organo di governo della rete ed un ecosistema composto da fornitori, clienti, centri di ricerca, autorità pubbliche ed altri soggetti tra loro interagenti (Zucchella e Previtali, 2019). Ciò sottolinea l'importanza di definire i confini del sistema, le interconnessioni tra tutte le parti coinvolte e tra loro interdipendenti, le modalità di governo e di funzionamento della rete che vengono individuate di volta in volta.

Il lavoro è strutturato come segue: il paragrafo 2 identifica i principali cluster teorici in cui il fenomeno della simbiosi industriale inquadrate in letterature. Il paragrafo 3 propone una rilettura del fenomeno utilizzando la prospettiva sistemico-vitale per il tramite dei due principali approcci di riferimento. Infine, il paragrafo 4 propone e discute i risultati. Il lavoro si conclude con la discussione dei principali limiti, future linee di ricerca e conclusioni.

2. Review della letteratura

L'analisi della letteratura adottata in questo lavoro è basata su metodi bibliometrici che consentono di sistematizzare, elaborare (Kessler, 1963), analizzare e rappresentare graficamente quantità anche enormi di contributi scientifici. In particolare, tali metodi offrono la possibilità di fornire rappresentazioni sinottiche (mappe bibliometriche) navigabili e pubblicamente accessibili relative alla presenza dei soggetti/oggetti dell'analisi (Autori, contributi scientifici, Istituzioni maggiormente impegnate, tematiche più frequentemente trattate ed altro, d'ora in avanti "unità di analisi"), fornendo anche informazioni relativamente al loro posizionamento reciproco, alle relazioni fra essi esistenti ed all'intensità dei legami tra le stesse. Queste caratteristiche stanno incidendo sulla rapida diffusione del loro utilizzo, dovuto anche alla loro versatilità ed immediatezza nella rappresentazione e discussione dei risultati ottenuti.² Inoltre, l'approccio

² Ad esempio, con riferimento alla simbiosi industriale, e limitando strettamente la ricerca in Web of Science all'ambito delle scienze sociali [TOPIC: ("industrial symbiosis") AND TOPIC: (bibliometric) Refined by: DOCUMENT TYPES: (REVIEW OR ARTICLE) Timespan: All years], è dato contare 7 contributi, tutti pubblicati tra il 2017 e il 2020, che hanno fatto uso di metodi bibliometrici per predisporre review "strutturali" della letteratura.

bibliometrico, in quanto basato su specifici algoritmi e non sulla soggettività dello Studioso, ne migliora il processo di revisione, sintetizzando la ricerca in modo sistematico, trasparente e riproducibile (Markoulli et al, 2017).

Sulla base di queste considerazioni, è stata condotta una review bibliometrica lo scopo di ricostruire le “reti bibliometriche” di van Eck e Waltman (2014) [o le “reti di articoli scientifici” di de Solla Price (1965)] degli studi sulla simbiosi industriale.

La numerosità dei data-base bibliografici presenti e la molteplicità di software utilizzabili hanno reso necessaria una serie di scelte preliminari relative a: software da utilizzare; data base da interrogare; modalità di formulazione delle interrogazioni.

Tra i software bibliometrici in grado di fornire il panorama scientifico desiderato (CiteSpace, Gephi, HistCite, Vosviewer, CitNet Explorer ed altri), è stato scelto VOSviewer (Visualizzazione di somiglianze) sviluppato da van Eck e Waltman (2010) con lo scopo specifico di costruire, visualizzare e mettere a disposizione pubblicamente mappe bibliometriche della produzione scientifica relativa a specifici argomenti trattati. Vosviewer, infatti, fornisce mappe bibliometriche basate sulla distanza. In base a tali rappresentazioni grafiche, l'importanza di una unità di analisi (in termini di citazioni ricevute o di connessioni con altre pubblicazioni) è rappresentata dalle sue dimensioni mentre la distanza tra due unità di analisi riflette la forza della relazione tra esse, pertanto minore è la distanza, più intensa è la relazione che le lega. La scelta del software è stata dettata dalla potenza di calcolo, dalla prerogativa offerta di mettere a comune utenza sul web le mappe bibliometriche prodotte, dal valore informativo intrinseco delle mappe stesse, dalla funzionalità di zooming e scrolling per una loro esplorazione approfondita.

Relativamente alla scelta dei data-base bibliografici, sono stati presi in considerazione quelli ormai universalmente conosciuti e di uso comune da parte degli Studiosi [Google Scholar, Scopus, ISI Web of Science, recentemente Dimensions]. In questa fase si è osservato che Google Scholar, contrariamente agli altri data-base citati, fornisce solo in parte i riferimenti bibliografici contenuti nelle pubblicazioni in forma trattabile dai software prescelti (Adriaanse e Rensleigh, 2013). Questa circostanza impedisce l'applicazione di alcuni metodi bibliometrici (citazioni dirette, accoppiamento bibliografico, analisi delle co-citazioni) restringendo la possibilità di condurre l'analisi alla frequenza con la quale sono utilizzate le parole chiave (co-occorrenza) ed alla identificazione delle reti di Autori (Co-Authorship), cioè di Studiosi attivi su un determinato argomento legati da forti legami sociali sulla base della numerosità delle pubblicazioni da essi realizzate congiuntamente. La scelta si è posta, pertanto, tra Scopus, Web of Science e Dimensions, che consentono tutti di disporre dei riferimenti bibliografici contenuti nelle pubblicazioni codificati in modo tale da potere essere elaborati dai software prescelti.

Dimensions è stato scartato in quanto, essendo di più recente costituzione, contiene un numero limitato di riferimenti bibliografici. A fronte di una maggiore estensione di Scopus il database scelto è stato Web of Science, generalmente considerato la fonte più autorevole per l'esplorazione bibliometrica nell'ambito delle scienze sociali in quanto contiene le riviste dotate di impact factor in base al Journal Citation Report di Clarivate Analytics.

Per quanto riguarda la formulazione delle interrogazioni, si è optato per l'utilizzo di due sole chiavi di ricerca (rispettivamente, per i due argomenti da trattare, “industrial symbiosis” e “viable system*”) che sono state ricercate in “topics” del Social Science Citation Index di Web of Science.

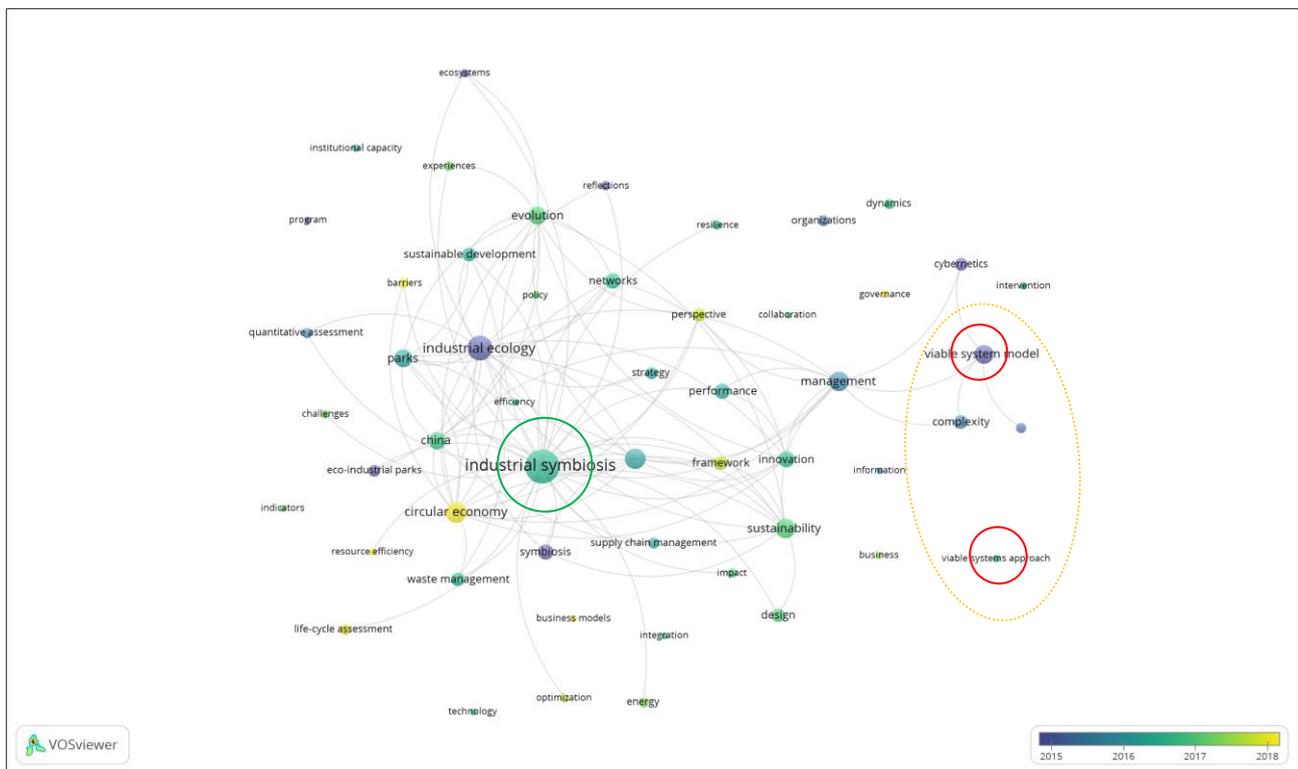
I due ambiti scientifici sono stati individuati mediante le seguenti interrogazioni al Social Science Citation Index di Web of Science:

- TOPIC: (“industrial symbiosis”) - Refined by: DOCUMENT TYPES: (ARTICLE) AND [excluding] DOCUMENT TYPES: (EARLY ACCESS OR PROCEEDINGS PAPER) - Timespan: All years. Indexes: SSCI. (306 risultati)
- TOPIC: (“viable system*”) - Refined by: DOCUMENT TYPES: (ARTICLE) AND [excluding] DOCUMENT TYPES: (PROCEEDINGS PAPER OR EARLY ACCESS) - Timespan: All years. Indexes: SSCI. (194 risultati)

La ricerca è stata limitata agli articoli su rivista, in quanto considerati veicolo privilegiato di impatto e diffusione della conoscenza nella comunità scientifica: sono stati pertanto omessi libri, capitoli di libri, atti di conferenze, recensioni, note, editoriali. In ogni caso, i più importanti tra tali ultime tipologie di contributi vengono recuperati nella loro quasi totalità tramite l'analisi delle co-citazioni. Nel caso di questo lavoro, infatti, l'analisi delle co-citazioni tra i riferimenti bibliografici censiti (306 riferimenti) mostra che tali articoli contengono oltre 13.000 riferimenti bibliografici a far data dalla metà del 1800 ad oggi, peraltro anch'essi classificabili in termini di rilevanza scientifica in base alle citazioni ricevute, con ciò sostanzialmente assicurando che nessun riferimento significativo venga escluso dall'analisi e rendendo, di fatto, superflua l'ulteriore applicazione di tecniche di "snowballing" (Goodman, 1961).

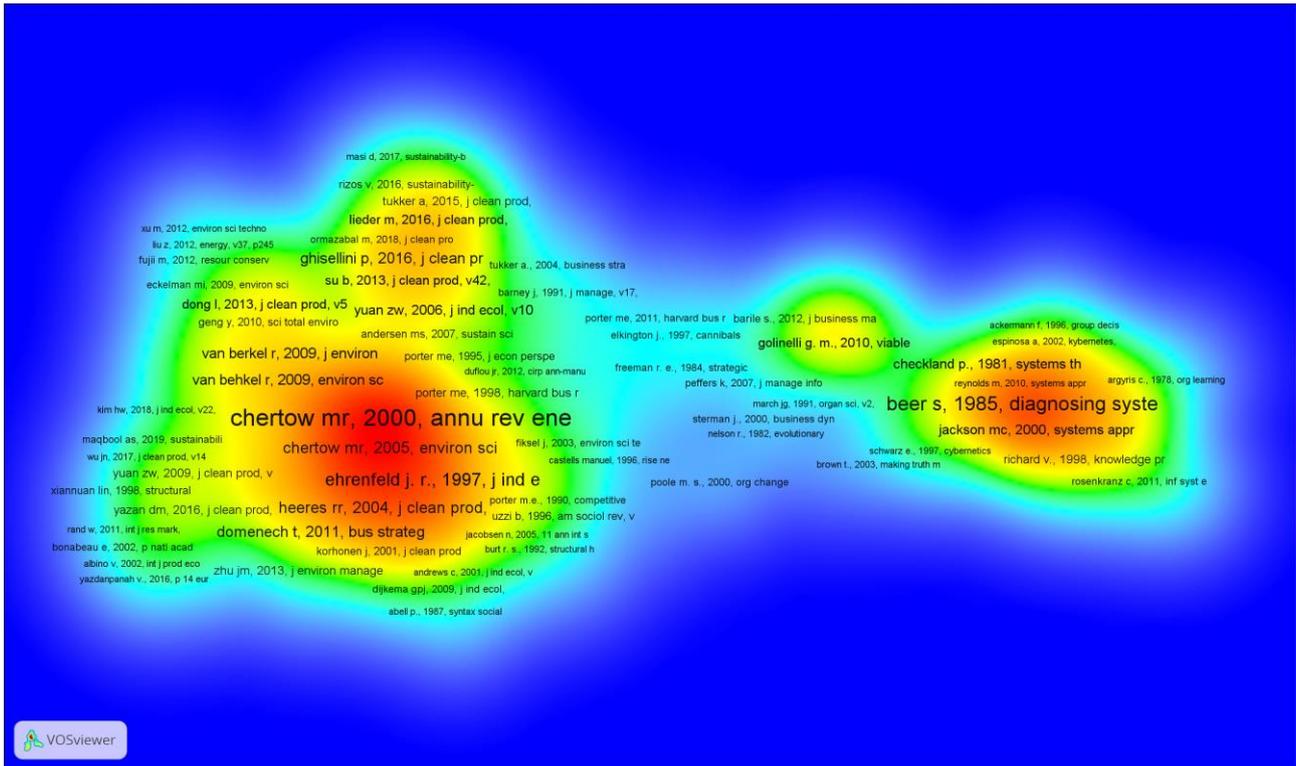
La congiunzione dei risultati delle ricerche in WoS relative a IS e a VS mostra infatti le seguenti mappe:

Fig. 1: I due ambiti scientifici in base alle parole chiave (versione online: <https://bit.ly/332T3G0>)



(Overlay Visualization – No colored lines – Min. strenght: 5; Max. lines: 100)

Fig. 2: I due ambiti scientifici in base alle co-citazioni (versione online: <https://bit.ly/2FXbR0I>)



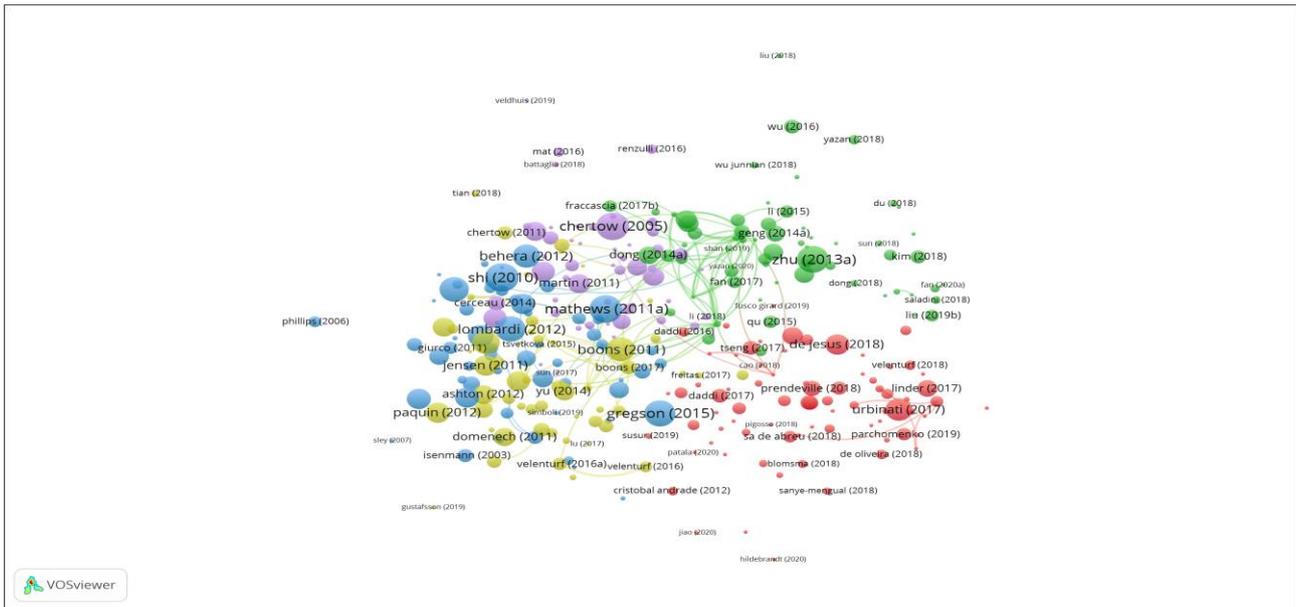
(Density visualization – Items density – Predefined colour: Rainbow)

2.1 Review bibliometrica della letteratura sulla simbiosi industriale

La mappa bibliometrica costruita mediante l'accoppiamento bibliografico (figura 3) mostra un corpus scientifico omogeneo: infatti, tutti i contributi censiti, tranne uno, risultano tra loro collegati in termini di riferimenti bibliografici citati. Inoltre, in base al procedimento di clustering in VOSviewer³, pur limitando ad un solo contributo la consistenza del cluster di minori dimensioni, non è possibile distinguere più di cinque cluster, peraltro di dimensioni simili (il cluster più grande contiene il 24% dei contributi, quello di minori dimensioni il 17%).

³ In questo lavoro, ove non diversamente specificato, la risoluzione utilizzata nell'algoritmo di clustering di VOSviewer, che dà conto della finezza delle analisi, è stata posta pari ad 1.

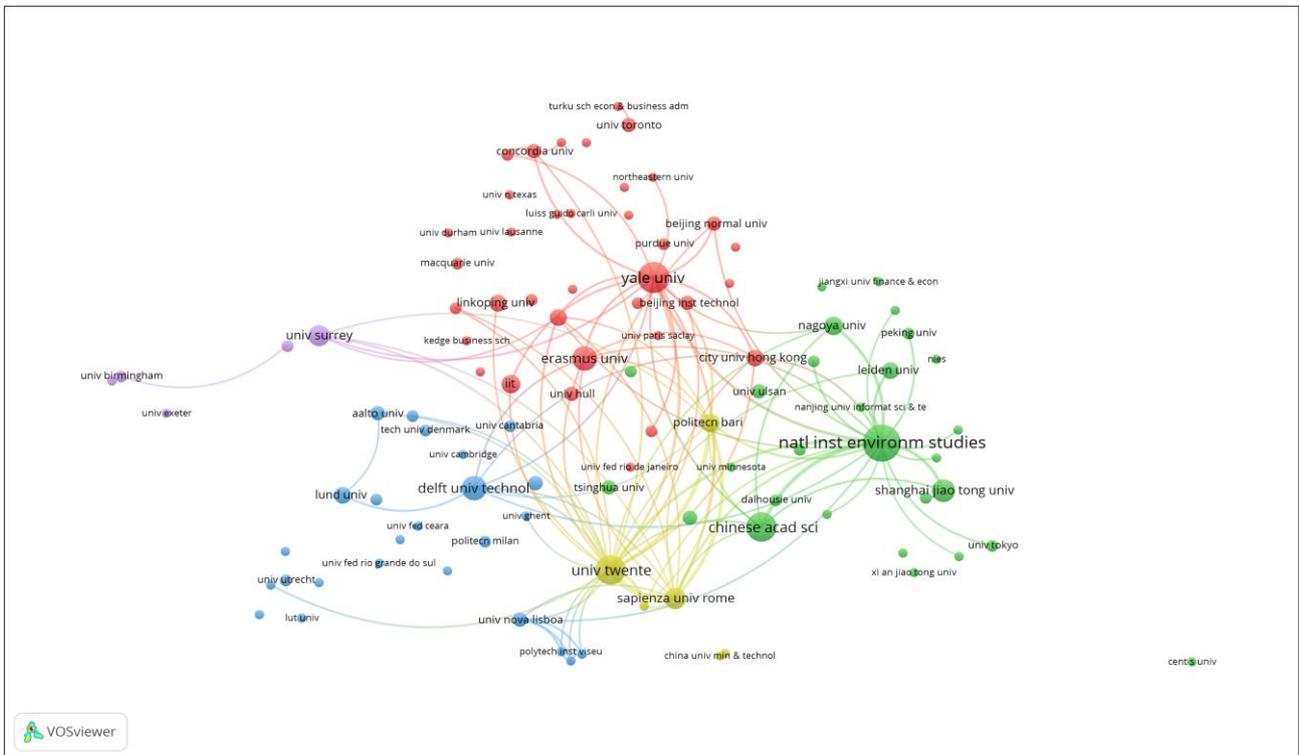
Fig. 3: Clusterizzazione dei contributi sulla simbiosi industriale in base ai riferimenti bibliografici (versione online: <https://bit.ly/35hgOu8>)



(Network visualization)

I cinque cluster identificati sono stati analizzati successivamente nel dettaglio con riferimento a: parole chiave (keywords co-occurrence) e contributi della letteratura precedente (co-citations) più frequentemente utilizzate/citati insieme; Università e Istituzioni di ricerca maggiormente attive; riviste scientifiche cui la produzione degli Autori si rivolge con maggiore frequenza; Paesi di appartenenza degli Autori corrispondenti.

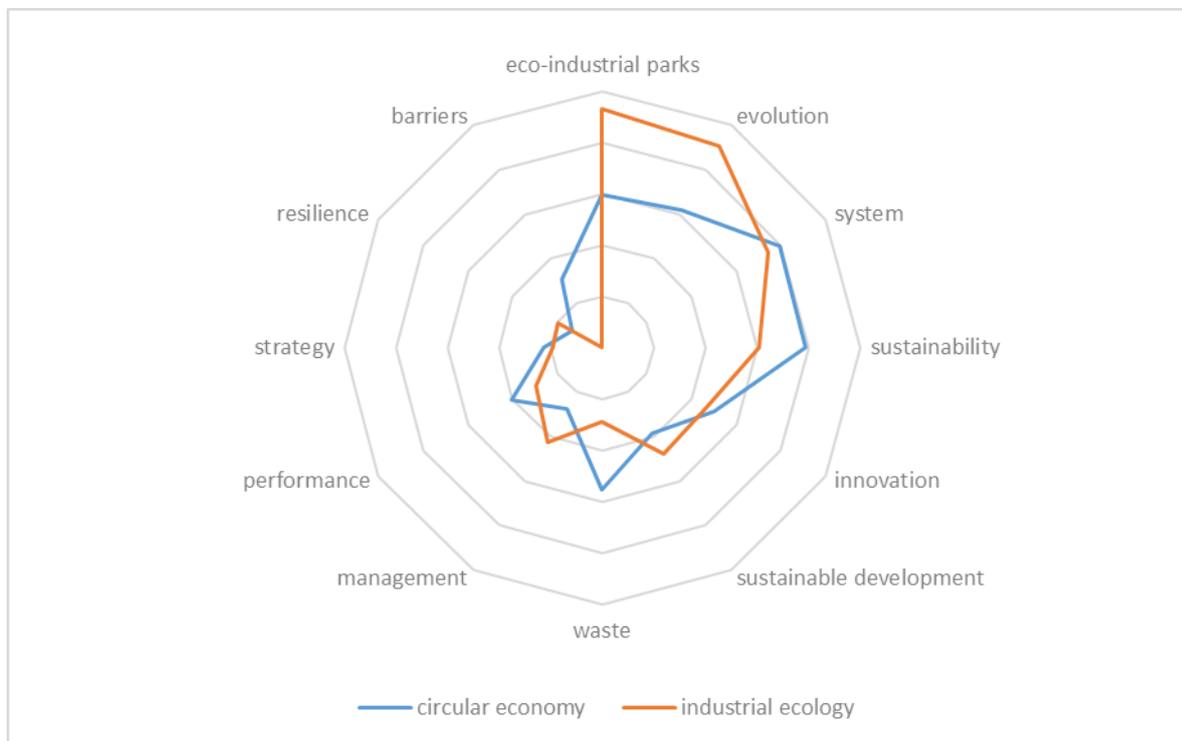
Fig. 3: Clusterizzazione delle principali organizzazioni di ricerca attive sulla simbiosi industriale in base ai riferimenti bibliografici (versione online: <https://bit.ly/3jd5Cn9>)



(Network visualization)

Attraverso l'analisi delle ulteriori parole chiave comuni ai due cluster così riaggregati è stato costruito il grafico in figura 6 che dà conto della diversa attenzione alle tematiche ivi indicate nei contributi risalenti rispettivamente all'economia circolare e all'ecologia industriale:

Fig. 5: La simbiosi industriale nell'economia circolare e nell'ecologia industriale



Fonte: elaborazione propria

La rappresentazione a radar in Fig. 6 dimostra un'ampia sovrapposizione degli argomenti trattati da entrambi i punti di vista, fornendo anche informazioni desumibili dai rispettivi picchi di attenzione: nell'economia circolare la trattazione delle tematiche di simbiosi industriale si appunta in particolare sui rifiuti e sulla loro gestione, sulla performance declinata su vari fronti, da quello dei risultati economici ed ambientali delle imprese simbiotiche a quello della misurazione del livello di circolarità dei processi, sulla sostenibilità, sulla resilienza dei sistemi simbiotici. L'aspetto maggiormente orientato al pratico dei contributi nell'alveo dell'ecologia industriale invece risulta non solo nella frequenza con cui si ritrovano contributi sui parchi eco-industriali in gran parte basati su studi di casi e sulla loro evoluzione in termini di ricerca di nuove opportunità di scambi ma anche, da un punto di vista semantico, dal più frequente utilizzo della locuzione "sviluppo sostenibile" rispetto a "sostenibilità".

Nel seguito vengono presentati, in forma tabellare, i profili dei singoli cluster, i primi due dei quali utilizzano prevalentemente approcci propri dell'economia circolare mentre i restanti tre quelli dell'ecologia industriale.

2.1.1. La prospettiva dell'economia circolare

Cluster 1

L'anno medio di pubblicazione dei contributi appartenenti al cluster è il primo trimestre del 2019, configurandolo così come il cluster di più recente formazione tra quelli individuati. È un cluster a spiccata territorialità europea (Italia, Spagna, Gran Bretagna) cui contribuiscono particolarmente le Istituzioni Universitarie italiane, segnatamente la Scuola Superiore Sant'Anna di Pisa ed il Politecnico di Milano sebbene tra i riferimenti più citati compaiano l'Alma Mater Studiorum di Bologna e l'Università Parthenope di Napoli. Il profilo scientifico appare concettuale-

metodologico e profondamente immerso nell'economia circolare come si ricava proprio dai contributi maggiormente citati, consistenti sostanzialmente in estese review della letteratura volte di tempo in tempo a chiarire il concetto di economia circolare (Kirchherr *et al.*, 2017), le sue radici scientifiche ed il possibile contributo al raggiungimento di un equilibrio tra fini ambientali ed economici (Ghisellini *et al.*, 2015), le relazioni tra il concetto di sostenibilità e quello di economia circolare (Geissdoerfer *et al.*, 2017). Tra i riferimenti non mancano la tradizionale sistemazione di Chertow (2000) sulla tassonomia dei modelli di simbiosi industriale, anch'essa sostanzialmente una review della letteratura, ed il suo contributo successivo Chertow (2007) pure volto a concettualizzare i fenomeni di simbiosi industriale. Fanno riferimento a tali contributi (Urbinati *et al.*, 2017) che non si discostano dall'alveo principale degli studi del cluster proponendo una nuova tassonomia per i modelli di business ispirati ai principi dell'economia circolare; obiettivi di tipo operativo vengono invece perseguiti da (Franklin-Johnson *et al.*, 2016) che individuano nella durevolezza delle risorse un indicatore manageriale della performance dell'economia circolare, (Linder *et al.*, 2017) che propongono come metrica della circolarità il rapporto tra il valore economico ricircolato e il valore totale del prodotto, utilizzando a riferimento i costi della catena del valore.

Tab. 1: Pubblicazioni più citate degli Autori del cluster 1 (simbiosi industriale)

label	url	weight<Citations>
Urbinati A., Chiaroni D., Chiesa V. (2017)	Towards a new taxonomy of circular economy business models	116
De Jesus A., Mendonça S. (2018)	Lost in Transition? Drivers and Barriers in the Eco-innovation Road to the Circular Economy	91
Franklin-Johnson E., Figge F., Canning L. (2016)	Resource duration as a managerial indicator for Circular Economy performance	63
Linder M., Sarasini S., van Loon P. (2017)	A Metric for Quantifying Product-Level Circularity	59
Prendeville S., Cherim E., Bocken N. (2018)	Circular Cities: Mapping Six Cities in Transition	47
Ormazabal M., Prieto-Sandoval V., Puga-Leal R., Jaca C. (2018)	Circular Economy in Spanish SMEs: Challenges and opportunities	43

Fonte: elaborazione degli autori

Tab. 2: Pubblicazioni maggiormente co-citate nei contributi del cluster 1 (simbiosi industriale)

	label	weight<Citations>
Ghisellini P., Ulgiati S., Cialani C. (2015)	A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems	34
Chertow M.R. (2000)	Industrial symbiosis: Literature and taxonomy	27
Geissdoerfer M., Savaget P., Bocken N.M., Hultink E.J. (2017)	The Circular Economy-A new sustainability paradigm?	22
Kirchherr J., Reike D., Hekkert M. (2017)	Conceptualizing the circular economy: An analysis of 114 definitions	21
Chertow M.R. (2007)	"Uncovering" industrial symbiosis	19
Lieder M., Rashid A. (2016)	Towards circular economy implementation: a comprehensive review in context of manufacturing industry	18

Fonte: elaborazione degli autori

Cluster 2

Tab. 3: Pubblicazioni più citate degli Autori del cluster 2 (simbiosi industriale)

label	url	weight<Citations> >
Zhu Q., Geng Y. (2013)	Drivers and barriers of extended supply chain practices for energy saving and emission reduction among Chinese manufacturers	167
Dong L., Gu F., Fujita T., Hayashi Y., Gao J. (2014)	Uncovering opportunity of low-carbon city promotion with industrial system innovation: Case study on industrial symbiosis projects in China	70
Dong L., Fujita T., Zhang H., Dai M., Fujii M., Ohnishi S., Liu Z. (2013)	Promoting low-carbon city through industrial symbiosis: A case in China by applying HPIMO model	62
Dong H., Ohnishi S., Fujita T., Geng Y., Fujii M., Dong L. (2014)	Achieving carbon emission reduction through industrial & urban symbiosis: A case of Kawasaki	59
Geng Y., Liu Z., Xue B., Dong H., Fujita T., Chiu A. (2014)	Emergy-based assessment on industrial symbiosis: a case of Shenyang Economic and Technological Development Zone	58
Zhang B., Wang Z. (2014)	Inter-firm collaborations on carbon emission reduction within industrial chains in China: Practices, drivers and effects on firms' performances	56

Fonte: elaborazione degli autori

Tab. 4: Pubblicazioni maggiormente co-citate nei contributi del cluster 2 (simbiosi industriale)

	label	weight<Citations>
Chertow M.R. (2000)	Industrial symbiosis: Literature and taxonomy	30
Chertow M.R. (2007)	"Uncovering" industrial symbiosis	25
Jacobsen N.B. (2006)	Industrial symbiosis in Kalundborg, Denmark: A quantitative assessment of economic and environmental aspects	22
Van Berkel R., Fujita T., Hashimoto S., Geng Y. (2009)	Industrial and urban symbiosis in Japan: Analysis of the Eco-Town program 1997-2006	18
Zhu Q., Lowe E.A., Wei Y., Barnes D. (2008)	Industrial Symbiosis in China: A Case Study of the Guitang Group	17
Berkel R.V., Fujita T., Hashimoto S., Fujii, M. (2009)	Quantitative Assessment of Urban and Industrial Symbiosis in Kawasaki, Japan	15

Fonte: elaborazione degli autori

2.1.2 La prospettiva dell'ecologia industriale

Cluster 3

Tab. 5: Pubblicazioni più citate degli Autori del cluster 3 (simbiosi industriale)

References	url	weight<Citations>
Shi H., Chertow M., Song Y. (2010)	Developing country experience with eco-industrial parks: a case study of the Tianjin Economic-Technological Development Area in China	191
Mathews J.A., Tan H. (2011)	Progress Toward a Circular Economy in China	184
Gregson N., Crang M., Fuller S., Holmes H. (2015)	Interrogating the circular economy: the moral economy of resource recovery in the EU	163
Lombardi D.R., Laybourn P. (2012)	Redefining Industrial Symbiosis	152
Mirata M., Emtairah T. (2005)	Industrial symbiosis networks and the contribution to environmental innovation	143
Behera S.K., Kim J.H., Lee S.Y., Suh S., Park H.S. (2012)	Evolution of 'designed' industrial symbiosis networks in the Ulsan Eco-industrial Park: 'Research and development into business' as the enabling framework	119

Fonte: elaborazione degli autori

Tab. 6: Pubblicazioni maggiormente co-citate nei contributi del cluster 3 (simbiosi industriale)

	Co-cited References	weight<Citati ons>
Chertow, M. R. (2000)	Industrial symbiosis: Literature and taxonomy	40
Chertow, M. R. (2007)	“Uncovering” industrial symbiosis	31
Ehrenfeld, J., & Gertler, N. (1997)	Industrial ecology in practice: The evolution of interdependence at Kalundborg	29
Frosch, R. A., & Gallopoulos, N. E. (1989)	Strategies for manufacturing	27
Jacobsen, N. B. (2006)	Industrial symbiosis in Kalundborg, Denmark: A quantitative assessment of economic and environmental aspects	25
Schwarz, E. J., & Steininger, K. W. (1997)	Implementing nature’s lesson: the industrial recycling network enhancing regional development	23

Fonte: elaborazione degli autori

L’anno medio di pubblicazione dei contributi appartenenti al cluster è il secondo trimestre del 2012, configurandolo così come il cluster di più antica formazione tra quelli individuati.

Cluster 4

Tab. 7: Pubblicazioni più citate degli Autori del cluster 4 (simbiosi industriale)

label	url	weight<Citations >
Boons F., Spekkink W., Mouzakitis Y. (2011)	The dynamics of industrial symbiosis: a proposal for a conceptual framework based upon a comprehensive literature review	128
Ashton W. (2008)	Understanding the Organization of Industrial Ecosystems	122
Paquin R.L., Howard-Grenville J. (2012)	The Evolution of Facilitated Industrial Symbiosis	91
Jensen P.D., Basson L., Hellowell E.E., Bailey M.R., Leach M. (2011)	Quantifying “geographic proximity”: Experiences from the United Kingdom’s National Industrial Symbiosis Programme	88
Paquin R.L., Howard-Grenville J. (2013)	Blind Dates and Arranged Marriages: Longitudinal Processes of Network Orchestration	80
Grant G.B., Seager T.P., Massard G., Nies L. (2010)	Information and Communication Technology for Industrial Symbiosis	76

Fonte: elaborazione degli autori

Tab. 8: Pubblicazioni maggiormente co-citate nei contributi del cluster 4 (simbiosi industriale)

	label	weight<Citations>
Chertow M.R. (2007)	“Uncovering” industrial symbiosis	38
Chertow M.R. (2000)	Industrial symbiosis: Literature and taxonomy	33
Ashton W. (2008)	Understanding the Organization of Industrial Ecosystems	27
Baas L., Boons F. (2004)	An industrial ecology project in practice: exploring the boundaries of decision-making levels in regional industrial systems	25
Chertow M., Ehrenfeld J. (2012)	Organizing Self-Organizing Systems	25
Ehrenfeld J., Gertler N. (1997)	Industrial ecology in practice: The evolution of interdependence at Kalundborg	25

Fonte: elaborazione degli autori

Cluster 5

Tab. 9: Pubblicazioni più citate degli Autori del cluster 5 (simbiosi industriale)

label	url	weight<Citazioni>
Ashton, W. S. (2009)	The Structure, Function, and Evolution of a Regional Industrial Ecosystem	82
Chopra, S. S., & Khanna, V. (2014)	Understanding resilience in industrial symbiosis networks: Insights from network analysis	78
Sokka, L., Pakarinen, S., & Melanen, M. (2011)	Industrial symbiosis contributing to more sustainable energy use - an example from the forest industry in Kymenlaakso, Finland	73
Martin, M., & Eklund, M. (2011)	Improving the environmental performance of biofuels with industrial symbiosis	71
Busch, T., Bauer, R., & Orlitzky, M. (2015)	Sustainable Development and Financial Markets	66
Zhang, H., Dong, L., Li, H., Fujita, T., Ohnishi, S., & Tang, Q. (2013)	Analysis of low-carbon industrial symbiosis technology for carbon mitigation in a Chinese iron/steel industrial park: A case study with carbon flow analysis	55

Fonte: elaborazione degli autori

Tab. 10: Pubblicazioni maggiormente co-citate nei contributi del cluster 5 (simbiosi industriale)

	label	weight<Citazioni>
Chertow, M. R. (2000)	Industrial symbiosis: Literature and taxonomy	48
Chertow, M. R. (2007)	"Uncovering" industrial symbiosis	17
Jacobsen, N. B. (2006)	Industrial symbiosis in Kalundborg, Denmark: A quantitative assessment of economic and environmental aspects	17
Ehrenfeld, J., & Gertler, N. (1997)	Industrial ecology in practice: The evolution of interdependence at Kalundborg	11
Chertow, M. R., & Lombardi, D. R. (2005)	Quantifying economic and environmental benefits of co-located firms	10
Chertow, M., & Ehrenfeld, J. (2012)	Organizing Self-Organizing Systems	7

Fonte: elaborazione degli autori

L'analisi svolta dimostra come il focus dei contributi si sia progressivamente spostato da una prospettiva teorica di inquadramento della simbiosi industriale in seno all'ecologia industriale, con sforzi finalizzati soprattutto alla circoscrizione del campo di indagine attraverso la ricerca delle definizioni ed alla messa a fuoco dei concetti, per approdare ad una visione analitica ed interpretativa delle diversificate e complesse relazioni esistenti nei parchi eco-industriali, che dei concetti della simbiosi industriale rappresentano le principali concretizzazioni, attraverso l'indagine empirica.

3. La simbiosi industriale nelle teorie dei sistemi

3.1 La natura sistemica delle reti simbiotiche

La palese natura di sistemi aperti delle reti simbiotiche industriali è denotata dalla presenza e dalle interazioni contestuali delle imprese direttamente coinvolte quali attori principali degli scambi e dall'ecosistema composto da fornitori, clienti, centri di ricerca, autorità pubbliche ed altri; in tali sistemi, ciascuno degli attori gioca un ruolo specifico sulla base delle relazioni inter-organizzative cui partecipa con diversa sensibilità con ciò determinandone la complessità.

Nonostante l'evidente carattere sistemico, il ricorso all'utilizzo di chiavi interpretative fornite dalle teorie dei sistemi per l'analisi dei fenomeni di simbiosi industriale risulta, nella letteratura scientifica, poco sviluppato. Anche il concetto di "viability" dei sistemi simbiotici, che compare originariamente nella definizione di Christensen è presente solo sporadicamente nella letteratura successiva.

Tra le eccezioni, Ashton (2009) sviluppa, con riferimento al caso concreto di un parco eco-industriale, uno schema interpretativo delle funzioni, delle transazioni economiche, del contesto politico/normativo e delle interazioni sociali in cui evolve la collaborazione tra imprese facendo ricorso agli strumenti del Complex Adaptive Systems.

Più recentemente, Wang *et al.* (2018) richiamano implicitamente i principi fondanti della cibernetica e delle teorie dei sistemi in un contributo che indica quale rimedio al contenimento delle fluttuazioni nell'equilibrio delle reti simbiotiche industriali dovute a sollecitazioni ambientali, il ricorso ai metodi dei controlli automatici concludendo che questi possono giocare un ruolo chiave nel contenimento della vulnerabilità, intesa come compromissione del funzionamento della rete o perfino della sua sopravvivenza dovuta a perturbazioni impreviste quali l'abbandono improvviso di un'impresa o le variazioni nella qualità dei residui scambiati, incrementandone la resilienza. Più direttamente, Cui *et al.* (2018) utilizzano i metodi della System Dynamics per formalizzare un modello dell'evoluzione delle reti simbiotiche, con ciò costituendo uno dei pochi anelli di congiunzione tra i due fronti scientifici considerati. Risultano assenti, all'attuale migliore conoscenza di chi scrive, le interpretazioni delle reti simbiotiche attraverso gli affermati modelli dei sistemi vitali (VSM e vSa) nonostante significative tracce di alcune prospettive e concetti ad essi appartenenti siano disseminate in diversi contributi. Hewes e Lyons (2008), per esempio, sulla base di un'analisi empirica di un campione di parchi eco-industriali, trovano che le relazioni sociali basate sul radicamento nel tessuto socio-economico locale e sulla fiducia sono considerati più rilevanti ai fini della viability del sistema rispetto alle connessioni tecniche e tecnologiche: è palese, sebbene implicito, il parallelismo con la proposizione 2 (Eidos) del vSa, relativa alla distinzione tra struttura e sistema. Behera *et al.* (2012), riferendosi alla fase progettuale di evoluzione dei complessi industriali convenzionali in parchi eco-industriali, enfatizzano il ruolo dei canali di comunicazione tra gli attori, in assenza di una corretta progettualità dei quali gli sforzi finalizzati alla trasformazione potrebbero risultare improduttivi ai fini della viability del sistema: con la lente del VSM "viene violata la condizione necessaria a sufficiente per la viability del sistema".⁴

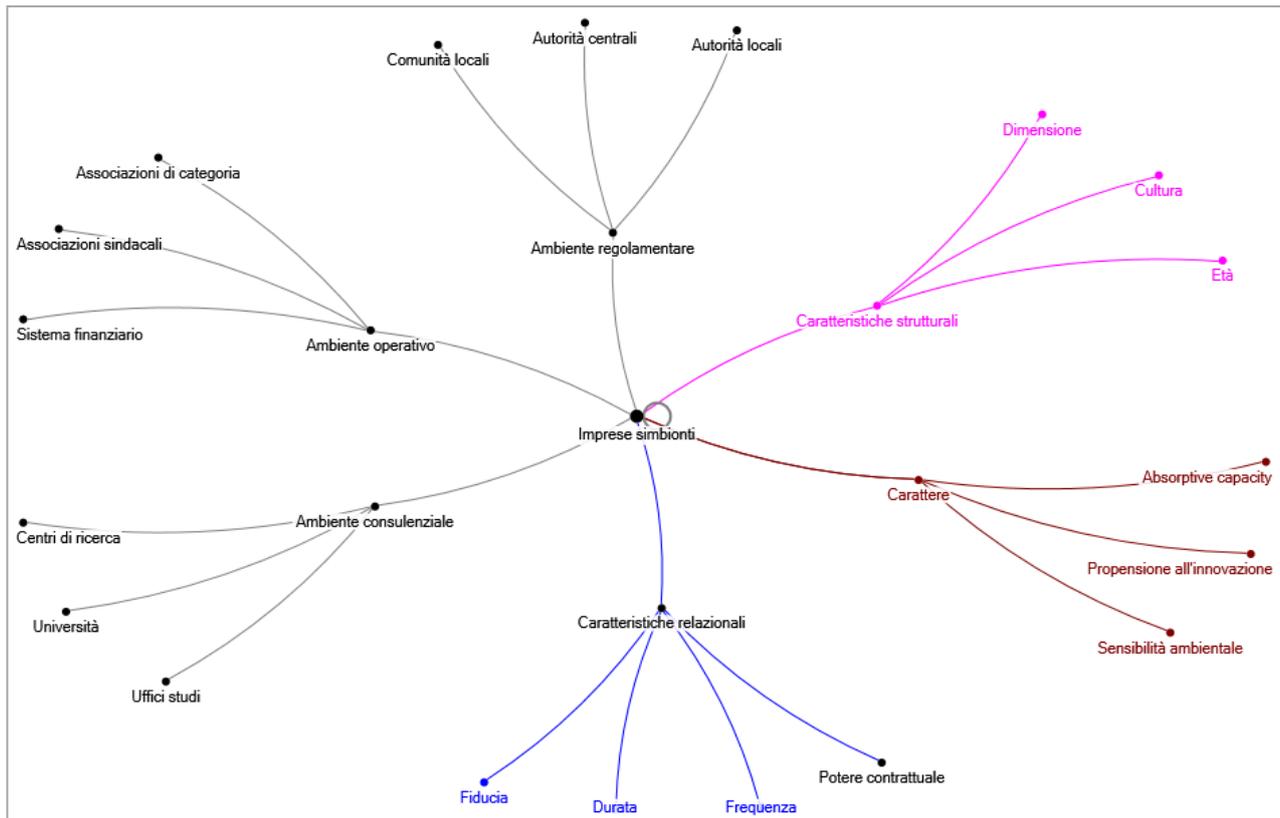
Uno degli ostacoli all'utilizzo dei modelli sistemico-vitali per l'interpretazione delle reti simbiotiche, e forse la spiegazione della loro assenza in letteratura, è probabilmente costituito dalle molteplici forme che assumono tali reti (ciascuna delle quali rappresenta un caso unico) per cui non è agevole riferirsi ad esse come sistemi vitali: l'importanza di riferirsi a classi omogenee di esperienze di simbiosi industriale risalta, nell'approccio sistemico-vitale, ai fini dell'individuazione dell'organo (o degli organi) di governo del sistema (Golinelli, 2000; Barile, 2009), del livello di conduzione di esso, delle loro responsabilità. Nel Viable System Model di Beer (1972; 1979; 1985) la disponibilità di classi omogenee di esperienze di simbiosi industriale risulta centrale per l'individuazione degli attori e del ruolo di essi nell'ambito dei 5 sottosistemi identificati nel modello.

In entrambi gli approcci scientifici, la classificazione appare dunque rilevante per la definizione dei confini del sistema.

La natura sistemica si può meglio apprezzare schematizzando la rete degli attori di un parco eco-industriale, le loro caratteristiche strutturali e relazionali ed i sovra-sistemi che influenzano le dinamiche del parco (Figura 7).

⁴ La carenza di informazioni e l'inadeguatezza di canali di comunicazione tra le imprese è chiaramente indicata come barriera di carattere "non tecnico" anche dalle imprese coinvolte nello studio empirico di Lombardi (2012).

Fig. 7: La complessità sistemica delle reti simbiotiche



Fonte: Elaborazione propria

La simbiosi industriale rappresenta uno step verso la transizione dai sistemi aperti di von Bertalanffy (1968) verso sistemi ad un minore grado di apertura. Le attività economiche, in particolare industriali sono sistemi aperti in quanto scambiano energia, materie e informazioni con l'esterno. Più ampi sono i confini del sistema, andando ad includere altri soggetti (nel caso della simbiosi industriale le altre imprese, le istituzioni, la comunità, l'ambiente antropico) che possono usufruire in qualche modo dei rifiuti e dei sottoprodotti che si generano all'interno del sistema, minore risulta lo sfruttamento delle risorse in generale. In particolare, i parchi eco-industriali quali concretizzazioni del fenomeno della simbiosi industriale rappresentano il più importante esempio in questo senso.

Sembra andare da sé che la simbiosi industriale debba avvenire entro confini di sistema ampi anzi quanto più ampi sono tali confini e più soggetti partecipano tanto più l'iniziativa simbiotica ha probabilità di successo.

Il confine del sistema è l'interfaccia tra il sistema del prodotto e il suo ambiente.

3.2 La simbiosi industriale nel Viable System Model

La caratteristica principale delle reti simbiotiche, consistente nell'interdipendenza reciproca delle unità del sistema 1 dovuta ai flussi fisici di risorse, assorbe una parte significativa delle funzioni di coordinamento del sistema 2. Le unità del sistema 1, che in questo caso sono intere imprese con una propria mission ed un proprio processo produttivo (a confermare il principio di ricorsività del VSM dispongono al proprio interno di tutte le funzioni che Beer afferma essere necessarie e sufficienti per la sopravvivenza), in quanto interconnesse, devono rispettare, oltre la propria mission, anche quelle dell'intera rete in coerenza con gli obiettivi della sostenibilità. Il sistema 4, che definisce la strategia della rete, è composto, nel caso in esame, da un board di manager ciascuno appartenente ad una delle imprese coinvolte e deve adattare il proprio processo decisionale non solo alle esigenze interne dell'impresa cui appartiene ma anche a quelle delle altre e della rete nel suo complesso. I

principali riflessi delle caratteristiche peculiari delle reti simbiotiche si riflettono dunque, in particolare, sui manager e sulla loro condotta. Infatti, poiché l'adozione e l'implementazione della simbiosi industriale implicano aspetti quali connessione, comunità e cooperazione, il management deve sviluppare interazioni sinergiche con i manager appartenenti alla catena del valore, con i fornitori, con le associazioni di settore; deve inoltre avere una visione chiara dei vantaggi economici e ambientali delle partnership basata sulla conoscenza delle collaborazioni esistenti nella gestione delle risorse e possedere la capacità di intravedere le opportunità di espansione della rete attraverso l'analisi dei flussi di risorse attuali e potenziali.

Da un altro punto di vista, il management deve avere un orientamento alla salvaguardia ambientale, capacità negoziali sia rispetto alle altre imprese che alle autorità, con le quali si negoziano le regolamentazioni, in particolare sui rifiuti. In questo ambito, le capacità negoziali sono positivamente influenzate dal focus sulla gestione dei rifiuti, in particolare dalla capacità di concentrarsi sul risultato finale del processo di riutilizzo/riciclaggio anziché sul processo o sulla tecnologia utilizzata. Le abilità manageriali devono estrinsecarsi anche nella capacità di monitorare le politiche governative sulla gestione dei rifiuti e le innovazioni tecnologiche nei settori di interesse.

3.3 *La simbiosi industriale nel viable Systems approach*

Il ricorso ai principi dell'approccio sistemico vitale fornisce chiavi interpretative della principale caratteristica delle reti simbiotiche, consistente nelle interdipendenze reciproche tra le imprese partecipanti. Infatti, la struttura - che nell'approccio vSa contempla, oltre alle componenti fisiche rappresentate dagli impianti, dalle attrezzature e dalle infrastrutture di trasferimento dei materiali, anche i flussi dei materiali stessi - condiziona il sistema delle relazioni e dei processi decisionali che di essa determinano efficacia ed efficienza e, in ultimo, la viability, in quanto tale sistema presenta processi di autoregolazione più intensi. L'inquadramento dei fenomeni simbiotici nel vSa è delineato nel seguito con riferimento ai principi chiave dell'approccio metodologico adottato (Barile e Polese, 2010; Barile e Saviano, 2011; Ashby, 1956, 1958; Bateson, 1972, 1979; Watzlawick *et al.*, 1974; Maturana *et al.*, 1975; Von Foerster, 1984; Watzlawick, 1984):

- un approccio interpretativo multidisciplinare (tra olistico e riduzionismo);
- sistemi aperti (dal pensiero sistemico);
- confini del sistema (dal pensiero sistemico);
- autopoiesi e finalità comuni (da chimica e biologia);
- omeostasi e autoregolazione (da scienze naturali ed ecologiche);
- strutture, sistemi ed equifinalità (dalle scienze naturali ed ecologiche);
- consonanza e risonanza (da sociologia e psicologia);
- vitalità del sistema (dal pensiero sistemico);
- adattamento e sviluppo delle relazioni (dalle scienze naturali ed ecologiche);
- complessità e processo decisionale (dalla sociologia e dalla psicologia).

Alla luce della natura interdisciplinare dell'approccio interpretativo dell'aSv, gli alvei concettuali dell'approccio cui risalgono le iniziative di simbiosi industriale sono individuati di seguito.

Sistemi aperti

Considerate dalla prospettiva scientifica della teoria generale dei sistemi di von Bertalanffy le iniziative di simbiosi industriale tendono a ridurre il grado di apertura del sistema limitando da un lato i prelievi di risorse naturali, da un altro le emissioni nocive nell'ambiente.

Strutture, sistemi ed equifinalità

L'insieme di imprese facenti parte di una rete simbiotica, ciascuna con la propria specifica mission ed i propri obiettivi (la struttura), fa emergere, tra gli altri possibili, un sovra-sistema (un

parco eco-industriale, per esempio) che si riferisce alle più ampie finalità sociali ed ambientali da rendere coerenti con gli obiettivi economici.

Autopoiesi e finalità comuni

Al principio di autopoiesi (ogni sistema tende a generare condizioni equilibrate rispetto alle possibilità interne e ai vincoli esterni) si possono far risalire la genesi delle iniziative simbiotiche e le iniziative innovative che attualmente caratterizzano molte delle loro principali concretizzazioni, i parchi eco-industriali. Dal lato della nascita di tali concretizzazioni si ravvisa infatti l'impulso dato dalla necessità di adattamento al coacervo di esigenze sociali, ambientali ed economiche alle diverse scale territoriali e ai diversi livelli di governo dei sistemi: se la genesi è dovuta a piani o programmi di sviluppo locali o regionali si ravvisa il tentativo di indirizzare le attività industriali verso configurazioni in equilibrio sociale, ambientale ed economico; se la genesi è spontanea tale aspetto è ancora più evidente.

Omeostasi e autoregolazione

In accordo con questo principio, le imprese industriali, nel coinvolgersi in attività simbiotiche, conservano ciascuna la propria identità non modificando eccessivamente le caratteristiche interne nel tentativo di raggiungere un equilibrio interno ed esterno.

Consonanza e risonanza

Il termine "consonanza" si riferisce alla potenziale compatibilità tra gli elementi dei sistemi; nel caso della simbiosi industriale il concetto comprende una vasta serie di requisiti, tra i quali la vicinanza geografica, e naturalmente l'appartenenza ad uno dei settori industriali delle imprese in grado di generare i flussi di risorse o di fruire di essi. Nell'operare ciascuna per il proprio fine, esse devono sviluppare un elevato livello di risonanza interagendo armonicamente in una prospettiva di lungo periodo.

System viability

La capacità di un sistema di sopravvivere è determinata dalla sua attitudine, nel tempo, di conservare la consonanza e un comportamento risonante nel lungo periodo (Piciocchi e Bassano, 2009). Ai fini di ciò un sistema vitale deve essere in grado di regolare dinamicamente la sua struttura e il suo comportamento per preservare la sua stabilità.

Adattamento e sviluppo delle relazioni

Per garantire la redditività, i sistemi devono analizzare i cambiamenti esterni nella domanda e il comportamento dei loro concorrenti e, in ossequio alla teoria evuzionistica di Darwin relativa alla necessità di adattamento per la sopravvivenza delle specie, impegnarsi in modo continuativo in processi dinamici di adattamento, trasformazione, ristrutturazione e "ripensamento" aziendale.

4. Conclusioni

Le esperienze esistenti di simbiosi industriale mostrano che le configurazioni reticolari delle imprese ad esse partecipanti sono effettivamente in grado di generare benefici economici, ambientali e sociali diffusi tra i molteplici Stakeholder direttamente o indirettamente in esse coinvolti. L'analisi di tali esperienze, alcune di esse da considerare veri e propri benchmark di applicazione congiunta dei principi dell'ecologia industriale e dell'economia circolare, mostra come esse rappresentino l'espressione concreta o di piani di sviluppo economico e di transizione ecologica formulati ad uno o più livelli decisionali (governo centrale e locale, associazioni di categoria, sindacati) ovvero di iniziative spontanee di cooperazione tra singole imprese. L'identificazione delle opportunità simbiotiche, il loro inquadramento in piani di miglioramento economici ed ambientali, la successiva transizione in programmi di sviluppo locale e in ultimo nelle

progettualità specifiche su cui implementare le iniziative sono state finora, in particolare nel nostro Paese, sporadiche e prive di un quadro di riferimento omogeneo. Alla vigilia del grande sforzo promosso dall'Unione Europea verso la green transition che tutti i Paesi si apprestano a fare, un piano di sviluppo della simbiosi industriale che parta dalla ricognizione sistematica delle opportunità simbiotiche esistenti e le dettagli fino al livello delle singole progettualità appare quanto mai opportuno se non necessario. In queste considerazioni si rappresenta, con tutta evidenza, il carattere sistemico e ricorsivo delle iniziative simbiotiche: il sovrasistema costituito dalle comunità locali e dai loro organi di rappresentanza, dalle imprese e dalle loro associazioni di categoria, dai Centri di ricerca e dalle Università, dal sistema finanziario; il sistema delle imprese interconnesse negli scambi di energia e/o di reflui di qualunque tipo; il sottosistema della singola impresa con le sue specificità, la sua cultura, la sua sensibilità ambientale, il suo organo di governo, la sua struttura operativa. Nel quadro descritto, appare evidente la necessità di azioni consonanti nel senso dell'aSv da parte di tali attori, azioni che si devono dipanare su più tavoli di concertazione e nei diversi livelli di raccordo tra gli attori via via che dai programmi generali, coerenti con il piano di sviluppo di cui sopra, si passa alle progettualità specifiche.

5. Implicazioni manageriali

Con riferimento ai parchi eco-industriali, la ricerca svolta ha evidenziato che il ruolo di governo risulta diverso in funzione delle caratteristiche del parco (processi decisionali concentrati in un'unica impresa dominante, diffuso tra poche imprese, diffuso tra tutti i partecipanti incluse le entità esterne). I principi e gli strumenti interpretativi del vSa forniscono chiavi di lettura generali delle collaborazioni simbiotiche che consentono ai manager di meglio adattarsi, qualunque sia il modello di governance, al ruolo non tradizionale di gestori delle proprie imprese e contemporaneamente di componente di una rete. Ciò richiede ai manager la capacità di rivestire con successo il duplice ruolo di decision maker, tradizionalmente finalizzato all'interesse dell'impresa cui appartengono, e di componente di un sistema di governo più ampio, orientato al contemperamento delle esigenze di tutti gli Stakeholders coinvolti e di quelle del sistema nel suo complesso, sempre ispirato al perseguimento di obiettivi non solo economici ma anche sociali ed ambientali, in uno di sostenibilità (Vito *et al.*, 2018; Barile *et al.*, 2014; Barile e Saviano, 2018). Le condizioni di successo si declinano essenzialmente lungo le linee dello stile di leadership e dell'orientamento culturale alla sostenibilità; nella capacità di sviluppare rapporti basati sul principio della consonanza con tutti i soggetti facenti parte della catena del valore, con le associazioni di settore, gli enti locali e centrali; di prevedere le opportunità di espansione della rete simbiotica attraverso l'analisi dei flussi potenziali di energia e di materiali di qualunque tipo; di effettuare le relative valutazioni economiche e ambientali; di monitorare le politiche governative e le innovazioni tecnologiche in materia di processi specifici e di gestione dei rifiuti.

Da questo punto di vista, la prima sfida dell'applicazione di un approccio sistemico allo studio della simbiosi industriale concerne la possibilità di misurare il valore creato da pratiche sostenibili in un'ottica allargata.

6. Linee per ulteriori ricerche

Ulteriori ricerche potranno essere orientate al rafforzamento delle interpretazioni sistemiche della simbiosi industriale secondo i principi dell'aSv ai fini della modellazione dei processi sociali, economici ed ambientali che innescano le esperienze simbiotiche; alla determinazione del valore creato nell'ambito delle dimensioni sociali, ambientali ed economiche in quanto ciascuna di esse costituisce uno o un insieme di sovrasistemi aventi rilevanza diversa a seconda dell'organo di governo. In questo senso, il contributo dell'aSv è essenziale: la composizione delle istanze derivanti da ciascuna delle tre dimensioni che possono differire da contesto a contesto e risultare

frequentemente in conflitto tra loro, contribuirà infatti a realizzare una misura di valore sostenibile appositamente costruita e determinata con riferimento alla singola organizzazione.

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Le decisioni di *co-branding*: un'analisi sistematica della letteratura e nuovi percorsi di ricerca

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Abstract

Obiettivi. Una decisione fondamentale nell'ambito del marketing strategico riguarda l'associazione di due brand per la promozione di un unico prodotto. Per questa ragione, non sorprende che, negli ultimi decenni, gli studi internazionali abbiano ampiamente esplorato gli antecedenti della decisione di *co-branding* nonché le differenze in termini di risultati tra i due brand alleati. L'ampio numero di studi sul *co-brand*, le molteplici prospettive teoriche e approcci empirici fanno emergere l'opportunità di riassumere lo stato dell'arte sul *co-brand* e, facendo leva sui risultati, presentare una agenda strutturata per futuri studi.

Metodologia. Sviluppiamo un'analisi sistematica della letteratura sul *co-brand* che include 190 articoli scientifici pubblicati dal 1990 al 2019 e indicizzati su Scopus e Web of Science.

Risultati. Proponiamo un framework teorico-interpretativo che lega gli antecedenti e le conseguenze del *co-brand*. Inoltre, proponiamo set di linee future di ricerche.

Limiti della ricerca. I limiti di questo studio sono legati alla soggettività dell'analisi degli autori. Infatti, lo studio potrebbe essere corroborato tramite analisi bibliometriche.

Implicazioni pratiche. Il presente studio facilita l'identificazione delle variabili e dimensioni che interessano il *co-brand*, al fine di utilizzarle proficuamente per sfruttare i punti di forza e limitare i punti di debolezza di un dato brand.

Originalità del lavoro. Questo studio evidenzia come il *co-brand* si sviluppi all'interno di diversi contesti e dimensioni connesse sia all'impresa che al consumatore. Il framework che presentiamo sottolinea l'interdipendenza tra queste dimensioni.

Parole chiave: *co-brand*; gestione del brand; sfruttamento del marchio; analisi sistematica della letteratura

Objectives. A critical decision in marketing is the association of two brands in a joint product, namely the formulation and the implementation of a *co-branding* alliance. Likewise, the inputs of *co-branding* alliances, the differences in performance between the paired brands, and the emergence of "spillover effects" have been pillars of the marketing research agenda for almost three decades. The extensive number of studies on *co-branding* alliances, combined with multiple theoretical perspectives and empirical approaches informing extant literature, calls for the summary of the state of the art of this research.

Methodology. We develop a systematic overview of *co-branding* literature. We build a conceptual framework that summarizes the main concepts and variables used in *co-branding* research.

Findings. We build a conceptual framework linking antecedents, *co-branding* alliance implementation, and consequences. Finally, based on the synthesis of existing research on *co-branding*, we propose a structured research agenda.

Research limits. Limitations of this paper relate to the subjectiveness used to analyse the papers. Bibliometric analyses may corroborate our results.

Practical implications. We detect the main variables and dimensions involved in a brand alliance to exploit strengths and lessen weaknesses of given brand.

Originality of the study. This paper shed new light on how *co-branding* is embedded in different contexts and dimensions of both firms and consumers. The map presented in this study underly the interdependence among such dimensions.

Key words: *co-branding*; brand management; brand leveraging; systematic literature review

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1. Introduzione

Già da uno sguardo veloce alle pubblicità in TV o agli scaffali di un'impresa commerciale, è possibile osservare diversi esempi di associazione tra due brand per promuovere un singolo prodotto. Questa strategia è denominata co-branding: due brand vengono combinati insieme per il lancio di un unico prodotto, al fine di sfruttare le potenziali sinergie esistenti tra i due partner (Newmeyer *et al.*, 2014; Rao e Ruekert, 1994). Esempi recenti di co-brand sono Fiat con Gucci nel settore automobilistico, Fiasconaro con Dolce e Gabbana nel settore dolciario, Fendi con Fila nel settore moda.

Il ricorso crescente a strategie di co-brand nel mondo del business ha spinto la comunità accademica a studiare approfonditamente il tema. In particolare, è emerso che le performance del co-brand mostrano un'alta variabilità (Washburn *et al.*, 2000) e possono essere asimmetriche per i brand coinvolti (Simonin e Ruth, 1998). Una ragione che spiega la diversità dei risultati ottenuti dal fenomeno in parola può essere ricercata nella molteplicità degli antecedenti che informano la scelta di avviare una campagna di co-brand come, per esempio, avere accesso a nuovi segmenti di mercato, sviluppare un brand globale, incrementare il fatturato e costruire una “*brand equity*” più forte (Aaker e Keller, 1990; Barwise e Robertson, 1992; Kotteman *et al.*, 2017; Washburn *et al.*, 2000). Inoltre, i brand partner possono ottenere vantaggi anche dall'effetto di “*spillover*” generato, in differenti modi e con diverse intensità (Simonin e Ruth, 1998).

Da un'analisi preliminare della letteratura esistente, inoltre, possiamo osservare come la questa sia caratterizzata da numerose prospettive teoriche (*Signaling Theory, Information Integration Theory, Associative Learning Theory*, etc.) e molteplici approcci empirici (esperimenti, *survey* e casi studio).

Dodici anni dopo una prima analisi della letteratura sul co-brand (Helmig *et al.*, 2008), la frammentazione della letteratura che lega antecedenti, implementazione del co-brand e conseguenze rende difficile avere una chiara e generale visione del fenomeno in oggetto. In più, la varietà di teorie e approcci metodologici usati per studiare il fenomeno del co-brand rendono ardua la definizione di future linee di ricerca (Durand *et al.*, 2017). Questa difficoltà viene indirizzata solo parzialmente dalle più recenti *review* della letteratura. Per esempio, Chiambaretto e Gurău (2017) offrono una ricca tassonomia dei diversi tipi di co-brand e dei conseguenti rischi e benefici. Tuttavia, gli autori si concentrano soprattutto su un elemento cruciale rappresentato dal *fit* tra i due brand partner e/o i prodotti offerti in co-brand (Chiambaretto e Gurău, 2017). Da una prospettiva complementare, l'articolo di Besharat e Langan (2014) analizza come le alleanze di co-brand producano un beneficio o un danno nella percezione del consumatore e come il brand venga associato nella mente del consumatore (Besharat e Langan, 2014).

L'obiettivo del presente lavoro è di fornire un quadro generale e completo sul co-branding, sintetizzando gli aspetti chiave che caratterizzano la letteratura esistente. Inoltre, si mettono in luce taluni gap di ricerca, sia teoria sia empirica.

2. Aspetti metodologici dello studio

Come sopra enunciato, il nostro obiettivo è quello di sviluppare una *review* della letteratura sistematica. A questo fine abbiamo preso in considerazione articoli scientifici indicizzati in due *database*: Scopus e Web of Science. La scelta di considerare entrambi i *database* è finalizzata a garantire la maggiore completezza possibile della nostra ricerca. Infatti, per esempio, abbiamo notato che in Scopus “*Journal of Consumer Research*” e “*Journal of Marketing*” presentano dei buchi temporali rispettivamente fino al 1993 e 1995.

Per selezionare il campione di studi scientifici da includere nella nostra analisi, abbiamo selezionato tutti gli articoli che includono i termini “*co-brand**”, “*co brand**”, “*cobrand**”, “*brand alliance**”, “*joint branding*”, “*dual branding*”, “*co-marketing alliance*”, “*ingredient*

branding”, “*multiple branding*” nel loro titolo, abstract o nella loro lista di parole chiave. Nella nostra ricerca sono inclusi gli articoli pubblicati fino a Dicembre 2019.

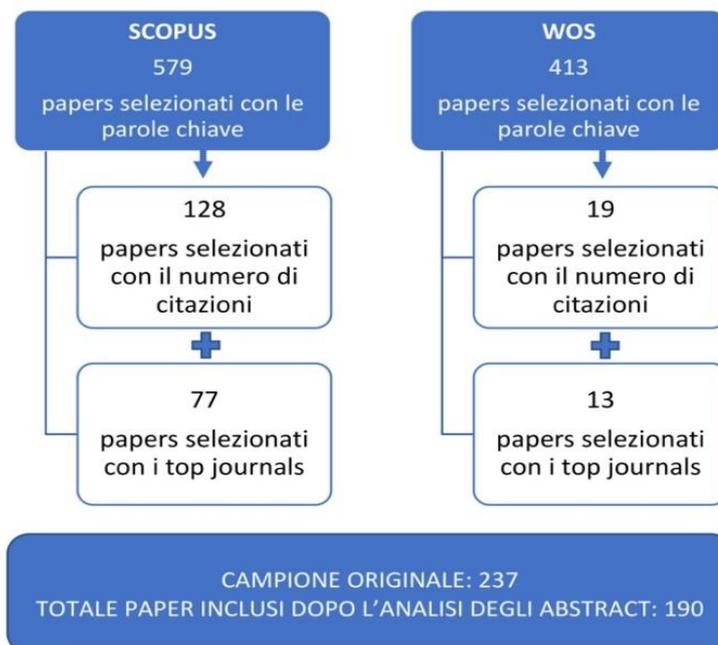
Partendo da Scopus, tramite i filtri rappresentati dalle parole chiave da noi inserite, abbiamo selezionato 580 articoli. Successivamente, abbiamo rifinito la ricerca basandoci su due criteri:

1. abbiamo filtrato tutti gli articoli che hanno ricevuto almeno dieci citazioni. Questa soglia ci consente di selezionare il “*top*” 33% degli articoli, basandoci sul complessivo numero di citazioni ottenute. Sono 187 gli articoli che soddisfano questo criterio.
2. abbiamo incluso nel campione tutti gli articoli scientifici pubblicati in giornali di marketing classificati con 3 e 4 stelle dalla *U.K. Academic Journal Guide 2018*. Questi articoli vengono aggiunti al campione anche qualora presentino un numero di citazioni inferiore alla soglia stabilita in precedenza. Alla fine della procedura di filtraggio, il campione finale estratto da Scopus include 205 articoli.

Abbiamo successivamente ripetuto la stessa procedura descritta su Web of Science, e abbiamo trovato 32 articoli in aggiunta a quelli già selezionati con la ricerca su Scopus.

Alla fine della procedura di raccolta dati, il campione finale è composto da 237 articoli scientifici. Abbiamo analizzato gli abstract di questi articoli uno ad uno, e dopo la rimozione di quelli che riguardano un argomento differente o che toccano solo marginalmente il fenomeno di nostro interesse (e dopo aver rimosso un articolo di correzione), il campione finale include 190 articoli. In Fig. 1 presentiamo uno schema che riassume la procedura di selezione.

Fig. 1: Procedura di selezione paper



Fonte: ns. elaborazioni

Nella fase successiva alla mera raccolta dati, abbiamo analizzato in profondità i 190 articoli seguendo tre principali passi. Innanzi tutto abbiamo costruito uno schema per sintetizzare gli articoli, estraendo da questi gli aspetti chiave (anno di pubblicazione, autori, rivista, titolo, numero di citazioni, parole chiave, tipologia di articolo, domanda di ricerca, prospettiva teorica, approccio metodologico. Per i paper quantitativi, si considerano altresì: variabile dipendente, variabili indipendenti, moderatori, mediatori, e operalizzazione dei costrutti). In secondo luogo, abbiamo creato un *framework* che sintetizzi i concetti e le variabili usati nelle precedenti ricerche. La figura 2 riporta, quindi, il *framework* che emerge dall’analisi dello stato dell’arte sul co-brand. Infine, per ciascun componente del *framework* della letteratura abbiamo individuato alcune linee di ricerca che, in base all’analisi svolta, sarebbe interessante sviluppare.

3. Analisi Descrittiva

Il nostro campione è formato da 190 articoli scientifici e include gli studi sul fenomeno del co-brand pubblicati nell'arco di tempo tra il 1990 e il 2019 (si osservi che il 1990 è l'anno di pubblicazione del contributo più datato nel nostro database, mentre la nostra analisi iniziale non aveva considerato *left-truncation*). Guardando alla distribuzione degli articoli in base all'anno di pubblicazione, notiamo un picco nel 2014 (19 articoli nel campione).

La maggior parte degli articoli usa un approccio quantitativo, nello specifico 138 su 190 articoli. L'articolo che rappresenta il contributo più influente è quello firmato da Simonin e Ruth (1998) che, secondo Scopus, ha ricevuto 585 citazioni.

In totale sono 76 i giornali che hanno pubblicato articoli sul co-brand. L'ampio numero di giornali interessati al fenomeno studiato riflette l'impatto che il co-brand ha nel marketing. I cinque giornali che hanno pubblicato più articoli sul fenomeno investigato sono: *Journal of Business Research* (16), *Psychology & Marketing* (12), *Journal of Product and Brand Management* (12), *European Journal of Marketing* (10), e *Industrial Marketing Management* (9).

Infine, gli articoli inclusi nel nostro campione usano 63 teorie differenti. Tra gli articoli nel campione, 73 non menzionano nessuna specifica teoria, 83 articoli impiegano una sola teoria e 34 analizzano il co-brand attraverso almeno due diverse prospettive teoriche.

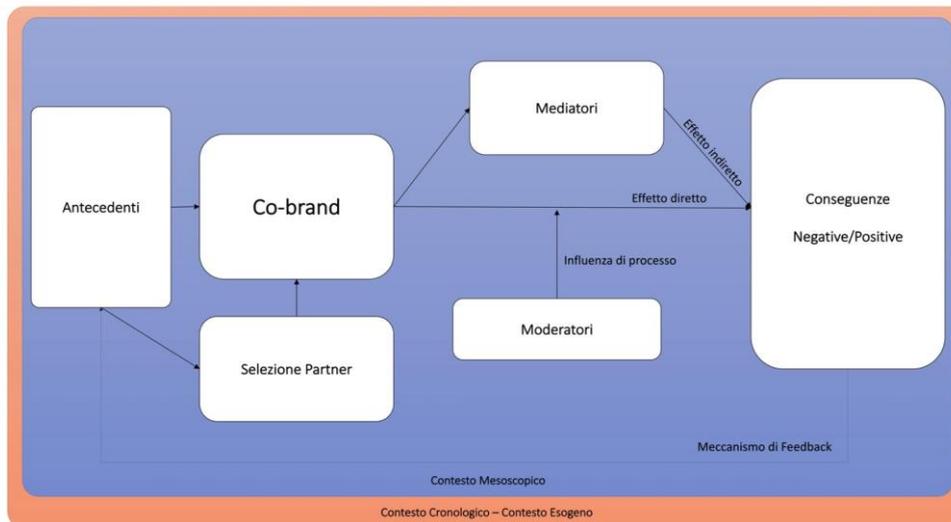
4. La costruzione di un framework teorico-interpretativo della letteratura sul co-brand

Al fine di sintetizzare e riassumere lo stato dell'arte sul co-brand, abbiamo costruito un *framework* che suddivide le variabili sottostanti il fenomeno, così come riportato in figura 2. Nello specifico, il modello rappresentato dal *framework* in figura 2 è il risultato di un processo articolato in fasi sequenziali. In primo luogo, siamo partiti dall'analisi delle *review* esistenti sul tema, studiando quali fossero le variabili considerate e gli aspetti centrali su cui si focalizzano gli studi. In secondo luogo, analizzando i singoli *paper*, abbiamo studiato i legami tra le variabili che ognuno di essi considera. Infine, abbiamo consultato alcune *review* recenti (Debellis *et al.*, 2020; Kotlar *et al.*, 2018) su altre tematiche che ci hanno aiutato a definire la struttura del modello finale.

Il *framework* inizia con il rettangolo *antecedenti* che rappresentano gli aspetti che spingono un brand alla realizzazione di una alleanza di co-brand. Invece, i possibili risultati sono riportati nella sezione *conseguenze*, distinguendo tra gli effetti positivi e negativi potenzialmente derivanti dal co-brand. In mezzo, troviamo la realizzazione del *co-brand*, da dove nascono l'effetto diretto e indiretto che questo può produrre; nello specifico distinguiamo tra *mediatori* e *moderatori*. In aggiunta, una specifica sezione del framework considera le variabili che sono connesse alla *selezione del partner*. Molto importante è anche notare che le conseguenze positive del co-brand possono essere considerate esse stesse motivazioni che conducono al co-brand (*meccanismo di feedback*).

Infine, nel presente lavoro vogliamo dare particolare attenzione al ruolo dei *contesti*. Nello specifico, basandoci sulla recente pubblicazione di Kotlar *et al.* (2018) nella formulazione delle strategie, consideriamo tre livelli di contesti: (a) il *contesto mesoscopico* che rappresenta gli aspetti legati alla natura e allo scopo di un'impresa, ovvero quegli elementi che rappresentano delle condizioni esistenti dalla nascita di una specifica impresa; (b) il *contesto esogeno* che considera i fattori economici, sociali e culturali; e (c) il *contesto cronologico* che principalmente si focalizza sul ciclo di vita di un brand.

Fig. 2: Framework teorico-interpretativo derivato dalla letteratura



Fonte: ns. elaborazioni

5. Antecedenti all'alleanza tra due brand

Analizzando la letteratura esistente, in questo paragrafo sintetizziamo gli antecedenti alla creazione di una alleanza di co-brand. In primo luogo, si rileva che il co-brand è utile al fine di incrementare la percezione del consumatore dei brand partner. Questo significa che una delle ragioni che portano due brand a collaborare è il meccanismo di proiezione che consente ai consumatori di percepire i brand partner in modo diverso (Abratt e Motlana, 2002).

Un secondo input molto interessante per il co-brand è il trasferimento di associazione e la condivisione dell'immagine. Nello specifico, Levin (2002) mostra che, un effetto del co-brand può essere rappresentato da un'influenza bidirezionale tra i partner e l'attitudine che i consumatori hanno su un brand ben conosciuto può essere trasferita su un partner meno conosciuto. Inoltre, l'immagine positiva (di uno e/o entrambi i partner) può essere trasferita sui prodotti in co-brand (Park *et al.*, 1996; Washburn *et al.*, 2000).

In terzo luogo, associare due brand può anche incrementare l'immagine positiva di un brand nella mente del consumatore (Washburn *et al.*, 2000).

In quarto luogo, il co-brand rappresenta una strategia di crescita per i brand coinvolti e/o di riduzione dei costi (Blackett e Russell, 1999). Nello specifico, un'alleanza tra brand consente all'impresa di raggiungere nuovi segmenti di mercato (Blackett e Russell, 1999), oltre che supportare la diversificazione di portafoglio (Barwise e Robertson, 1992).

In quinto luogo, una ragione che spinge alla creazione di un co-brand è la combinazione di risorse che da questa può scaturire. Nel dettaglio, questo rappresenta un elemento chiave in una specifica tipologia di co-brand: l'*ingredient branding*. In questo caso, un prodotto con una determinata marca diventa (materialmente) un componente chiave di un altro prodotto con un'altra marca (Desai e Keller, 2002). L'*ingredient branding* può portare a diversi vantaggi, come l'applicazione di un "*premio di prezzo*", che di conseguenza incrementa i profitti, attraverso lo sfruttamento dei due brand combinati; inoltre, l'"ingrediente" in sé può essere visto come fattore cruciale nella scelta del partner migliore (Venkatesh e Mahajan, 1997).

In sesto luogo, la decisione di co-brand supporta lo sviluppo di un brand, dal momento che tende ad incrementare il valore del prodotto in co-brand (Washburn *et al.*, 2004) e generare valore per il brand (Oeppen e Jamal, 2014). Inoltre, uno dei modi più efficienti di far leva sulla *brand equity* è la realizzazione di un co-brand con un partner che possieda già un nome affermato (Gammoh *et al.*, 2006). Il risultato sperato è che l'elevata *brand equity* influenzi la valutazione che i consumatori fanno sul nuovo prodotto oggetto del co-brand (Besharat, 2010).

Infine, una buona parte degli articoli presenti nel nostro campione (Lafferty *et al.*, 2004; Lafferty e Goldsmith, 2005; Lafferty, 2007; Lafferty, 2009; Lafferty e Edmondson, 2009; Bignè *et al.*, 2012; Myers *et al.*, 2012; Lafferty e Edmondson, 2014; Lafferty *et al.*, 2016) ha analizzato le alleanze create per una specifica causa, ovvero quelle costituite a fini benefici. Una pratica comune è infatti quella di allearsi a scopi benefici (Lafferty *et al.*, 2004). Questo tipo di co-brand ha l'obiettivo di incrementare l'attitudine che i consumatori hanno sui brand, dal momento che l'alleanza per scopi benefici può migliorare la percezione che il consumatore ha dei partner (Lafferty *et al.*, 2004). Questa pratica può essere posizionata nelle strategie di *Corporate Social Responsibility* dei brand partner.

5.1 Gap #1

La maggior parte degli articoli analizzati in questo lavoro considera variabili di input relative principalmente al consumatore. Sembra quindi necessario condurre una più approfondita analisi delle logiche sottostanti la decisione di allearsi, che riguardino le dimensioni economico-manageriali, in aggiunta a quelle già considerate in letteratura. Un'analisi qualitativa che consideri attentamente le logiche d'impresa potrebbe fare emergere, infatti, problemi che non sono stati catturati dagli studi precedenti. Facendo eco alla recente letteratura sulle alleanze strategiche, sottolineiamo l'importanza per i manager di comprendere perfettamente le ragioni sottostanti alla formazione di un'alleanza tra due aziende e di utilizzare questa conoscenza per ridurre il rischio del fallimento dell'alleanza stessa e, più in generale, migliorarne l'efficienza (Franco e Haase, 2015).

5.2 Gap #2

Un interessante approccio di ricerca potrebbe essere quello di analizzare l'evoluzione del rapporto impresa-consumatore di un'impresa che nel corso del tempo abbia partecipato frequentemente ad alleanze di co-brand. Nonostante la nostra review mostri che questo approccio non è molto utilizzato in letteratura, questo sembra essere un passo fondamentale per ottenere una visione che consideri due punti di vista simultaneamente, quello dell'impresa e quello del consumatore, al fine di comprendere le motivazioni che spingono un'impresa a implementare ricorsivamente questo tipo di strategia. Ovvero, quali sono i motivi che spingono un'impresa a fare co-brand con cadenza regolare (ad esempio annuale)? Come viene percepita una campagna di co-brand regolare nel tempo dal consumatore?

6. Il processo di selezione del partner

Un elemento caratterizzante ogni alleanza di co-brand è la scelta del partner. Quindi, non sorprende che molti degli articoli si focalizzino come rispondere alla domanda "qual è il miglior partner da scegliere" nella realizzazione di un co-brand.

La nostra *review* riconosce quattro aspetti chiave. Innanzitutto, vengono considerate le caratteristiche specifiche del partner. Newmeyer *et al.* (2014) affrontano il problema legato alla selezione del partner concentrandosi sul ruolo di tre caratteristiche chiave del potenziale partner, che sono la complementarità degli attributi funzionali del partner, la consistenza degli attributi di immagine dei due brand e il livello di diversificazione tra i partner (Newmeyer *et al.*, 2014).

Secondo, focalizzando l'attenzione sull'*ingredient branding* (ove ogni partner offre il suo prodotto chiave come "*ingrediente*" del prodotto creato in collaborazione; Desai e Keller, 2002), l'*"ingrediente"* sembra essere uno dei più importanti aspetti sottostanti la selezione del partner; infatti, l'*ingredient branding* è basato sulla condivisione del più noto e riconoscibile elemento caratteristico dei brand partner (Desai e Keller, 2002). In questo contesto, Venkatesh e Mahajan (1997) studiano come selezionare il partner più indicato scegliendo tra componenti di un marchio ben conosciuto e componenti senza alcuna specifica marca. Spostando la nostra attenzione sulle

alleanze di co-brand orientate al raggiungimento di nuovi segmenti di mercato in termini di prezzo e prodotto, Thompson e Strutton (2012) analizzano il modo distintivo in cui una alleanza può influenzare la valutazione da parte del consumatore quando l'alleanza è implementata con lo scopo della *brand extension*. In questo contesto, un brand caratterizzato da un alto “*fit*” con il nuovo segmento di mercato da raggiungere rappresenta un aspetto chiave nel processo di selezione del partner (Thompson e Strutton, 2012).

Terzo, studi precedenti mostrano che la selezione del partner può riflettere la proiezione della percezione e valutazione del consumatore di una specifica *partnership*. Nel dettaglio, si crede che la “*between-partner congruity*” possa influenzare la valutazione del consumatore sul prodotto in co-brand e questo aspetto può guidare il brand nel processo di scelta del partner (Walchli, 2007). Inoltre, a giocare un ruolo importante nella scelta del partner migliore con cui allearsi è il concetto dietro la *partnership*; in particolare, la coerenza concettuale delle personalità dei brand che costituisce un predittore dell'attitudine dei consumatori verso una certa alleanza (Van Der Lans *et al.*, 2014).

Infine, il “*celebrity endorsement*” e il “*cause co-brand*” giocano anch'essi un ruolo essenziale nella selezione del partner. Nello specifico, Seno e Lukas (2007) e Halonen-Knight e Hurmerinta (2010) analizzano il fenomeno del “*celebrity endorsement*”. Seno e Lukas (2007) studiano come i partner siano in grado di generare *equity* ciascuno per l'altro e concludono che l'immagine del partner (di entrambi, la celebrità e il brand) assume il ruolo di mediatore nel processo di creazione di *equity*. Nelle loro conclusioni, gli autori intendono suggerire un meccanismo di selezione della “*celebrity-endorser*” (Seno e Lukas, 2007).

Nelle alleanze causa-brand, studi precedenti mostrano che il *fit* tra la causa e il brand non influenza significativamente l'attitudine del consumatore e le intenzioni di acquisto, e questo risultato non influenza i livelli di credibilità dell'impresa (Lafferty, 2007). Al contrario, l'importanza della causa gioca essa stessa un ruolo chiave nel modellamento delle attitudini del consumatore e nelle sue intenzioni di acquisto molto più che quanto faccia il “*fit*” tra brand e causa (Lafferty, 2009).

6.1 Gap #1

Gran parte della letteratura considerata omette di studiare alcune dimensioni che influenzano il co-brand. In particolare, studi precedenti prendono in considerazione soltanto relazioni diadiche o considerano un solo brand con la sua storia di precedenti *partnership* (Shen *et al.*, 2017). Si potrebbe allora considerare uno specifico co-brand come una componente del portafoglio di alleanze formate da un'impresa nel tempo (ove per portafoglio si intende l'insieme di tutte le alleanze di co-brand che hanno interessato un dato brand) e analizzare l'impatto della diversità del portafoglio (in termini di partner, funzioni e governance) sul processo di selezione del partner in una nuova campagna (Jiang *et al.*, 2010). Ovvero, identificare una *path dependency* che spieghi l'evoluzione delle alleanze di co-brand nel tempo.

6.2 Gap #2

La letteratura esistente si focalizza sulla selezione del partner basandosi sulle reazioni attese dei consumatori. Noi crediamo che il portafoglio delle precedenti alleanze di un brand possa rappresentare una variabile importante sia nella selezione del partner che nella determinazione dei risultati di una campagna di co-brand. Infatti, la nostra analisi mostra un iniziale interesse verso l'uso di un approccio di rete nello studio del co-brand (Aarstad *et al.*, 2015). Questo approccio consente di esplorare il processo di associazione tra brand che avviene nella mente del consumatore (Henderson *et al.*, 1998). Noi riteniamo, dunque, che potrebbe essere interessante investigare una prospettiva d'insieme sulla rete di co-brand in un determinato mercato. Infatti, i risultati del co-brand potrebbero essere meglio compresi analizzando, anziché le singole interazioni diadiche, l'intera rete di alleanze di co-brand in un settore.

7. I fattori di moderazione e mediazione nella relazione di co-brand

Spostiamo adesso la nostra attenzione sulle variabili (moderatori e mediatori) che possono influenzare qualitativamente e quantitativamente i risultati di una alleanza tra brand.

In prima istanza, ci concentriamo sulle variabili che agiscono da *moderatori*, ovvero i fattori che cambiano in intensità e direzione la relazione tra l'alleanza e i suoi risultati (Baron e Kenny, 1986).

Una variabile che assume il ruolo di moderatore è l'esclusività. Il suo effetto moderatore può essere differente a seconda del caso in cui il brand (esclusivo) nell'alleanza giochi un ruolo da brand "principale" o da brand "alleato" (Rodrigue e Biswas, 2004), e questa esclusività può essere percepita come ancora più forte se legata alla percezione del lusso (Moon e Sprott, 2016).

La familiarità del brand sembra essere un'altra variabile moderatrice tra le più studiate. Come mostrano Simonin e Ruth (1998), la familiarità del brand in una alleanza genera un effetto di "*spillover*" e produce parzialmente anche un contributo sul successo complessivo dell'alleanza. Se il brand incluso in una partnership è abbastanza familiare ai consumatori, questo fattore contribuisce alla performance dell'alleanza, e l'effetto di "*spillover*" tende ad emergere (Simonin e Ruth, 1998).

Nel contesto del "*celebrity endorsement*", Ambroise *et al.* (2014) mostrano empiricamente come il trasferimento della personalità della celebrità sul brand influenzi il comportamento del consumatore. Inoltre gli autori mostrano come questo meccanismo dipenda dal profilo della celebrità e dalla reputazione del brand (Ambroise *et al.*, 2014).

La percezione del *fit* tra i due brand è un altro fattore che agisce come moderatore sugli effetti di una alleanza tra brand. Infatti, il "*brand fit*" ha un influsso sulla valutazione del consumatore rispetto l'alleanza (Lin, 2013). A questo proposito, Simonin e Ruth (1998) mostrano che l'attitudine del consumatore verso il prodotto in co-brand è influenzato dal *fit* dei brand in partnership con il prodotto e il *fit* dei singoli brand con il prodotto (Simonin e Ruth, 1998). Assumendo la prospettiva dell'impresa, l'attenzione è stata posta sulla compatibilità e complementarità. Infatti, alcune caratteristiche dei brand, come la percezione della compatibilità e complementarità tra i due brand in partnership, modera l'effetto di *spillover* (Tasci *et al.*, 2011). In più, le precedenti partnership e le capacità acquisite nell'implementazione e gestione di queste precedenti alleanze giocano anch'esse un ruolo significativo (Gammoh e Voss, 2013).

Infine, l'effetto di moderatore può anche essere prodotto dall'annuncio di una alleanza di co-brand (Cao e Sorescu, 2013). Infatti, a seguito dell'annuncio di un nuovo prodotto in co-brand, il prezzo di mercato di una impresa tende ad incrementare significativamente rispetto all'incremento registrato per l'annuncio di un nuovo prodotto da parte di un singolo brand (Cao e Sorescu, 2013).

Spostando la nostra attenzione sull'analisi dei *mediatori*, si ricorda che questi rappresentano delle variabili che si posizionano tra lo stimolo e la risposta: sono variabili che identificano come o perché si produce un determinato effetto (Baron e Kenny, 1986). I mediatori determinano gli effetti indiretti prodotti, stabilendo chiare barriere tra l'effetto diretto e indiretto di una relazione causa-effetto. Un mediatore di rilievo è la credibilità (Bigné *et al.*, 2012). Alcaniz *et al.* (2010) analizzano il ruolo di mediatore assunto dalla credibilità di un'impresa e vedono la credibilità come composta da due dimensioni: affidabilità e competenza.

Inoltre, la letteratura indica che, nel contesto di "*celebrity endorsement*" l'immagine di un brand e l'immagine della celebrità possano agire in qualità di mediatore nel processo di creazione di *equity* (Seno e Lukas, 2007). Sfruttando l'immagine di brand e della celebrità, gli autori mostrano che il "*celebrity endorsement*" produce *equity* sia per il prodotto che per la stessa celebrità.

7.1 Gap #1

Mentre altri autori considerano l'importanza del brand in termini di *loyalty*, credibilità e immagine, le specifiche caratteristiche del prodotto e in particolare l'elemento che, nel prodotto stesso, è distintivo di un dato brand (la caratteristica che contraddistingue i prodotti con un determinato brand rispetto al prodotto concorrente) potrebbe avere un ruolo centrale. Di conseguenza, suggeriamo che futuri studi esplorino quanto l'impatto del co-brand sulla disponibilità

a pagare del consumatore sia moderato dall'elemento più riconoscibile che caratterizza i singoli brand.

7.2 Gap #2

Un'interessante ricerca futura potrebbe riguardare l'analisi dell'effetto diretto che un co-brand può avere sulla *brand equity*, e come la variazione di questa può influenzare la disponibilità a pagare da parte dei consumatori, agendo in questo modo da variabile di mediazione e distinguendo un effetto diretto e indiretto.

8. Le conseguenze delle strategie di co-brand

Nell'interpretazione delle conseguenze del co-brand facciamo riferimento a Rodrigues *et al.* (2011) e Chiambaretto, Gurău, e Le Roy (2016) che considerano il co-brand come una potenziale situazione di *co-opetition* (Nalebuff e Brandenburger, 1997). Per esempio, secondo Simonin e Ruth (1998), l'attitudine dei consumatori verso un'alleanza influenza la valutazione dei singoli partner; così come l'attitudine che un consumatore ha verso una determinata alleanza può essere trasferita verso il singolo brand in *partnership*, attraverso un effetto di "*spillover*". Gli autori mostrano anche che i brand in *partnership* non necessariamente vengono influenzati allo stesso modo e con la stessa intensità dall'effetto di *spillover* (Simonin e Ruth, 1998).

Tra le conseguenze negative di un co-brand l'effetto di *dilution* rappresenta un rischio tipico che può danneggiare l'immagine di un brand. Nello specifico, un'alleanza con il partner sbagliato può generare la "diluizione" del brand, effetto di *spillover* avverso, ed erosione del brand (Cornelis, 2010). Inoltre, quando c'è una incongruenza tra le informazioni possedute dai partner, il co-brand può influenzare negativamente le intenzioni di acquisto del consumatore (Ilicic e Webster, 2013).

Le conseguenze positive attese sembrano essere altrettanto rilevanti. Innanzi tutto, il co-brand può condurre ad una crescita delle preferenze da parte dei consumatori; per esempio, il *cause-related marketing* viene normalmente utilizzato per incoraggiare le intenzioni di acquisto (Lafferty, 2009). Tra le conseguenze positive del co-brand, la più importante è probabilmente l'incremento dei ricavi. Infatti, il co-brand può beneficiare a entrambi i partner in termini di massimizzazione dei profitti (Shen *et al.*, 2017).

Il co-brand può influenzare la percezione di qualità che i consumatori hanno verso i brand partner e i loro prodotti. Infatti, specialmente quando uno dei partner possiede alcuni elementi non direttamente osservabili e si allea con un brand noto, la percezione di qualità da parte del consumatore tende a crescere per effetto di associazione (Rao *et al.*, 1999).

Precedenti studi mostrano anche come il co-brand possa incentivare la soddisfazione del cliente e la lealtà di questo verso un brand (Kim *et al.*, 2007). In più, una alleanza tra brand può essere uno strumento chiave che le aziende usano per migliorare la loro immagine di responsabilità sociale (Alcaniz *et al.*, 2010). Molti articoli presenti nel nostro campione analizzano il co-brand a fini benefici (per citarne uno tra tutti quelli già menzionati: Lafferty *et al.*, 2016).

Una conseguenza diretta positiva del co-brand può essere legata alla disponibilità a pagare da parte dei consumatori (Chang *et al.*, 2018). Infatti, una alleanza tra brand potrebbe essere vista come un elemento chiave per indirizzare le intenzioni di acquisto del consumatore. Nello specifico, studi precedenti indicano che l'attitudine verso il brand partner influenza l'attitudine verso l'alleanza e, in definitiva, una così formata attitudine influenza l'intenzione di acquisto e la disponibilità a pagare del consumatore (Rodrigue e Biswas, 2004).

Il co-brand può influenzare la capacità di riconoscimento di un brand (Rodrigues *et al.*, 2011). Come precedentemente menzionato, il co-brand può incrementare o danneggiare la *brand equity*, a seconda che il partner abbia una alta o bassa *equity* (Washburn *et al.*, 2000). Inoltre, il co-brand può portare ad un incremento di fiducia, di lealtà (Delgado-Ballester e Hernández-Espallardo, 2008; Shen *et al.*, 2017), e di credibilità (Rodrigues *et al.*, 2011) verso un brand.

Infine, un'ulteriore conseguenza è l'attitudine verso i brand partner e verso l'alleanza (James *et al.*, 2006). Infatti, la strategia in parola produce un'attitudine positiva da parte dei consumatori verso i brand partner che, di conseguenza, consente all'alleanza di ottenere anch'essa un'attitudine positiva da parte dei consumatori (James *et al.*, 2006).

8.1 Gap #1

Gli studi analizzati, in gran parte, descrivono e analizzano la tradizionale struttura di co-brand. Tuttavia, le recenti dinamiche di business suggeriscono di estendere il fenomeno di co-brand ad altre tipologie. Infatti, per esempio, assistiamo ad una proliferazione di alleanze dove il ruolo centrale viene giocato dal *celebrity endorsement* o dall'attività degli *influencer*. Noi riteniamo, dunque, che potrebbe essere interessante analizzare se e come questi fenomeni rappresentino nuove tipologie di alleanze tra brand e usarle per analizzare le strategie con cui un brand crea e modifica la sua immagine in "co-creazione" con il consumatore.

8.2 Gap #2

Evidenziamo, infine, la necessità di studi sull'evoluzione delle alleanze di co-brand. La letteratura di *strategic management* riconosce diversi *drivers* che agiscono come ragioni per la nascita di un'alleanza. Per esempio, sulla scorta della *resource-based view*, Tsang (1998, p. 207, trad. It. nostra) trova i seguenti quattro *driver*: "espansione dell'uso delle risorse, diversificazione dell'uso delle risorse, imitazione delle risorse e disponibilità delle risorse". Questi *driver* possono essere sovrapposti con alcuni che abbiamo tracciato nella letteratura sul co-brand: alleanze che hanno come obiettivo la crescita del brand, riduzione dei costi, trasferimento e condivisione di immagine. Sulla base della letteratura sulle alleanze (Madhok *et al.*, 2015), noi riteniamo che un tema di interesse sia come le alleanze di co-brand influenzino nel tempo le caratteristiche dei partner partecipanti.

9. Contesti

I contesti rappresentano eventi e condizioni che esistono prima o precedono logicamente l'azione di co-brand e sono associati alla natura profonda di ogni impresa. In questa sede, analizzeremo la letteratura precedente in chiave di contesto cronologico, esogeno e mesoscopico.

Gli studi precedenti sembrano considerare soltanto il ciclo di vita di un'impresa (Blankson e Kalafatis, 2007) come elemento di rilievo all'interno del *Contesto Cronologico*.

La letteratura sul co-brand considera il *Contesto Esogeno* specificatamente collegato al contesto culturale in cui una alleanza di co-brand si inserisce (Diallo e Siqueira, 2017). Infatti, le conseguenze di un co-brand sono moderate dal contesto culturale del Paese specifico in cui il co-brand viene implementato (Diallo e Siqueira, 2017). Gli attributi culturali influenzano le scelte dei consumatori e questo aspetto può significativamente influenzare il risultato dell'alleanza durante il processo di associazione di immagine, soprattutto quando l'alleanza include brand che provengono da paesi con ampie differenze culturali (Decker e Baade, 2016). Studi precedenti mostrano che associare due brand trasmette il messaggio che i due brand alleati condividono gli stessi valori e contesti culturali (Chiambaretto *et al.*, 2016). Quando il contesto culturale è fortemente legato alle risorse del brand, questo può diventare un fattore chiave per il successo del co-brand (Uggla, 2006). Il contesto culturale è un importante fattore da tenere in forte considerazione anche in relazione agli esperimenti sul consumatore, dal momento che può significativamente influenzarne i risultati (Baumgarth, 2004).

Altre variabili da includere nel contesto esogeno riguardano il contesto sociale. Infatti, questo può produrre, nella mente del consumatore, informazioni specifiche legate ad un brand (Chan *et al.*, 2018).

Per quanto concerne al *Contesto Mesoscopico*, consideriamo le caratteristiche di un'impresa relative alla sua stessa natura: il *country of origin*, la specifica industria e le specifiche contrattuali del co-brand. Per esempio, in presenza di una ridotta familiarità del brand nella mente del consumatore, un influsso positivo proviene dal paese di origine del brand, che è stato dimostrato capace di modellare l'attitudine del consumatore verso una determinata alleanza, influsso che sembra essere ancora più forte di quella prodotta dal *brand fit* (Bluemelhuber *et al.*, 2007). Il Paese di origine può giocare un ruolo importante nell'*ingredient branding*, dal momento che può influenzare positivamente le percezioni del consumatore (Cheah *et al.*, 2016). Lee *et al.* (2013) confermano che il *fit* del Paese di origine tra i due brand alleati è un elemento chiave che influenza la percezione del consumatore, infatti il *fit* del Paese di origine può rappresentare uno stimolo nella formazione dell'attitudine del consumatore verso i brand (Lee *et al.*, 2013). L'immagine del paese impatta la valutazione del prodotto, che può anche essere trasmessa verso prodotti non familiari ed è, inoltre, in grado di attivare alcuni concetti e conoscenze che condizionano l'interpretazione del consumatore (Ahn *et al.*, 2009).

Lo studio di Decker e Baade (2016) mostra come diversità tra i brand partner in termini di Paese di origine, di dimensione dell'impresa e di settore industriale influenzano negativamente la percezione del *fit* tra i brand e, di conseguenza, le intenzioni di acquisto dei consumatori (Decker e Baade, 2016). All'interno del contesto mesoscopico possiamo, infatti, ricomprendere il settore industriale in cui una determinata impresa opera. Questo è rilevante nel determinare il successo di una campagna di co-brand perché, quando l'alleanza tra brand è focalizzata sulla *brand extension*, una partnership con un brand ben noto e conosciuto nella categoria obiettivo dell'estensione può portare a ottenere risultati maggiormente favorevoli rispetto a quelli che un brand avrebbe potuto ottenere agendo individualmente (Thompson e Strutton, 2012).

Infine, Newmeyer *et al.* (2014) concentrano l'attenzione sulle caratteristiche specifiche dei contratti sottostanti il co-brand e, tra gli altri fattori, individuano che l'esclusività (intesa come il numero di partner con cui un dato brand si allea contemporaneamente) influisce sulla valutazione e sulla considerazione da parte dei consumatori (Newmeyer *et al.*, 2014).

9.1 Gap # 1

In questa sede è possibile riconoscere che, nonostante taluni importanti avanzamenti, la letteratura sul co-brand non dedica particolare attenzione ai contesti in cui l'alleanza viene implementata. Per quanto riguarda il contesto cronologico, precedenti studi in questo settore hanno principalmente considerato il ciclo di vita di un'impresa. Proponiamo, quindi, di definire nuove ricerche che aiutino la comprensione del ruolo giocato dal tempo dalle strategie di co-brand, nonché all'interno del ciclo di vita del brand in sé. Infine, sarebbe interessante esplorare gli effetti a livello d'impresa.

9.2 Gap # 2

Spostando l'attenzione sul contesto esogeno, osserviamo che, diversamente dalle ricerche sulle alleanze strategiche (Gomes *et al.*, 2016), finora le ricerche sul co-brand hanno mostrato poca attenzione al contesto "macro". Risulterebbero, quindi, molto utili nuovi studi empirici che analizzino questi aspetti. Una variabile di interesse potrebbe essere rappresentata dall'impatto che le distanze (culturali, amministrative, geografiche ed economiche) tra il paese d'origine e il paese ospitante hanno sul co-brand e i suoi risultati (Gomes *et al.*, 2016).

9.3 Gap # 3

Infine, sottolineiamo che come contesto mesoscopico le decisioni di *business* sembrano comunque strutturate sulla base di teorie che implicitamente assumono la razionalità dei soggetti coinvolti. Si rende, quindi, necessario aprire future linee di ricerca che investighino la natura della

razionalità dei soggetti sottostanti il processo manageriale nella formulazione delle alleanze di co-brand.

10. Conclusioni

Questo studio sintetizza e riassume lo stato dell'arte della ricerca sul co-brand e presenta una descrizione comprensiva delle dimensioni interessate dal fenomeno. Il contributo da noi fornito alla letteratura esistente è la proposta un *framework* aggiornato delle dimensioni tipicamente interessate in una alleanza tra brand. Tale *framework* evidenzia le fasi e le variabili coinvolte nella formulazione e nell'implementazione di un co-brand, fornendo una visione d'insieme del fenomeno, fino ad ora poco considerata. Questo *framework* rappresenta, dunque, uno strumento utile per accademici e professionisti, in quanto propone una sintesi organizzata dei fattori chiave che intervengono nell'implementazione e nel lancio di una campagna di co-brand. In una prospettiva meramente accademica, il nostro lavoro contribuisce alla comprensione delle dinamiche tra le variabili in gioco e a trovare interessanti spunti per nuove ricerche. In una prospettiva manageriale, il nostro paper consente di identificare alcune implicazioni per i *manager*. I manager possono infatti utilizzare il *framework* da noi presentato nella figura 2 per identificare le variabili e le dimensioni interessate in una alleanza tra brand. Infatti, è possibile considerare gli elementi riportati ed utilizzarli al fine di sfruttare e sviluppare gli aspetti di forza di un brand e limitare gli aspetti di debolezza, contribuendo, in questo modo alla definizione delle connotazioni che una determinata campagna di co-branding dovrà assumere per raggiungere i risultati auspicati. Inoltre, in base ai risultati attesi da una campagna di co-brand e le caratteristiche specifiche di un brand, il *framework* può essere utile nel processo di selezione del partner in ogni alleanza che si intende implementare.

Questo lavoro di *review* ha il pregio di mettere in luce le principali variabili che secondo gli studi recenti in letteratura giocano un ruolo nella gestione di una campagna di co-brand. Tuttavia la nostra analisi presenta un certo grado di soggettività dovuta, almeno in parte, ai *bias* degli autori. Quindi, riteniamo che possa essere ulteriormente corroborata da uno studio bibliometrico (Naveen *et al.*, 2021). Inoltre, si rileva che il nostro focus sulle variabili in gioco nella gestione di una campagna di co-brand ci ha spinto, almeno parzialmente, a non dare risalto all'evoluzione teorica dello *stream* di ricerca. Studi futuri potranno arricchire il dibattito tramite studi qualitativi longitudinali o di applicazione della *network theory* per studiare i *link* tra le diverse teorie, anche in una prospettiva evolutiva.

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Mobile Shopping Behaviour: un'analisi bibliometrica

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Abstract

Obiettivi. Il lavoro intende realizzare un'analisi bibliometrica della letteratura sul mobile commerce nella prospettiva della domanda.

Metodologia. La ricerca è stata condotta seguendo due fasi: l'individuazione dei contributi scientifici di interesse dal 2000 al 2020 attraverso la consultazione di Web of Science (WoS) e l'analisi bibliometrica tramite SciMAT.

Risultati. Attraverso il database WoS sono stati raccolti 275 articoli, successivamente analizzati con il software SciMAT nei periodi temporali 2000-2015 e 2016-2020. Nel primo periodo, la letteratura si è concentrata sull'individuazione delle determinanti della scelta del canale, sul legame tra fiducia, fedeltà e customer satisfaction, fino all'utilizzo ripetuto del canale. Nel secondo periodo, l'attenzione è maggiormente rivolta all'interazione con gli altri canali, in un'ottica di multi- e omni-channel.

Limiti della ricerca. Sebbene WoS sia considerata la fonte di dati più autorevole per la maggior parte delle pubblicazioni, alcuni contributi inclusi in altri database potrebbero essere stati trascurati. Inoltre, il database di pubblicazioni considerato andrebbe arricchito dei contributi pubblicati a fine 2020 che, verosimilmente, contemplano l'effetto del Covid-19 sul tema indagato.

Implicazioni pratiche. Dal punto di vista scientifico, è possibile tracciare il quadro evolutivo della tematica, individuando i filoni maggiormente trattati e quelli emergenti che possono rappresentare valide opportunità di ricerca futura. Dal punto di vista manageriale, la ricerca sistematizza i risultati degli studi esistenti fornendo indicazioni utili per le imprese che intendono sviluppare strategie di mobile commerce e omni-channel management.

Originalità del lavoro. Nell'ambito della vasta letteratura sul mobile commerce, la ricerca fornisce una prima sistematizzazione dei contributi sviluppati negli ultimi vent'anni e consente di evidenziare i temi che dovranno orientare le future ricerche scientifiche e pratiche manageriali.

Parole chiave: mobile commerce; shopper behaviour; analisi bibliometrica; digitale; SciMAT

Objectives. The work aims to carry out a bibliometric analysis of the literature on mobile commerce in a consumer behavior perspective analyzing the contributions published from January 2000 to July 2020.

Methodology. The research was carried out following two phases respectively of identifying contributions through the online databases Web of Science (WoS) and bibliometric analysis through SciMAT.

Findings. Through the WoS database, 275 articles were collected, then analyzed with SciMAT in the two time periods 2000-2015 and 2016-2020. In the first period, contributions focused on identifying the antecedents of mobile commerce adoption and its relationships with trust, loyalty and customer satisfaction and its repeated use. In the second period, the focus is more on interaction with other channels, with a multi- and omni-channel perspective.

Research limits. Although WoS is considered the most suitable data source for most publications, some contributions included in other databases may have been overlooked. In addition, the research does not take into account the contributions of the whole of 2020 most impacted by the effects of the COVID-19 pandemic.

Practical implications. From a scientific perspective, it is possible to draw up the evolutionary picture of the topic, identifying the most covered and emerging strands representing valid opportunities for future research. From a managerial perspective, research systemizes the results of existing studies by providing useful indications on mobile commerce strategies in retailing.

Originality of the study. With reference to the wide literature on mobile commerce, the research provides a first systematization of the contributions developed in the last twenty years and provides interesting insights for future scientific research and managerial practices.

Key words: mobile commerce; shopper behaviour; bibliometric analysis; digital; SciMAT

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1. Introduzione e background teorico

La crescente diffusione dei dispositivi mobili non ha solo modificato il modo di interagire e comunicare degli individui, ma ha profondamente trasformato le abitudini di acquisto dei consumatori, richiamando l'attenzione degli studiosi di *consumer behaviour*.

Nel 2020 si contano oltre 3 miliardi di utenti di *smartphone*, una cifra che è destinata a crescere ulteriormente con l'evoluzione della tecnologia e l'impatto del 5G sui livelli di connettività (Statista, 2020a). Grazie ai dispositivi mobili, gli individui oggi possono svolgere svariate funzioni, dalla più diffusa ricerca delle informazioni prima dell'acquisto allo svolgimento di transazioni commerciali vere e proprie, come acquistare prodotti e servizi, ma anche pagare bollette ed effettuare transazioni finanziarie. L'aumento del tasso di penetrazione degli *smartphone*, unitamente alla diffusione della rete a banda larga, rappresentano un volano per l'e-commerce che in futuro sarà sempre più in mobilità.

Il *mobile commerce* (*m-commerce*) conquista ampio spazio in letteratura dove viene inteso come qualsiasi attività di ricerca, valutazione o transazione monetaria relativa agli acquisti di beni o servizi tramite dispositivi mobili o cellulari connessi a Internet o tramite la rete di telecomunicazioni wireless (Clarke, 2001; Ko *et al.*, 2009; Lai *et al.*, 2012). In un senso più ampio del termine, il *mobile commerce* può essere considerato un servizio che offre agli individui la possibilità di raccogliere informazioni da più fonti, verificare la disponibilità di un prodotto o servizio, valutare offerte speciali e alternative in qualsiasi momento lungo tutto la *customer journey* (Lai *et al.*, 2012). Secondo questa prospettiva, il *mobile commerce* viene interpretato come un'estensione dell'e-commerce e come un canale di marketing separato e autonomo capace di creare nuovo valore per i clienti (Kleijnen *et al.*, 2007; Choi, 2017). Questo grazie alle sue caratteristiche distintive, di mobilità e flessibilità, che lo rendono utilizzabile in qualsiasi luogo e momento (Rodríguez-Torrico *et al.*, 2019; Yun *et al.*, 2011).

Si stima che entro la fine del 2021 il *mobile commerce* raggiungerà il 72,9% delle vendite mondiali di e-commerce e che entro il 2023 possa aumentare del 250% passando da 1,9 trilioni di dollari del 2018 a 4,3 trilioni di dollari (Statista, 2020a). Si tratta di una previsione che andrà probabilmente rivista al rialzo a seguito degli effetti della pandemia COVID-19 sui comportamenti di acquisto degli individui. Le restrizioni attivate per contenere l'emergenza sanitaria, unitamente alla resistenza degli individui a effettuare acquisti in negozi fisici e alla crescente familiarità con gli *smartphone*, hanno ulteriormente accelerato la diffusione del *mobile commerce*, portando molte imprese, del *retail* soprattutto, a rivedere i propri modelli di business. A giugno 2020, il traffico globale di *mobile commerce* ha raggiunto 22 miliardi di visite mensili, con una domanda eccezionalmente elevata per articoli di generi alimentari, abbigliamento e tecnologia (Statista, 2020b).

Alla luce di queste considerazioni, non stupisce che negli ultimi due decenni siano aumentati in maniera considerevole i contributi scientifici sul *mobile commerce* e sui fattori che ne determinano l'utilizzo (Yang, 2010; Li *et al.*, 2012; Yang e Kim, 2012; Kumar e Mukherjee, 2013). Nello specifico, le ricerche si sono concentrate sull'adozione e l'utilizzo della tecnologia mobile da un lato (Wu e Wang, 2005; Kim *et al.*, 2009; Yang 2012; Agrebi e Jallais, 2015; Groß, 2015) e sulle intenzioni e le motivazioni dello shopping tramite mobile dall'altro (Yang, 2010; Li *et al.*, 2012; Yang e Kim, 2012; Kumar e Mukherjee, 2013).

In particolare, nell'ambito del primo filone sono state utilizzate diverse teorie per spiegare le determinanti di natura tecnologica del *mobile commerce*: *Innovation Diffusion Theory* (IDT) di Rogers (1983 e 2010) e Moore e Benbasat (1991), *Technology Acceptance Model* (TAM) di Davis *et al.* (1989), *Theory of Reasoned Action* (TRA) di Fishbein e Ajzen (1975), *Theory of Planned Behavior* (TPB) di Ajzen (1991), *Unified Theory of Acceptance and Use of Technology* (UTAUT) di Venkatesh *et al.* (2003) e la sua estensione UTAUT2 di Venkatesh *et al.* (2012).

Sul fronte delle motivazioni di acquisto, diversi contributi hanno evidenziato come queste cambino a seconda del contesto e del periodo temporale di riferimento (Gupta e Arora, 2017; Madan e Yadav, 2018). Diversi autori si sono concentrati sul ruolo dei fattori di natura utilitaristica,

come l'efficienza, l'accessibilità, la percezione dell'utilità, la facilità d'uso e la *convenience* (Davis *et al.*, 1989; Groß, 2015), mentre altri hanno indagato l'influenza delle dimensioni edonistiche, come la percezione di piacere nell'utilizzo dei *device* mobili (Li *et al.*, 2012). Alcuni autori, infine, affermano che sia le motivazioni utilitaristiche sia quelle più edonistiche contribuiscono alle intenzioni e alle motivazioni dei consumatori circa l'adozione e l'utilizzo dello *smartphone* per attività di shopping (Yang e Kim, 2012).

Nonostante la crescente attenzione verso il *mobile commerce* e il proliferare di studi sul tema, sono ancora poche le revisioni e le sistematizzazioni qualitative e quantitative del fenomeno oggetto d'analisi (Zhang *et al.*, 2012; Groß, 2015; Natarajan *et al.*, 2017).

Ciò posto, nel quadro della rilevanza e della dinamicità del *mobile commerce*, risulta interessante procedere a una sistematizzazione dei contributi scientifici sul tema al fine di aggiornare ed espandere la conoscenza dei comportamenti di acquisto nel contesto digitale, utile per orientare in futuro la ricerca scientifica e le pratiche manageriali.

Il presente lavoro si propone, pertanto, di realizzare un'analisi bibliometrica della letteratura sul *mobile commerce* nella prospettiva della domanda prendendo in esame i contributi scientifici pubblicati negli ultimi vent'anni (da gennaio 2000 a luglio 2020). Dal punto di vista scientifico, questo lavoro consente di tracciare il quadro evolutivo della tematica al fine di individuare i filoni più presidiati e quelli emergenti, che possono rappresentare futuri ambiti di ricerca. Dal punto di vista manageriale, i risultati della ricerca possono fornire indicazioni utili alle imprese industriali e commerciali che intendono sviluppare strategie di *mobile commerce* e di *omnichannel management*.

2. Metodologia

Al fine di analizzare la letteratura prodotta finora sul tema del *mobile commerce* dal punto di vista della domanda, è stato adottato un approccio quantitativo basato sull'analisi bibliometrica. Fondata negli anni Venti, tale metodologia di analisi si è sviluppata solo di recente a seguito di una maggiore disponibilità di grandi database online che consentono l'archiviazione di un gran numero di pubblicazioni scientifiche (Gutiérrez-Salcedo *et al.*, 2018). L'analisi bibliometrica consente una revisione sistematica e ordinata della letteratura esistente sull'argomento analizzato e può essere suddivisa in due macro-aree: analisi delle performance e analisi della mappatura scientifica (SMA) (Noyons *et al.*, 1999). La prima, attraverso l'uso di indici bibliometrici basati su citazioni e dati di pubblicazione, mira a valutare da un punto di vista descrittivo le caratteristiche dei contributi (es. tipologia, rivista, citazioni, paese) (Narin e Hamilton, 1996); la seconda (mappatura scientifica) si concentra sul monitoraggio di un campo scientifico e sulla definizione delle aree di ricerca al fine di identificare, attraverso un'analisi dei contenuti, l'aspetto strutturale ed evolutivo del fenomeno in esame (Noyons *et al.*, 1999; Börner *et al.*, 2003). Pertanto, la mappatura bibliometrica è una rappresentazione spaziale di come discipline, filoni di ricerca e contributi o autori sono correlati tra loro (Cobo *et al.*, 2012; Martínez *et al.*, 2015).

Per quanto riguarda la ricerca proposta, l'analisi delle performance è stata realizzata utilizzando il database online Word of Science (WoS), mentre il software bibliometrico open source SciMAT

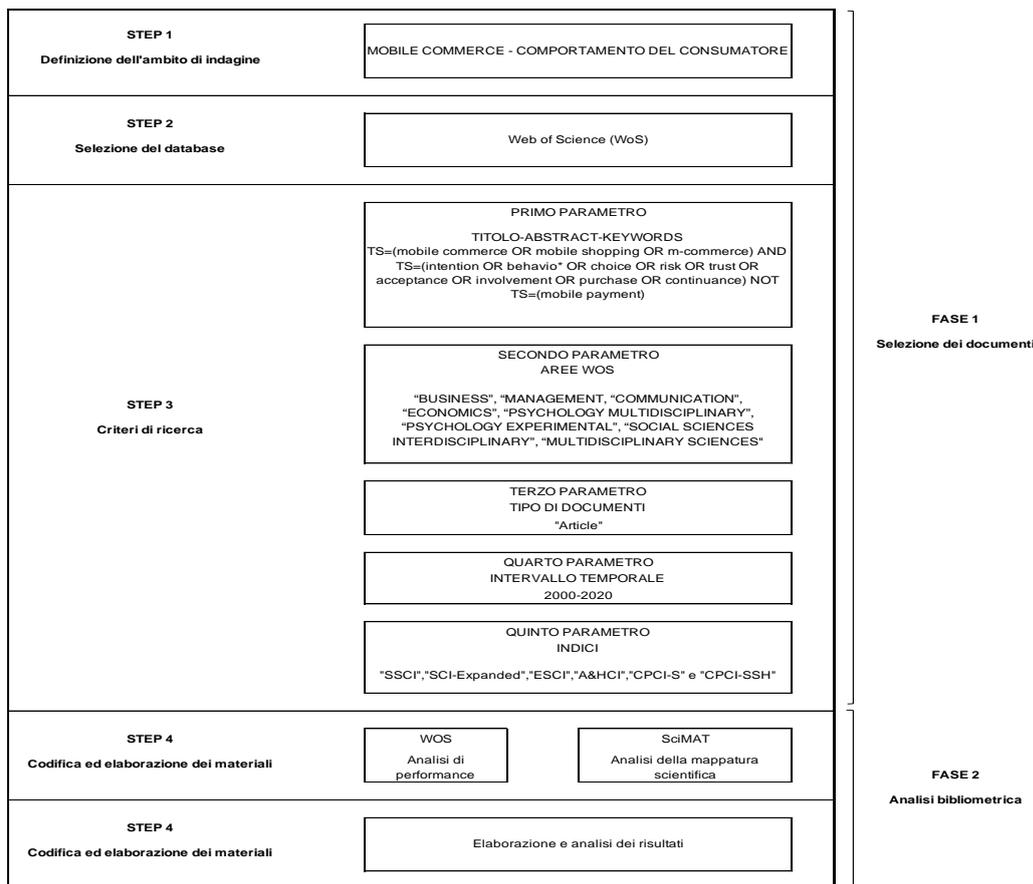
1.1.04 è stato impiegato per sviluppare un'analisi longitudinale della mappatura scientifica basata sulla *co-word analysis*, una consolidata tecnica di *content-analysis* utilizzata per lo studio delle co-occorrenze delle parole-chiave al fine di ottenere una visualizzazione grafica utile per l'analisi dei dati (Callon, 1983; Cobo *et al.*, 2012; Batagelj e Cerinsek, 2013). Inoltre, grazie a SciMAT è possibile identificare le associazioni e le interazioni tra i vari filoni di ricerca al fine di identificare quelli maturi ed emergenti e tracciarne la loro evoluzione temporale (Callon *et al.*, 1991). In questo modo, le analisi effettuate tramite SciMAT, combinando sia strumenti di analisi delle performance che strumenti di mappatura scientifica, consentono ai ricercatori di analizzare tutti gli aspetti del *mobile commerce*, rilevare e visualizzare i suoi argomenti concettuali o aree tematiche generali e la sua evoluzione tematica attraverso l'analisi dei contributi provenienti da specifici database online (Cobo *et al.*, 2012).

Rispetto ad altri software di mappatura scientifica, SciMAT ha tre caratteristiche chiave: in primo luogo, consente una potente pre-elaborazione utile per la pulizia dei dati bibliografici grezzi grazie al rilevamento di elementi duplicati o errori ortografici e la riduzione dei dati; in secondo luogo, consente di effettuare studi di mappatura scientifica secondo un quadro longitudinale (Price e Gürsey, 1975; Garfield, 1994) e costruire mappe scientifiche arricchite con indici bibliometrici quali la somma, il numero massimo, minimo o medio di citazioni ricevute, piuttosto che analisi e indici più robusti come l'*H index* (Hirsch, 2005; Alonso *et al.*, 2009 e 2010) e la *co-word analysis* (Callon *et al.*, 1983); in terzo luogo, include una procedura guidata che consente all'utente di configurare le diverse fasi della mappatura scientifica.

Il presente lavoro è stato strutturato in due fasi consistenti, rispettivamente, nell'individuazione dei contributi scientifici di interesse (da gennaio 2000 a luglio 2020) attraverso la banca dati Web of Science e l'analisi bibliometrica tramite SciMAT, a partire dal necessario processo di standardizzazione dei documenti e delle parole chiave. In particolare, secondo un approccio consolidato in letteratura (Castillo-Vergara *et al.*, 2018; Capobianco-Uriarte *et al.*, 2019), la ricerca ha seguito i seguenti step (Fig. 1):

- per la fase 1, (1) definizione dell'ambito di indagine, (2) selezione del database, (3) definizione dei criteri di ricerca;
- per la fase 2, (4) codifica ed elaborazione dei materiali, (5) analisi dei dati.

Fig. 1: Processo di analisi bibliometrica



Fonte: elaborazione personale

2.1 Fase 1 - Selezione dei documenti

In primo luogo, è stato definito l'ambito di indagine della ricerca (step 1): il commercio mobile secondo una prospettiva di *consumer behaviour*. Successivamente, Web of Science è stata selezionata quale piattaforma di ricerca bibliografica per la ricerca dei contributi scientifici (step 2). Si tratta di una banca dati particolarmente appropriata per condurre studi bibliometrici poiché è la

più completa con riferimento agli studi di scienze sociali e rende disponibili diversi indici di citazione (Norris e Oppenheim, 2007; Waltman, 2016).

La selezione dei documenti si è svolta a luglio 2020 attraverso la definizione dei criteri di ricerca (step 3). In particolare, la ricerca dei contributi scientifici è stata realizzata attraverso l'utilizzo di una *query* precisa che includeva alcune parole chiave che i documenti dovevano esprimere. Sono stati inoltre fissati l'orizzonte temporale (2000-2020), il tipo di contributo richiesto e gli ambiti di ricerca entro i quali cercare documenti compatibili. La query finale era la seguente: TS=(mobile commerce OR mobile shopping OR m-commerce) AND TS=(intention OR behavio* OR choice OR risk OR trust OR acceptance OR involvement OR purchase OR continuance) NOT TS=(mobile payment) in "TITLE-ABSTRACT-KEYWORD. Per perfezionare la ricerca, sono state selezionate le categorie "BUSINESS", "MANAGEMENT", "COMMUNICATION", "ECONOMICS", "PSYCHOLOGY MULTIDISCIPLINARY", "PSYCHOLOGY EXPERIMENTAL", "SOCIAL SCIENCES INTERDISCIPLINAR" e "MULTIDISCIPLINARY SCIENCES" per il periodo 2000-

2020. Sono stati, inoltre, richiesti i contributi all'interno di database multidisciplinari come Social Science Citation Index (SSCI), Science Citation Index Expanded (SCI-Expanded), Emerging Sources Citation Index (ESCI) e A&HCI, CPCI-S e CPCI-SSH. Per il tipo di prodotto è stata presa in considerazione la categoria "ARTICLES".

La ricerca svolta ha permesso di individuare 890 pubblicazioni totali da gennaio 2000 a luglio 2020, di cui, a seguito di ulteriori scremature sulla base del *topic* trattato, sono state selezionate per l'analisi 275 pubblicazioni.

2.2 Fase 2 - Analisi bibliometrica

Come suggerito da ricerche precedenti (Noyons *et al.*, 1999), l'analisi bibliometrica (step 4) è stata divisa in due macro-aree: in primo luogo è stata condotta un'analisi delle performance e in secondo luogo si è proceduto all'elaborazione della mappatura scientifica (SMA).

Per quanto riguarda l'analisi delle performance, sono state valutate, attraverso Web of Science, le caratteristiche dei contributi (citazioni, paese) da un punto di vista descrittivo (Narin e Hamilton, 1996). Nello specifico, sono stati studiati, attraverso indici bibliometrici basati su citazioni e dati relativi alle pubblicazioni, tutti i trend delle pubblicazioni nel tempo 2000-2020, il numero di pubblicazioni per paese e la classifica degli articoli più citati in letteratura sull'argomento.

Inoltre, per quanto riguarda l'analisi della mappatura scientifica, è stato identificato attraverso un'analisi dei contenuti l'aspetto strutturale ed evolutivo dell'ambito di indagine (Börner *et al.*, 2003). Nello specifico, per eseguire la mappatura scientifica, è stato utilizzato il software SciMAT dividendo i contributi in due periodi temporali: 2000-2015 e 2016-2020. Questa divisione riflette un criterio tecnologico secondo l'intuizione per cui l'evoluzione della tecnologia ha guidato l'avvento e la diffusione dello shopping attraverso i dispositivi mobile. Nello specifico, il periodo dal 2000 al 2015 vede il graduale passaggio dalle tecnologie "tradizionali" a quelle "moderne", caratterizzate dall'avvento di iPhone, *smartphone* e 4G; gli ultimi anni, dal 2016 ad oggi, sono quelli della proliferazione di applicazioni mobile, dell'avvento di una nuova generazione di dispositivi mobile e della connessione 5G e della creazione di siti web ottimizzati per la navigazione tramite mobile. Il primo periodo (2000-2015) risulta più ampio del secondo poiché, come suggerito da ricerche precedenti (Cobo *et al.*, 2011), negli studi longitudinali che applicano la *co-words analysis*, il primo periodo di tempo analizzato dovrebbe essere generalmente più lungo degli altri al fine di raccogliere un numero sufficiente di contributi scientifici pubblicati. L'ultimo periodo, al contrario, può anche essere più breve ed è utile per fornire interessanti indicazioni per l'individuazione di future opportunità di ricerca (Cobo *et al.*, 2011).

Sulla base dei periodi stabiliti, l'analisi bibliometrica è stata condotta secondo l'analisi delle co-occorrenze prendendo come unità di riferimento le parole chiave "Authors'Word", "Source's Words" e "Added Words" (rispettivamente keywords indicate dagli autori, dalla rivista e da WoS). Come misura di similarità per la normalizzazione è stato scelto l'*indice di equivalenza* (Callon *et al.*, 1991) e come algoritmo di aggregazione per estrarre i cluster il *simple centers algorithm*. Per

derivare la rilevanza delle parole è stato scelto il numero di citazioni e l'*H-index* (Hirsch, 2005; Alonso *et al.*, 2009 e 2010), prendendo in considerazione i “*Core documents*”. Infine, l'*indice di Jaccard* (Peters e Van Raan, 1993) e l'*indice di inclusione* sono stati considerati rispettivamente come misura di evoluzione e di sovrapposizione dei temi.

I risultati dell'analisi (step 5) basati sull'output di SciMAT vengono discussi nel paragrafo seguente.

3. Risultati

3.1 Analisi descrittiva

Iniziando l'analisi descrittiva dalla produttività scientifica, la Cina risulta essere il paese più produttivo con 57 pubblicazioni (pari al 21% del totale), seguita dagli Stati Uniti con 52 pubblicazioni (pari al 19% del totale). Presi congiuntamente, le produzioni delle due nazioni rappresentano più di un terzo del totale dei contributi pubblicati nel periodo preso in esame. Al terzo posto troviamo Taiwan (con 33 pubblicazioni), seguita dall'India (con 30 pubblicazioni) e dalla Gran Bretagna (con 22 pubblicazioni). Quest'ultima è, dunque, al primo posto tra i paesi europei, seguita dalla Germania (con 21 pubblicazioni).

La Tabella 1 mostra la *top ten* degli articoli più citati pubblicati nel periodo 2000-2020. Si tratta di un'analisi particolarmente utile in quanto permette di comprendere l'influenza delle pubblicazioni nella comunità scientifica.

Wu e Wang (2005) sono gli autori più citati, sia sul totale del periodo (dal momento che è tra i contributi pubblicati da maggior tempo) sia come media annua di citazioni. In questo lavoro, gli autori studiano l'intenzione a utilizzare il canale mobile per gli acquisti attraverso l'applicazione di una versione estesa della TAM.

A seguire, seppur con un numero di citazioni notevolmente inferiore, lo studio di Lin e Wang del 2006 che sviluppa un modello di fidelizzazione dei clienti nel contesto mobile.

Tab. 1 Analisi citazionale

Titolo	Autori	Anno di pubblicazione	N° citazioni 2000-2020	Citazioni medie annue
What drives mobile commerce? An empirical evaluation of the revised technology acceptance model	Wu, JH; Wang, SC	2005	981	61,31
An examination of the determinants of customer loyalty in mobile commerce contexts	Lin, HH; Wang, YS	2006	375	25,00
Design aesthetics leading to m-loyalty in mobile commerce	Cyr, Dianne; Head, Milena; Ivanov, Alex	2006	303	20,20
Predicting consumer decisions to adopt mobile commerce: Cross country empirical examination between China and Malaysia	Chong, Alain Yee-Loong; Chan, Felix T. S.; Ooi, Keng-Boon	2012	203	22,56
What drives Malaysian m-commerce adoption? An empirical analysis	Wei, Toh Tsu; Marthandan, Govindan; Chong, Alain Yee-Loong; Ooi, Keng-Boon; Arumugam, Seetharam	2009	198	16,50
A meta-analysis of mobile commerce adoption and the moderating effect of culture	Zhang, Liyi; Zhu, Jing; Liu, Qihua	2012	189	21,00
Factors affecting purchase intention on mobile shopping web sites	Lu, Hsi-Peng; Su, Philip Yu-Jen	2009	179	14,92
Increasing trust in mobile commerce through design aesthetics	Li, Yung-Ming; Yeh, Yung-Shao	2010	172	15,64
On the Go: How Mobile Shopping Affects Customer Purchase Behaviour	Wang, Rebecca Jen-Hui; Malthouse, Edward C.; Krishnamurthi, Lakshman	2015	149	24,83
A two-staged SEM-neural network approach for understanding and predicting the determinants of m-commerce adoption	Chong, Alain Yee-Loong	2013	126	15,75

Fonte: elaborazione personale

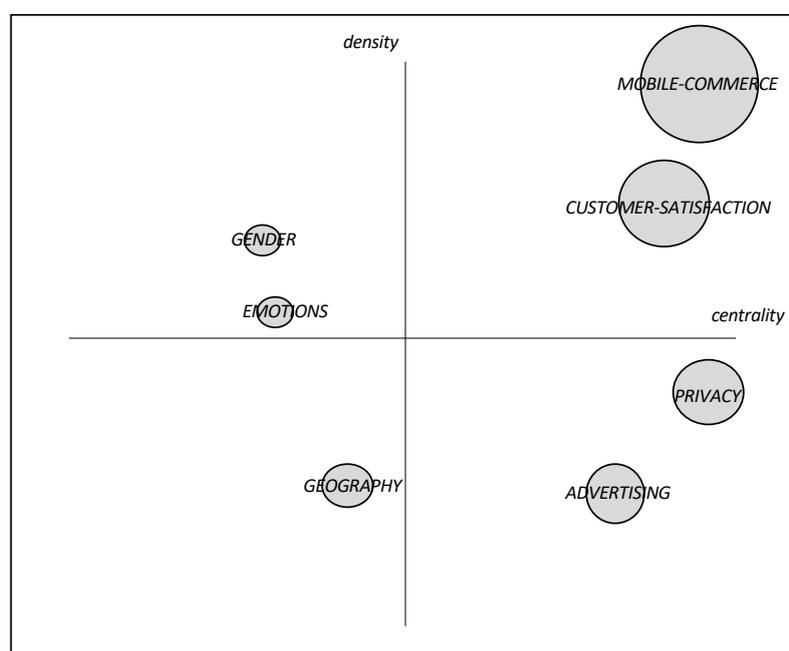
3.2 Analisi evolutiva

Prima di procedere con l'analisi evolutiva generata dal software SciMAT, è stato realizzato un processo di de-duplicazione delle parole-chiave per evitare la presenza di duplicati (che possono derivare dall'utilizzo di plurali, separatori e sinonimi) e migliorare così la qualità dei dati e dei risultati prodotti.

Attraverso i diagrammi strategici (Fig. 2 e 3) è possibile individuare i temi trattati nei due periodi esaminati, il loro peso e la loro rilevanza. In particolare, all'interno dei quattro quadranti si distinguono: (1) i temi centrali - *mothor theme* - (quadrante in alto a destra); (2) i temi basici e trasversali - temi rilevanti ma ancora poco sviluppati - (quadrante in basso a destra); (3) i temi emergenti o in declino (quadrante in basso a sinistra); (4) i temi marginali - (quadrante in alto a sinistra).

Nel primo periodo di analisi (2000 - 2015) emergono sette temi principali (Fig. 2).

Fig. 2: Diagramma strategico - periodo 2000-2015



Fonte: elaborazione degli autori

Questi sono gli anni in cui inizia a emergere l'interesse verso il *mobile commerce*. Per questo, le tematiche affrontate sono incentrate allo studio della scelta del canale mobile per l'acquisto di prodotti e servizi. La presenza nel quadrante dei *mothor theme* delle parole chiave *mobile commerce*, unitamente a *customer-satisfaction* conferma questa tendenza.

Analizzando nel dettaglio il tema *mobile commerce* si rilevano collegamenti con le parole chiave *adoption*, *determinant* e *techology acceptance model*. Il focus principale di questo periodo è proprio relativo all'individuazione e allo studio degli antecedenti dell'intenzione a utilizzare il canale mobile nel processo di acquisto. In particolare, il concetto di intenzione si riferisce alla prima volta in cui un individuo considera l'utilizzo di una tecnologia o di un canale e, dunque, rappresenta le componenti motivazionali di un comportamento, una misura della forza della propria intenzione di eseguire un comportamento specifico e del grado di sforzo consapevole esercitato per eseguirlo, come effettuare acquisti futuri attraverso il canale mobile (Davis *et al.* 1989; Fishbein e Ajzen 1975). La teoria maggiormente utilizzata a tal fine è proprio quella del *Techology Acceptance Model* (TAM), sviluppata da Davis (1989) per studiare l'adozione di nuove tecnologie. In questo filone troviamo lo studio di Wu e Wang (2005) i quali propongono un modello esteso della TAM. Tra le nuove variabili aggiunte, gli autori dimostrano l'azione negativa del costo percepito legato all'utilizzo del *mobile commerce* (costi delle apparecchiature, i costi di accesso e le commissioni di

transazione) e l'azione positiva della *compatibility* (percezione di una coerenza tra l'acquisto tramite mobile e i propri valori, le proprie esperienze e le proprie esigenze) sull'intenzione di acquisto attraverso il canale mobile. Shih e Chen (2013) ampliano a loro volta la TAM attraverso l'integrazione del modello *Task-Technology Fit* (TTF) e dimostrano la maggior forza esplicativa di questo modello integrato rispetto ai due singoli modelli. L'utilizzo della TAM per spiegare l'intenzione all'uso dei *device* mobili per effettuare gli acquisti prosegue negli anni focalizzandosi su specifici paesi (e.g., Cina, Sun *et al.*, 2010; Singapore, Yang *et al.*, 2015; India, Goyal *et al.*, 2013) e sul confronto *cross cultural* (e.g., Chong *et al.*, 2012; Dai e Palvi, 2009).

Il secondo *mother theme* del periodo è *customer-satisfaction*, che risulta essere fortemente correlato ai temi della *loyalty* e della *continuance intention*. L'attenzione, in questo caso, non è più rivolta alle determinanti della scelta del canale mobile, ma alla soddisfazione del cliente in seguito all'utilizzo del canale stesso; soddisfazione che risulta essere determinante nella scelta a utilizzare ancora il canale mobile. La soddisfazione è definita come uno stato psicologico o emotivo derivante da una valutazione cognitiva del divario tra aspettative e prestazioni effettive in seguito a un'esperienza con un prodotto o un servizio (Anderson e Srinivasan, 2003; Falk *et al.*, 2007; Johnson *et al.*, 1995; Locke, 1976; Oliver, 1981). In questo contesto, la soddisfazione si riferisce alla risposta emotiva che fa seguito dell'esperienza del *m-commerce* (Agrebi e Jallais, 2015; Groß, 2018; Yang e Lee, 2016). Numerosi studi dimostrano come, quanto più soddisfatti sono i consumatori, maggiore è la fiducia maturata nei confronti del canale e la probabilità di continuare a utilizzare il *m-commerce* in futuro (Bhattacharjee, 2001; Chen e Demirci, 2019; Rodríguez-Torrico *et al.*, 2019).

La TAM viene nuovamente utilizzata anche per lo studio della fedeltà del cliente al *mobile commerce*: Cyr *et al.* (2006) ampliano il modello aggiungendo la componente edonica del divertimento, già utilizzata per studiare il comportamento di acquisto nel contesto online ma mai con riferimento a quello mobile. I risultati hanno dimostrato l'influenza diretta e positiva del divertimento sulla fedeltà e l'importanza della componente estetica dell'interfaccia mobile quale determinante indiretta della fedeltà. Anche Lin e Wang (2006) sviluppano un modello di fidelizzazione dei clienti e rilevano l'influenza positiva del grado di soddisfazione sulla fedeltà del cliente; entrambe le variabili sono a loro volta positivamente determinate dalla fiducia verso l'*m-vendor*. Choi *et al.* (2008) studiano i fattori che determinano la soddisfazione e la fedeltà del cliente confrontando il contesto del *mobile commerce* con quello dell'*e-commerce*. Gli autori rilevano una parziale similarità tra i fattori determinanti la soddisfazione e la fedeltà per i due canali ma, al contempo, individuano anche fattori unici rispetto ai contesti. Ad esempio, l'affidabilità dei contenuti e il processo di acquisto risultano essere fattori determinanti sono per *mobile commerce*.

Proseguendo l'analisi delle varie fasi all'interno della *customer journey*, Zhou (2011) si sofferma sulla fase del *post-adoption*, in cui il consumatore deve scegliere se "continuare" e, quindi, riutilizzare il canale per successivi acquisti, "raccomandare" il canale oppure se lamentare (reclamo) un evento negativo. La conferma delle aspettative, la facilità d'uso e l'utilità percepite, e il costo di utilizzo sono fattori determinanti della soddisfazione che, a sua volta, aumenta le probabilità che il cliente utilizzi nuovamente (*continuance intention*) il canale per acquisti futuri. La *continuance intention* riguarda, dunque, l'intenzione dei clienti a continuare ad utilizzare i servizi di *m-commerce* dopo un primo utilizzo iniziale (Andrews e Bianchi 2013; Chang e Chou 2011; Rodríguez-Torrico *et al.*, 2019). Anche Gao *et al.* (2015) studiano la *continuance intention*: oltre al grado di soddisfazione e alla fiducia, gli autori individuano quale driver significativo anche quello che viene definito "flow", ovvero un'esperienza temporanea in cui il consumatore è divertito e pienamente concentrato sull'evento.

Già nel primo periodo di analisi del tema emerge, dunque, un interesse non solo verso la prima fase del processo di acquisto, vale a dire quella di approccio al canale e di intenzione di uso - rilevante dal momento che si tratta di un canale nuovo e per il quale non è stata spesso maturata una esperienza d'uso -, nonché verso le sue determinanti, ma anche verso le successive fasi che compongono il *customer journey* (*satisfaction, continuance intention, loyalty*).

Spostando l'analisi al secondo quadrante del diagramma strategico, quello contenente i temi rilevanti ma ancora poco sviluppati nel periodo in esame, troviamo le parole chiave *privacy and security* e *advertising*. La *privacy* e la sicurezza sono temi rilevanti e sensibili che iniziano a emergere in questo arco temporale. L'attenzione e la riservatezza nella condivisione di dati personali possono, infatti, rappresentare un deterrente all'utilizzo del canale mobile, soprattutto quando l'esperienza maturata è ancora marginale.

Benou *et al.* (2012) valutano i vantaggi e i rischi derivanti dall'utilizzo di elementi informativi aggiuntivi per fornire maggiori servizi ai consumatori: se, da un lato la richiesta di maggiori informazioni consente all'azienda di fornire servizi superiori e personalizzati, dall'altro lato genera preoccupazioni nell'utente per quanto riguarda la garanzia di *privacy* e sicurezza. Come evidenziano Banerjee e Dholakia (2013), la sempre maggiore diffusione della rete *wireless* ha eliminato una delle barriere all'utilizzo del mobile come canale d'acquisto, ovvero, i costi di connessione. Gli autori identificano diversi segmenti di consumatori in base ai comportamenti di acquisto tramite mobile e individuano nell'attenzione alla *privacy* una variabile chiave in questa segmentazione. Gli individui più attenti alla *privacy* saranno più inclini ad utilizzare i *device* mobili per fare gli acquisti quando si trovano tra le mura di casa, in un contesto "protetto", al contrario, gli individui che si preoccupano meno della *privacy* utilizzano i *device* mobili per fare gli acquisti sempre e ovunque si trovano. Chorppath e Alpcan (2013) studiano, invece, le motivazioni che spingono gli utenti a fornire dati sulla loro posizione quando utilizzano le *app-mobile*, permettendo alle aziende di offrire servizi *location-based*. I rischi individuali percepiti dagli utenti e i benefici offerti definiscono il livello di granularità delle informazioni condivise sulla propria posizione. Infine, Lai e Lai (2014) individuano la preoccupazione dell'utente alla propria *privacy* come deterrente all'utilizzo del *mobile commerce*.

Nel network associativo che si individua attorno alla parola chiave *advertising* troviamo i termini *mobile marketing* e *involvement*. L'efficacia del *mobile advertising* rappresenta un importante strumento per aumentare l'intenzione al *mobile commerce*. In questo ambito, Varnali *et al.* (2012) indagano le risposte dei consumatori alle *SMS-based mobile advertising campaigns* e, in particolare, l'effetto esercitato dalle caratteristiche del messaggio (incentivi offerti e autorizzazione preventiva da parte dell'utente) e dal percepito del consumatore (atteggiamento verso la campagna, coinvolgimento, intrusività del messaggio ed esperienza passata) sull'esito della campagna. I risultati dello studio dimostrano che l'invasione percepita e l'atteggiamento hanno un'influenza maggiore sulla reazione del consumatore alla campagna rispetto agli incentivi e all'autorizzazione preventiva richiesta. La ripetizione del messaggio e il livello di *time pressure* sono stati, invece, studiati da Rau *et al.* (2014), sempre con riferimento alle *SMS-based mobile advertising campaigns*: se, da un lato, l'efficacia della pubblicità su dispositivi mobili è maggiore in un contesto caratterizzato da bassa *time pressure*, dall'altro, è auspicabile ridurre al minimo i disturbi recati agli utenti, limitando la quantità giornaliera di annunci. Infine, Lin e Chen (2015) dimostrano che la credibilità del messaggio agisce positivamente sull'atteggiamento verso il *mobile commerce* (driver dell'intenzione), mentre l'irritazione generata dal messaggio agisce negativamente.

Nel terzo quadrante, che raggruppa i temi emergenti o in declino, si posiziona il termine *geography* che manca di sufficiente densità e centralità per poter rappresentare un tema rilevante del periodo. Questo termine, in realtà, non rileva un filone di studio in abito *mobile* ma, semplicemente, evidenzia come numerosi studi sono stati svolti con riferimento a uno specifico paese, come emerso anche durante l'analisi di altre parole chiave. Pertanto, non si può parlare di tema emergente o di tema in declino, ma di una modalità di analisi trasversale a tutte le tematiche.

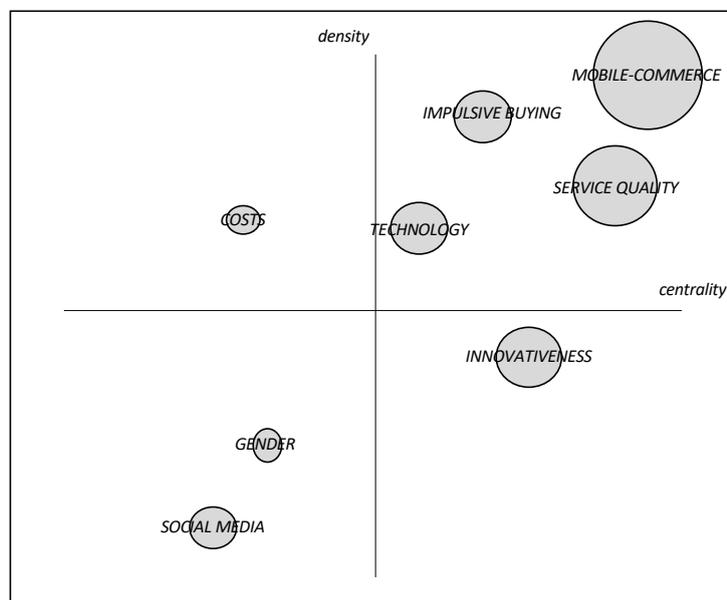
Il quarto e ultimo quadrante è quello che racchiude i temi marginali e in cui troviamo le parole chiave *gender* ed *emotion*. Se la prima si riferisce agli studi che indagano eventuali differenze nei comportamenti di shopping tramite mobile tra gli uomini e le donne (e.g., Banerjee e Dholakia, 2013; Okazaki e Mendez, 2013; Chung, 2014), la seconda richiama l'importanza della componente emotiva nei processi decisionali nel contesto mobile. I servizi di *mobile commerce* sono spesso usati dagli utenti per vivere esperienze divertenti e, per questo, le aziende che utilizzano questo *device* come canale di vendita e/o di comunicazione devono cercare di incrementare il senso di

divertimento provato dall'utente. Per fare questo devono investire su: (1) contenuto del messaggio e del servizio offerto, (2) *social orientation* dell'utente, perché lo shopping, anche se "virtuale", è vissuto come un momento di socialità (la *social experience* è una delle ragioni edoniche dello shopping) e (3) *self orientation* (altra motivazione edonica dello shopping), ovvero i servizi di *mobile commerce* devono diventare parte integrante dello stile di vita dell'utente (Davis, 2010). L'importanza della dimensione edonica nel *mobile commerce* è stata dimostrata anche da Ono *et al.* (2012) in uno studio in cui sono state messe a confronto le motivazioni della scelta del canale mobile rispetto a quello fisico.

Riassumendo, nel periodo 2000-2015 la letteratura in ambito *mobile commerce* si è concentrata sull'individuazione delle determinanti della scelta del canale, sul legame tra fiducia, fedeltà e *customer satisfaction*, fino ad arrivare alla *continuance intention*, quindi, all'utilizzo ripetuto del canale. Infine, con il tempo ha acquisito importanza anche la componente edonica ed emozionale legata agli acquisti anche nel contesto virtuale.

Il diagramma strategico relativo al secondo periodo di analisi (2016 - 2020) individua otto temi rilevanti (Fig. 3). Nonostante gli anni di riferimento siano inferiori rispetto al periodo precedente, i temi trattati che emergono dall'analisi appaiono numerosi e in crescita.

Fig. 3: Diagramma strategico - periodo 2016-2020



Fonte: elaborazione degli autori

Tra i *mother theme* ritroviamo, ovviamente, *mobile commerce*, il topic della ricerca. L'interesse principale di questo periodo è rivolto alla soddisfazione dell'utente derivante dall'utilizzo del *mobile commerce*. In particolare, vengono studiati, da un lato, le sue determinanti e, dall'altro il ruolo che ricopre all'interno della *customer journey*. Marinkovic e Kalinic (2017) si inseriscono in questo ambito di ricerca e individuano quali principali driver della soddisfazione la fiducia e la mobilità; al contempo, il loro effetto risulta essere moderato dalla personalizzazione del sito web (strumento efficace per soddisfare le aspettative dell'utente). Gli autori enfatizzano molto, anche dal punto di vista manageriale, i vantaggi offerti dal *mobile commerce* in termini di mobilità, evidenziando la necessità di comunicare maggiormente agli utenti i benefici apportati da questo canale. La mobilità è, infatti, definita come l'insieme dei benefici derivanti dall'accesso e dall'utilizzo di un prodotto/servizio senza limiti spazio-temporali. Non da meno è il ruolo della personalizzazione: i servizi di *m-commerce* devono essere il più coerenti possibile con le esigenze, i valori e gli stili di vita degli utenti. Nel modello proposto da Groß (2018) la soddisfazione dell'utente viene inserita quale determinante diretta, congiuntamente all'intenzione comportamentale, del comportamento reale realizzato, supportando ulteriormente la sua importanza all'interno della *customer journey*. Infine, se per Jimenez *et al.* (2016) la soddisfazione agisce

positivamente sia sulla fiducia che sulla fedeltà verso il canale, per Thakur (2018) si tratta di un'importante determinante della *continuance intention*.

Ulteriore tema centrale del periodo è *service-quality*. Secondo Yang *et al.* (2017) l'integrazione dei canali online e mobile da parte del *retailer* ha un effetto positivo sulla qualità percepita dall'utente con riferimento a entrambi i contesti, che si ripercuote positivamente sulla soddisfazione totale e, di conseguenza, sulla *repurchase intention*. Sempre nell'ambito del *multi-channel*, Moon e Armstrong (2019) sviluppano un modello volto allo studio dell'intenzione a rivisitare lo *store* nell'ambiente *online-to-offline*. In particolare, gli autori si concentrano sul modello di business che viene sviluppato al fine di condurre i clienti online nel punto vendita fisico: gli utenti ricercano informazioni, ordinano prodotti/servizi e pagano sia sul canale online che mobile ma ritirano il prodotto all'interno del punto vendita fisico. In questo contesto particolarmente complesso, la qualità del servizio percepita, che agisce positivamente sulla fiducia e negativamente sul rischio percepito, è determinata sia da fattori tangibili che intangibili che interessano entrambi gli ambienti (fisico e virtuale). Si tratta, quindi, di un costrutto la cui valutazione dipende da una moltitudine di fattori associati al contesto.

Degna di nota è l'attenzione rivolta a un nuovo tema nel contesto mobile: *l'impulsive-buying*. Ampliamente indagato nel contesto fisico e anche in quello online, l'acquisto di impulso inizia a essere studiato con riferimento al *mobile commerce* solo in questo secondo periodo temporale. Questo nuovo canale sembra, infatti, accrescere i comportamenti di acquisto di impulso e proprio per questo è di interesse l'individuazione delle sue determinanti. Zheng *et al.* (2019) perseguono questo obiettivo attraverso lo sviluppo di un modello basato sul paradigma stimolo-organismo-risposta. Gli autori dimostrano un effetto diretto sull'*impulsive-buying* da parte delle motivazioni edoniche della navigazione mobile e un effetto indiretto (moderato da queste ultime) delle motivazioni utilitaristiche. Anche Chen e Yao (2018) studiano il comportamento di acquisto di impulso ma con riferimento alle piattaforme di aste mobile. In questo contesto, la tendenza agli acquisti di impulso, la valutazione normativa circa l'opportunità di realizzare un acquisto e l'emozione positiva generata dalla situazione agiscono positivamente sulla realizzazione di un acquisto di impulso. Quindi, nonostante più studi abbiano dimostrato come il canale mobile abbia aumentato questa tipologia di comportamenti, è altrettanto vero che la predisposizione personale verso azioni impulsive rappresenta un driver rilevante. A ciò, naturalmente, si aggiunge anche il contesto in grado di suscitare sensazioni positive e di sviluppare elevate aspettative.

Ultima parola chiave collocata nel quadrante dei *mother theme* è *technology*. In particolare, si fa riferimento all'impatto esercitato dall'evoluzione tecnologica dei dispositivi mobile sul comportamento di acquisto del consumatore. Il contributo pubblicato da Pantano e Priporas (2016) si poneva proprio questo obiettivo: capire fino a che punto le tecnologie mobili hanno modificato il comportamento di acquisto in ambito *retailing*. I risultati del lavoro dimostrano l'importanza dell'avanzamento della tecnologia e dei servizi offerti dal *mobile commerce* per spostare i consumatori verso questo canale, sia per realizzare tutti gli step del processo di acquisto, sia per integrarlo con gli altri canali esistenti (online e fisico). La ricerca qualitativa condotta da Fuentes e Svingstedt (2017) ha messo in luce il contributo degli *smartphone* nella ridefinizione e trasformazione del comportamento di acquisto del consumatore. Attraverso questo *device* è, infatti, possibile raccogliere, elaborare e condividere informazioni in un modo nuovo, nonché vivere nuove esperienze di acquisto. Sicuramente si tratta di conseguenze positive per il consumatore che risultano, tuttavia, essere accompagnate anche da risvolti negativi quali una maggiore ansia e un maggior livello di stress. Questo nuovo progresso tecnologico spinge sempre più gli utenti a spostarsi dal canale online (che prevede l'uso dei personal computer) a quello mobile (che prevede l'utilizzo di *device* mobili) per effettuare i propri acquisti. Secondo Tang *et al.* (2016), gli elementi che favoriscono questa migrazione, oltre all'utilità percepita e alla facilità d'uso percepita dei dispositivi mobile (in accordo con la TAM), sono la sicurezza percepita del canale e alcuni limiti relativi agli strumenti collegati all'e-commerce: i vincoli temporali e spaziali e l'ingombro del pc.

Alla luce di questa prima disamina, si rileva come in questo secondo periodo di analisi l'attenzione non sia rivolta solo al canale mobile come svincolato rispetto agli altri canali, ma si

inizia a studiare maggiormente anche l'interazione con questi ultimi, in un'ottica di *multi- e omni-channel*.

Innovativeness è l'unico tema trasversale che emerge dall'analisi. Tra i driver di scelta del canale sempre maggior rilevanza viene posta all'innovatività del consumatore, tratto che connota la sua personalità ed è indipendente dal contesto. Precisamente, quando si parla di innovatività si fa riferimento alla predisposizione individuale di ricercare le novità o di essere ricettivo rispetto a nuove idee (Goldsmith, 2001). Per questo, chi è maggiormente incline all'innovazione sarà maggiormente propenso a provare nuovi prodotti, nuovi servizi, nuovi canali e, quindi, è più probabile che adotti il *mobile commerce*. Tuttavia, la relazione tra innovatività e intenzione all'utilizzo del *mobile commerce* non è del tutto chiara. Se Chang (2019) dimostra una relazione diretta - l'innovatività e la fiducia nelle tecnologie mobile agiscono positivamente sull'intenzione a utilizzare il *mobile commerce* - Sun e Chi (2018) rilevano una relazione indiretta - l'innovatività agisce sull'intenzione tramite l'utilità e la facilità d'uso percepite -.

Nel quadrante dei temi emergenti si collocano le parole chiave *gender* e *social media*. Per quanto riguarda il genere, si tratta di una variabile sempre più frequentemente inserita nei modelli di analisi del comportamento del consumatore mobile come driver del comportamento o come moderatore di alcune relazioni. Nel contesto turistico, Tan e Ooi (2018) supportano l'ipotesi di una moderazione esercitata del genere sulla relazione tra la fiducia e l'intenzione comportamentale. Marinković *et al.* (2020) rilevano, invece, un diverso atteggiamento verso il canale tra gli uomini e le donne. In generale, il ruolo svolto dalle caratteristiche sociodemografiche raccoglie l'interesse della comunità scientifica proprio perché è importante, anche ai fini manageriali, capire come queste agiscono sui comportamenti di scelta del canale. Il tema dei *social media* e del *social mobile commerce* è il vero tema emergente del periodo che trova ampio spazio di approfondimento in letteratura. Hew *et al.* (2016) propongono un modello per studiare l'impatto del *mobile social commerce* sulla *brand loyalty* e dimostrano come gli utenti dei *social media* siano effettivamente inseparabili dall'uso degli stessi che sono diventati parte integrante della loro quotidianità; nemmeno la preoccupazione per la *privacy* delle proprie informazioni sembra essere in grado di impedirne l'utilizzo. Secondo Hew *et al.* (2019), l'essere un utente di *social media mobile* aumenta le probabilità di utilizzare il *mobile social commerce*: le barriere all'utilizzo sembrano venire meno. Contrariamente alla maggior parte della letteratura che sostiene che i *social media* siano uno strumento molto importante per il *retailing*, secondo Parker e Wang (2016) i consumatori preferiscono in realtà comunicare con gli altri in modo interpersonale più tradizionale piuttosto che condividere pubblicamente sui *social* l'esperienza di acquisto vissuta.

La parola chiave *costs* è l'unica a occupare il quadrante dei temi marginali e, in quella parola chiave, sono racchiusi tutti gli studi che indagano l'impatto dei costi di transazione verso il canale mobile (e.g., Tang *et al.*, 2016; Luo *et al.*, 2020). Nonostante ci siano ancora studi recenti che approfondiscono e analizzano questo tema, si tratta in realtà di un argomento non più particolarmente attuale, poiché l'utilizzo del *mobile commerce* è ormai diventata una pratica sempre più diffusa e, di conseguenza, anche i costi di transazione sono sempre meno percepiti dagli utenti.

4. Conclusioni

Il presente lavoro si è posto come obiettivo quello di fornire una sistematizzazione dei contributi scientifici sul tema del *mobile commerce* alla luce della sua crescente rilevanza nel quadro economico mondiale, accelerata ulteriormente dalla situazione di emergenza sanitaria provocata dal COVID-19. I risultati dell'analisi bibliometrica condotta sui contributi scientifici degli ultimi vent'anni forniscono un chiaro quadro di quelle che dovranno essere le future traiettorie della ricerca scientifica e gli ambiti su cui le imprese dovranno concentrarsi nello sviluppo di modelli di business *omni-channel*.

Appare innanzitutto doveroso osservare come il tema del *mobile commerce* non abbia perso la sua centralità nel corso dei decenni. L'inalterato posizionamento di *mother theme* in entrambi i

diagrammi strategici sottolinea come il tema continui ad essere presidiato in ambito scientifico, al fine di produrre conoscenza utile agli operatori già presenti nel mercato digitale e alle imprese che stanno rivedendo i propri modelli di business in ottica multicanale, anche come risposta al contesto emergenziale.

Nel corso degli ultimi vent'anni, con l'evolversi della tecnologia e della conseguente maggiore familiarità degli utenti, l'attenzione degli studiosi si è spostata dagli antecedenti dell'intenzione di adottare il mobile come canale di acquisto alle ragioni dell'utilizzo ripetuto dello stesso. Ne è derivato un quadro conoscitivo piuttosto esaustivo che appare utile per orientare le strategie di tutti gli operatori, a prescindere dalla fase in cui si trovano del ciclo di vita di implementazione del *mobile commerce*.

Le imprese alle prime armi con il *mobile commerce* possono attingere all'ampio patrimonio di contributi scientifici sull'intenzione di acquisto, e scoprire quali sono i fattori, di matrice prevalentemente utilitaristica, che riducono le barriere all'utilizzo del canale mobile. Le imprese che al contrario operano nel mercato digitale da più tempo, possono beneficiare della più recente conoscenza sugli antecedenti della *continuance intention* e sulle determinanti della soddisfazione, fedeltà e fiducia. È sicuramente molto interessante apprendere che su questi aspetti incidono la dimensione edonistica e la componente estetica dell'interfaccia mobile, oltre ai fattori di natura *convenience* come la facilità d'uso e l'utilità percepita. Dimensione utilitaristica e dimensione emozionale, quindi, si intrecciano creando le condizioni necessarie e sufficienti per una crescente soddisfazione del consumatore, che aumenta in ultima istanza la probabilità che il consumatore continui a utilizzare il *mobile commerce* per acquisti futuri.

È proprio su questi temi che si è concentrata la ricerca scientifica degli ultimi anni. La chiave di successo del *mobile commerce* risiede sempre più nella sua capacità di soddisfare le esigenze del consumatore lungo tutto il *customer journey* attraverso diversi *touchpoint* fisici e digitali. Le evidenze empiriche in merito alla relazione tra integrazione dei canali, qualità percepita e soddisfazione spostano progressivamente l'attenzione degli studiosi dal solo canale mobile all'interazione con gli altri canali, in un'ottica di *multi e omni-channel*. È ragionevole attendersi una crescita ulteriore dei contributi volti a indagare i comportamenti multicanale dei consumatori e i ruoli che essi attribuiscono ai diversi *touchpoint*, nonché i diversi ruoli che agli stessi vengono attribuiti all'interno del *customer journey*. In questo contesto la comprensione del comportamento del consumatore si fa più complessa poiché entrano in gioco nuove variabili dalla cui relazione scaturiscono nuove modalità di interazione e di acquisto. Appare rilevante, ad esempio, lo studio della componente edonistica/utilitaristica nell'utilizzo dei diversi *touchpoint*, così come dei fattori e delle modalità di interazione che più di altri possono determinare gli acquisti di impulso, senza tralasciare del ruolo giocato in questo contesto dalla *app* e dai *social media* come importanti canali di interazione e di acquisto.

Il tema del *mobile commerce* nella prospettiva della domanda si arricchisce di nuovi contenuti, alimentando l'interesse scientifico e manageriale verso i temi emergenti del *social mobile commerce*, senza trascurare le dimensioni del *service quality* che nel contesto omnicannale si fanno più articolate.

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