

Sustainability in footwear industry: a big data analysis

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Abstract

Purpose of the paper: *The work aims to achieve a twofold objective: highlight, through a big data analysis, the consumers' perception about sustainability in the footwear context and provide useful considerations regarding the opportunities for companies to adequately manage the decision-making process in order to maximize the benefits and minimize the risks deriving from the definition and implementation of sustainability-oriented business strategies.*

Methodology: *A text analytics study has been performed to understand the main variables that people consider when adopting their shoe purchasing behavior. In particular, the collection of the people's opinions has taken place on Twitter, a well-known and widespread social network community.*

Findings: *According to the big data analysis carried out, sustainability is ranked last among the factors capable of orienting the consumers' purchasing choice, as demonstrated by the only 1311 posts on Twitter.*

Research limits: *The automated collection of people's posts has prevented from going deeper in understanding their real ideas about variables more capable of orienting their shoe purchasing behavior.*

Practical implications: *The study suggests the importance to enhance managerial meta-capabilities for those footwear companies that are actively engaged in corporate sustainability. The systematic analysis of points of view, preferences and expectations would allow the development of innovative eco-value propositions in terms of both products (i.e. environmentally friendly shoes) and services (i.e. reverse logistics).*

Originality of the paper: *The paper is based on an innovative technique of data analysis, carried out by means of a web crawler, software for automatically identifying, collecting and classifying a big number of terms, capable of facilitating the understanding of the investigated phenomenon.*

Key words: sustainability; footwear industry; big data; big data analysis; Twitter; web crawler; decision making

1. Introduction

Since the 80s many unexplored themes have received the attention of scholars and practitioners for disparate reasons, due to economic development, environmental protection, protection of workers' rights, and so on. Among these, one of the most debated topics in the recent years is certainly the concept of sustainability, which, over time, has taken on

different meanings, in most cases related to the environmental sphere, other times referring to social or economic events (Baccarani, 2016; Golinelli *et al.*, 2015; Douglas, 2015).

In this scenario, characterized by the considerable and growing interest in sustainability and, above all, in the effects that the adoption of sustainable practices could derive from companies, the work aims to achieve a dual research objective: on one hand, it tries to highlight, through a big data analysis, the consumers' perception about the concept of sustainability in the footwear sector; on the other hand, it seeks to provide some considerations regarding the opportunities for companies to adequately manage the decision-making process in order to maximize the benefits and minimize the risks deriving from the definition and implementation of sustainability-oriented business strategies.

In fact, despite of the fact that sustainability represents the most pressing issue for today's global society, to date, lots of misunderstandings characterize its meaning (Ramirez, 2012). Sustainability, while on one hand can represent a great opportunity for companies, on the other hand can be a dangerous threat (Zgurovsky, 2007). Therefore, beyond the scientific or commodity sector, both scholars and practitioners can no longer ignore the issue of the sustainable development of companies, which are called to compete in markets with standards extremely complicated by the strong push towards the production of increasingly high-performance technologies on global scale.

In this regard, it is worth pointing out the recent spread of a research strand based on the idea that sustainability in support of business strategies should be appropriately thought and designed to encourage innovation in a broad sense (with regard to activities, products, processes, services, supply and demand relationships, etc.) (Adams *et al.*, 2016). In other terms, by virtue of the continuous upgrading that characterizes the evolution of sustainability as a process, the business conducts oriented towards sustainability in its threefold dimension (economic, social and environmental) call for new "meta-capabilities" to companies strategically oriented towards the exploration and exploitation of emerging opportunities.

In addition to this consideration, as stated by Ciasullo *et al.* (2018), despite the growing focus on sustainability in every sector, within the extant academic literature there are still few contributions dealing with the topic of sustainable development by providing sufficient generalizable results. In this regard, the paper aims to fill that gap by performing a big data analysis, carried out by means of a web crawler, software for automatically identifying, collecting and classifying a big number of terms, capable of facilitating the understanding of the investigated phenomenon.

In so doing so, the proposed big data approach highlights the importance of having access to information that can, if properly interpreted, catalyze the knowledge needed to stimulate the generation of sustainable innovation.

More in detail, the work is structured in 7 sections. It opens with a theoretical overview on the concept of sustainability in the footwear sector and on the use of big data analysis to provide support for company decision-making processes. Later, the research design is deepened, with

particular regard to the operations performed to carry out data mining and data analysis. Subsequently, the results are first described and then discussed. Subsequently theoretical and practical implications are debated and conclusions are presented.

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2. Theoretical overview

2.1 Footwear industry and sustainability

The last decade has seen a growing attention to sustainability in each commodity sector (Brunetti *et al.*, 2013) and, in particular, in the footwear one (Lopes *et al.*, 2015), where several interventions have been carried out in order to provide a concrete response to the need to adopt sustainable behaviors, such as minimization of chemical compounds typically used in the past, reduction of the noise produced by the machines operating in the plants, greater energy efficiency, improvement of the working conditions of the individuals involved in the design or production of footwear, and so on (Tartaglione and Corradini, 2013).

All these interventions have contributed to ensuring an acceptable level of sustainability in the footwear sector, especially when compared to what was achieved in other production contexts, with overall beneficial effects not only in terms of environmental protection but also of improved social conditions and, for certain verses, even economic ones. Not by chance, the topic is widely debated in literature and several studies (Ugolini, 2010; Polese and Minguzzi, 2009) showing a growing consumers' sensitivity towards issues related to sustainability as a whole (Geels *et al.*, 2015; Cohen and Munoz, 2016): more and more often, they assess the history of the product they are buying and the "sacrifice" that has been made for its production in terms of sustainability (Luthra *et al.*, 2016; Lehner *et al.*, 2016; Michelini *et al.*, 2018; Herva *et al.*, 2011).

These reflections have given rise to a cultural phenomenon of great importance, by virtue of which consumers seem strongly conditioned by the desire to ensure that their products are made in the maximum respect of environmental, social and economic sustainability (Fuchs *et al.*, 2016), for example without having determined the exploitation of cheap labor in poor areas of the world or without contributing to the depletion of natural resources. This phenomenon, interpreted in this way, would lead to think that sustainability is not merely a result to be achieved, but rather a process deriving from the implementation of business models capable of guaranteeing an improvement in the environmental, economic and social conditions of both producers and of consumers (Eden, 2017) at every stage of the production process (logistics, distribution, packaging, etc.). Actually, since a couple of years ago, some footwear companies have already adopted more or less sustainable practices (Jacques *et al.*, 2010), probably also thanks to the national and international enactment of numerous regulations and laws to protect the environment and occupational safety and pressures of local communities living in those districts where the concentration of companies in the footwear sector has highlighted emergencies from the point of view of pollution risk factors.

However, on one hand, society has acquired a considerable awareness of the benefits deriving from the adoption of sustainable behaviors (Bly *et al.*, 2015), on the other hand though, a migration of shoe production has occurred exponentially from the countries traditionally known for being quality footwear producers (like the European Union and USA) to alternative countries (Fornasiero *et al.*, 2011). This tendency to relocate footwear production plants to other countries has grown to the point that, today, 99% of the shoes sold in USA is imported, whilst almost 90% of the shoes sold in the EU comes from plants situated outside somewhere else. All this for the benefit of some countries, first Asian ones (China, Taiwan, Indonesia, Vietnam, India and Korea), and recently Brazil, Mexico and Cambodia (Tartaglione and Corradini, 2013).

This phenomenon, which affects all of the world economies, produces repercussions from the sustainability viewpoint, since it defeats the certainty of transparency between producers and consumers. Moreover, the considerable complexity characterizing the production process of footwear and the decomposition of its different phases (supply of raw materials, design of models, construction of single components, assembly of footwear, sale, after-sales service) in more than one countries around the world make difficult, whether not impossible, the customers' conscious consumption, given that every economy operates under different political, legislative, economic, social and moral constraints (Ciasullo *et al.*, 2017).

Due to the specific inherent characteristics of the industry and the increased level of market complexity, dynamics and uncertainty, footwear companies, in order to reinforce their competitiveness, need to push towards the implementation of specific sustainable practices, let them to be known (Bly *et al.*, 2015) and learnt from the market, by exploiting and exploring new opportunities in order to manage sustainability as a strategic lever to retain old customers and attract new ones (Lee and Rahimifard, 2010).

2.2 Big data analysis for supporting decision-making

The development of "Mass Digitization" and the interest in Google and in other internet search engines, has produced and keeps on generating a big social and economic impact (Coyle, 2006). Furthermore, the strong growth of artificial objects that act together without any human interaction, known with the name of "Internet of Things" (Atzori *et al.*, 2010; Estrin *et al.*, 2002) has led to the rapid expansion of large amounts of data. Through these phenomena, information can be viewed as structured data and become a knowledge activity that may create value for businesses (Rowlley, 2007; Cricelli and Grimaldi, 2008). Therefore, there is a greater access to massive amounts of information about people, objects, and interactions in a continuously faster and more consistent manner, as defined by Laney's "3Vs" model, which represents the three-dimensional increase in volume, speed and variety of data (Zikopoulos and Eaton, 2011; Beyer and Laney 2012).

Nowadays, the model is evolved and big data are composed by various properties like volume, velocity, variety, variability, value and complexity,

that put forward many challenges (Katal *et al.*, 2013). Thus, big data can be captured, communicated, aggregated, stored and analyzed in every sector and function of global economy, and this can be considered like a social-cultural phenomenon as well as the technology that influenced significantly the human culture (Boyd and Crawford, 2012).

These large-scale data are designed to create better tools, services and public goods, becoming more and more comprehensible to computers. In fact, innovative IT tools with advanced artificial intelligence techniques can understand more data and be applied to many useful fields for human society (Lohr, 2012). In particular, data-driven management is spreading in many American companies and those which have adopted “data-driven decision-making” have achieved higher profits (Provost and Fawcett, 2013). Using the big data allows deciding on the basis of evidence rather than intuition, and it is representing a real revolution for management.

Thus, these huge data sets will become a key to gain a competitive advantage, supporting the productivity growth, innovation, and better relation with customers, according to the research by MGI and McKinsey’s Business Technology Office. In every sector, managers will have to deal with the implications of big data. This scenario will tend to increase. In fact, the increasing volume and detail of information captured by enterprises, the rise of multimedia, social media, and the Internet of Things will exponentially grow up in data in the near future (Brown *et al.*, 2011).

For this reason, companies will have to decide what kind of strategy to use to manage and implement big data, especially with regard to the possibility to move all information to a new big data environment and to execute all the reports, models and interrogation by means of new business intelligence based on big data (Sathi, 2012).

2.2.1 Big data challenge to gain a competitive advantage

Understanding the strategic role played by IT is, today more than in the past, extremely important. In fact, the big data era has started a new competitive scenario, changing the rules of the economic game and the concept of “competitive advantage” (LaValle, 2011). The benefits associated with using big data are different. Firstly, big data can be useful to perform marketing analysis. In fact, technology helps companies to capture rich and abundant data on consumer phenomena in real time and to reach a competitive advantage through the collection, extraction and use of information on the market (Erevelles *et al.*, 2016).

Another relevant aspect concerns the chance to use the amount of data to segment and target customers (Brown *et al.*, 2011). In particular, considering the huge amount of data extractable from *Social network*, it is possible to analyze them and define a collective behavior with respect to a product or a service (Lohr, 2012).

Therefore, the phenomenon of big data appears as closely correlated to the concept of “collective awareness”, which enables, integrating social and sensor networks, to transform data, if treated as a common knowledge, into a higher form of collective awareness that can stimulate users to self-organize and create innovative solutions to several socioeconomic issues

(Pitt *et al.*, 2013). Moreover, big data can enable to monitor and analyze the increasingly complex enterprise systems, allowing companies to reach and maintain over time a better level of performance (Rabl *et al.* 2012).

Furthermore, big data can also help to reach an advantage from an urban viewpoint: nowadays, the digital devices and infrastructure present in Smart Cities produce a large number of data that enable real-time analysis of city life, new modes of urban governance, and provide the rare material for envisioning and enacting more efficient, sustainable, competitive, productive, open and transparent cities (Kitchin, 2014).

Therefore, big data remain a big challenge. The most important future challenges to exploit the potential of big data could regard different actions (Wang, H., *et al.*, 2016):

- Data capture, storage and curation, with particular attention to the security related to sensitive information, such as medical records and banking transactions. In fact, privacy should be resolved before defining the strategy of information sharing;
- Data analysis and visualization. This problematic involves the way to formulate and depict the complexity of big data quantitatively. Again, data complexity can also be caused by sparse, uncertain, incomplete and dynamic data;
- Systematic challenge, focalized on the development of appropriate system architecture, useful to support decisions managing a diversity of complex information and conduct complex computation of big data;
- Non-technical challenge, focused on the management of service suppliers and users' problems.

2.2.2 Big data and Data-Driven Decision-Making

One of the most important things in decision-making process is to define how to gather information capable of enabling the achievement of satisfying outcomes. This aspect could represent a key factor more than decisions themselves (Mallinger and Stefl, 2015). Nowadays, the capacity of data-driven decision-making is being mostly recognized, and there is a growing interest for the concept of big data.

In fact, considering data science like that set of principles, processes, and techniques for understanding phenomena via the (automated) analysis of data, the most important goal of data science is improving decision-making, as this is generally of paramount interest to companies (Provost and Fawcett, 2013).

The benefits of data-driven decision-making have been conclusively demonstrated through the studies of Brynjolfsson and McElheran (2016) on how DDD (Data-Driven Decision-Making) affects firm performance: the authors developed a measure of DDD that rates firms on the basis of how they use data to make decisions, demonstrating that the more data-driven a firm is, the more productive it is. In addition, DDD also seems to be correlated with higher return on assets, equity, and market value (Brynjolfsson *et al.*, 2011).

Therefore, the factors theoretically capable of influencing decision-making process should be adequate. More in detail, to determine the

quality of the process, it is important to manage variables like veracity (manipulation, noise), variety (heterogeneity of data) and velocity (constantly changing data sources) of big data. Surely, taking advantage of big data is an evolutionary procedure in which the gradual understanding of their potential plays a crucial role for reaching a better quality of a decision making process (Janssen *et al.*, 2017). At the same time, it is important for managers to keep a broad perspective in evaluating big data. To this aim, as suggested by Mallinger and Stefl (2015), it could be useful to keep in mind the following principles:

- It is very important to set clear goals and mission for supporting decision-making process from the beginning;
- It should be considered that the data are “inanimate and silent” and need to be analysed and contextualized to take on meaning;
- Sensations should not be totally abandoned by decision-makers, particularly in the early stages, but it is important to incorporate those feelings in a process that verifies their substance, in accordance to data;
- Decision-makers have to recognize emotions and be aware of the emotions related to the issue associated with the decision. It can be very helpful in understanding the extent to which the feelings may bias your action. Indeed, optimism or pessimism can influence an objective decision;
- It is significant to conduct a reflective inquiry. In particular, it can be useful writing what allows the decision-maker to consider the ways in which the initial decision could be improved;
- It could be very advantageous searching a contrary opinion to strengthen the process of decision-making and to evaluate previously unexplained aspects.

3. Research design

A text analytics study has been carried out with the objective to understand the main variables that people consider in adopting to their shoes purchasing behavior. In particular, the collection of the people's opinions took place on Twitter, a very known and widespread *social network* community. The decision to choose Twitter depended on its high popularity: in fact, only in 2012, more than 100 million users posted about 340 million tweets a day, and the service handled an average of 1.6 billion search queries per day.

The analysis was completed in a nine-month period, starting from the beginning of January 2017 to the end of September 2017, to elude interpretative falsifications of the comments posted by Twitter users. Actually, carrying out a big data analysis in a tiny timespan could have determined the development of results conditioned by specific factors.

3.1 Data mining

A web crawled, named Twitter4J, allowed the data collection process. Practically, it has permitted assembling data in nearly real time as a

background activity. The crawled is based on the use of API, which has provided access to the public accounts on the chosen virtual community. In detail, the data collection has been performed by establishing and then implementing specific filters in order to identify all Twitter users' comments including the hashtag #shoes.

Specifically, the crawler has allowed identifying, selecting, gathering and classifying an extremely large amount of words, providing a classification capable of highlighting many keywords connected to the considered phenomenon. Consequently, a further skimming of the extracted words has been made to avoid that some terms could complicate the interpretation of the results. For example, the crawler has automatically ignored individual letters, definite and indefinite articles (a, an, the), prepositions (from, by, with, etc.) and other terms that, taken individually, would not have helped in any way the understanding of the findings.

3.2 Data analysis

After their mining, the collected data have been treated through a sentiment analysis, realized by means of "SentiWordNet", a software that, considering lexical resources for opinion mining (Ohana and Tierney, 2009; Denecke, 2008), has enabled identifying people's perceptions, allowing understanding the overall polarity of a set of words (Hung and Lin, 2013). Indeed, the most frequently used words identified and extracted in the previous stage have been passed to the sub module responsible for the sentiment check.

It is a useful type of analysis to identify information in online sources (such as opinions, comments, posts etc.) through the determination of positive, negative or neutral polarity. The most commonly identified approaches to sentiment analysis can be divided into three macro-categories: keyword detection, lexical affinity and statistical methods (Troisi *et al.*, 2018). In this paper, the latter has been employed since it is more complete, even if more complex, being based on elements of machine learning: to seize a person's thought, the grammatical relations of the terms are taken into account by means of a thorough scan of the extrapolated text.

Specifically, for each word, the adjectives and expressions related to it have been checked against a lexicon annotated with sentiment values in order to establish their potential positive, negative or neutral value (Baccianella, 2010). The submodule has returned, for each adjective/expression, values in the [0,1] range, that represents the adjective/expression's positivity, negativity, or objectivity, whose sum total is 1. For the *i*-eth word, its corresponding positivity (Sp_i), negativity (Sn_i) or neutrality (Su) values have been computed as follows:

$$Sp_i = \frac{\sum_{k=1}^K p_k}{K}$$

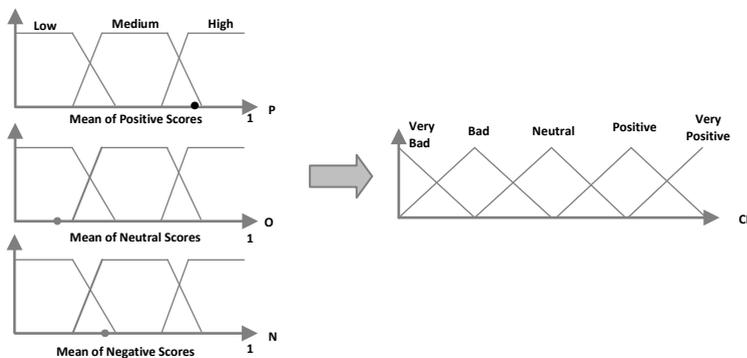
$$Sn_i = \frac{\sum_{k=1}^K n_k}{K}$$

$$Su_i = \frac{\sum_{k=1}^K u_k}{K}$$

where K is the total number of adjectives/expressions found and evaluated, and p_k , n_k and u_k are the k th positivity, negativity and neutrality value, respectively, for the k th adjective/expression.

Then, in order to estimate the collective perception related to a single word, a Fuzzy Inference System (FIS) (Guillaume, S., 2001) has been used for obtaining the value of the CP starting from the sentiment scores S_{pi} , S_{ni} and S_{ui} of the word computed by the SDA module with the formulas previously described. Such scores represent the inputs of the FIS and their membership functions are reported in figure 1. The FIS has allowed obtaining a value for the collective perception by “defuzzifying” the output (Kasabov and Song, 2002; Jang, 1993). The CP value has helped with the assessment of the community’s perception about the analyzed words and with the understanding of the strengths and weaknesses felt by people (Chang and Chang, 2006) about their preferences about shoes.

Fig. 1: Fuzzy variables and membership of the FIS for computing the collective perception



Source: Authors' elaboration

4. Results

With the aim to give an answer to the research aim, the software selected for the data collection (Twitter4J) has allowed gathering the 10% of all tweets containing the hashtag #shoes published during the period of analysis. The filter has permitted to extract about one hundred thousand words (precisely 91.223), within which about two thousand (1.837) different terms have been analyzed. Figure 2 shows a word cloud that includes the words most frequently used by users on Twitter in their posts about #shoes.

At this point, it is worth pointing out that the size of the terms showed in the figure 2 depends on the number of times that they have been extracted by the web crawler: the more the times the words are used, the bigger they are. Subsequently, with the purpose to better understand the users' opinion expressed by means of posts on Twitter, a sentiment analysis has been performed.

Fig. 2: The most used terms in the tweets containing the hashtag #shoes



Source: Authors' elaboration

Furthermore, it is necessary to underline that, in order to make the graphic representation clear, all the stopwords (such as articles, conjunctions, prepositions, etc.) have been preventively removed. After that, the words with a similar meaning posted more than 200 times on Twitter during the period of analysis have been grouped in a single concept and listed in descending order, as shown in in Table 1:

Tab. 1: The most frequently used concepts within tweets containing the hashtag #shoes

RANKING POSITION	CONCEPT	TERM
1st	Quality (4966)	#quality (1258)
		#comfortable (1008)
		#manufacture (833)
		#comfort (777)
		#traceability (558)
		#resistant (322)
2nd	Image (3732)	#fashionable (998)
		#beautiful (654)
		#design (616)
		#nice (557)
		#style (408)
		#chic (288)
		#stylish (211)
#swish (205)		
3rd	Price (2987)	#cheap (955)
		#price (558)
		#expansive (500)
		#money (442)
		#saving (300)
4th	Sustainability (1311)	#moneysaving (232)
		#environment (351)
		#sustainability (348)
		#environmentalism (210)
		#environmental (201)
		#protection (201)

Source: our elaboration

5. Discussion

5.1 Quality

Although, as pointed out by Fandos and Flavian (2006), the concept of quality, or more precisely, its perception, varies depending on lots of factors (such as the moment at which the consumer makes the purchase or consumes a product, the place where it is bought or enjoyed, and so on), according to the findings, regardless of all its possible forms, it would seem to be the variable mostly taken into consideration by people in purchasing their shoes, with a number of 4966 tweets.

This result is consistent with several studies, both dated (Juster, 1975; Triplett, 1975; Parasuraman *et al.*, 1985) and recent (Wang, 2017; Dedeke, 2016), from which what emerges is a high eligibility of quality in affecting the purchasing choices of the people. Not by chance, companies, both public and private, besides increasingly tending to be concerned with ensuring a high-quality standard of goods and services, also seek to ensure that the quality of their products is actually perceived by the recipients. All this depends on the awareness of the growing attention of the consumers to the concept of quality not only as goodness of good/service, but as the overall value gained from its use. In this regard, several scholars (Yang *et al.*, 2010; Sanchez-Rodriguez and Martinez-Lorente, 2004) have conducted empirical researches to assess the actual capacity of quality to influence the purchasing choices of the consumers, demonstrating how in many cases it can even influence their thinking.

In this regard, Stanley and Wisner (2002) justify the ability of quality to guide the purchasing process, arguing that it is due to the fact that nowadays consumers are used to gather information about the tangible and intangible characteristics of the products that they intend to purchase and this induces companies not to underestimate the quality of the proposed goods and services. This tendency to use a multiplicity of information channels, both direct and indirect, leads to the consideration that consumers can no longer be understood as purely passive recipients of business offerings (Troisi *et al.*, 2017; Loia *et al.*, 2016), but, on the contrary, as value co-creators (Polese *et al.*, 2017; Ciasullo *et al.*, 2017).

5.2 Image

The reading of the 3732 comments posted by people on Twitter emphasizes the great attention paid to the image of the shoes. In this regard, it is worth specifying that, in this paper, the concept of “image” does not refer (only) to the external appearance of a product, but, rather, to all those features that contribute to the people’s overall opinion about it. In this case, the image of a pair of shoes consists of those characteristics capable of inducing consumers to consider it as trendy, fashionable, swish, and so on.

Furthermore, besides including features properly linkable to the product, the image also refers to properties belonging to the company selling that product. In this perspective, Reza Jalilvand and Samiei (2012)

state that one of the most important things in which a company should interest is trying to create a good image in the consumer's head, since only products (and brands) with clear and recognizable logos can be remembered in the complex process that leads to the purchase.

Consistently, Wang *et al.* (2012) suggest that companies, in order to position or reposition themselves on the market, should necessarily focus on the planning and implementation of communication strategies designed to build an image capable of making the product appetizing. To this end, as Wu *et al.* (2011) argue that companies have to define or enrich the image through the brand-product associations able to convey positive elements or concepts within customers' minds, both current (retention of existing consumers) and potential (acquisition of new consumers).

Therefore, since every market, from a cultural, social and mental point of view, is constantly evolving, in order to reach and maintain a successful competitive position over time, companies cannot ignore the need to adapt to the evolution of the consumers' mental images (Pope and Voges, 2000), combining communication strategies immediately working to other ones projected on longer-term prospects. Such strategies can be used to reinforce existing mental associations (for example, making recipients more sensitive and responsive to certain themes or issues) or to create new mental associations (for example, by disseminating information capable of determining a good product placement in the consumer's mind).

5.3 Price

As easily predictable and demonstrated by the 2987 tweets, price represents one of the most important variables that people assess in adopting their own purchasing behavior. In the choice of shoes, as for any other products, people more or less carefully assess their availability to support a certain price in exchange of specific merchandise characteristics. Purchase is finalized only whether the perceived benefits of using the good/service exceed the price to be paid to buy it.

Over the years, numerous authors (Deaton and Muellbauer, 1980; Lichtenstein *et al.*, 1993; Degeratu and Rangaswamy, 2000; Arnould *et al.*, 2002; Haucap and Heimeshoff, 2011) have dealt with the issue of price fluctuation on consumers' behavior, highlighting that only in particularly exceptional cases it is completely ignored (for example, in the circumstance in which the price to be sustained to buy the product is quite trifling or very low compared to the consumer's economic availability). In all other cases, in line with what Mian (2013) has pointed out, consumers tend to highly take into account the price, often considering it as the main variable.

In light of this statement, Cho *et al.*, (2013) define the price as the most important lever to be managed to make efficient any company's marketing strategy: in addition to affecting the company's profitability, the price is also a powerful tool for communicating the brand or product image outside, since it allows the company to segment the market and thus choose the recipients of its offer.

Over the years, for a number of reasons, especially linked (but not limited to) to the global economic crisis, the attention to pricing has exponentially

grown (Cohen and Garrett, 2010), to the point that, nowadays, consumers seem to show a great sensitivity in this regard. Undoubtedly, the economic crisis has been a strong catalyst for this tendency, but it is not possible to deny that it has been alongside by the emergence of a new system of values, oriented towards a more cautious and selective consumption (Stavrianea and Siomkos, 2016).

In other words, consumers' behavior appears as influenced not so much by the desire to save money, but rather by the willingness to spend it sparingly. This approach is the basis of the concept of value for money (Andersen, 2000), an axiom aimed at valorizing money, without any self-imposing spending limit, which suggest that this kind of price attention should not be meant as consumer aversion, but rather as a propensity to a smart spending.

5.4 Sustainability

According to the big data analysis carried out, sustainability is ranked last of the factors capable of orienting consumers' purchasing choice, as demonstrated by the only 1311 posts on Twitter. However, this finding is not consistent with the results arising from several other studies (Schaltegger and Wagner 2017; Douglas, 2015; McKinnon *et al.*, 2015; Vlek and Steg, 2007) in which it is supposed to be one of the main variables taken into consideration by people in their purchases.

In this regard, it is worth underlining that, especially recently, the number of contributions that highlight the primary role played by sustainability in current markets is increasingly enhancing. In fact, some authors (Partridge 2014; Johnsen *et al.*, 2014) emphasize the great attention paid to environmental issues by people, who seem to be more and more concerned about the dangerous effects of climate change (Schipper and Pelling, 2006), such as the melting glaciers caused by global warming, the depletion of natural resources, etc. Likewise, Ciasullo *et al.* (2017) and Lopes *et al.* (2015) even state that the adoption of sustainable practices can be understood as the driving force of the competition, the winning strategy to enable companies to reach and defend their success.

However, the results of the performed big data analysis show that, regardless of what is stated in literature, sustainability seems to be even ignored by consumers of shoes. In an attempt to provide an explanation to this finding, it is possible to imagine that it depends on the fact that in the present socio-economic context, the term "sustainable" seems to have been emptied of its true meaning: the feeling is that many people are not entirely convinced of the effective sustainability of business practices, which often are focused on sustainable activities, which at best are only a little less unsustainable than their conventional alternatives (Engelman, 2013).

In other words, whether on one hand the widespread use of the term "sustainable" reflects a greater public awareness of the critical environmental situation, or on the other hand, the actions undertaken until now to address the related problems are still far from producing tangible and concrete results.

6. Theoretical and practical implications

The study provides some important contributions, both theoretical and managerial.

As concerns the theoretical profile, the research highlights the opportunity to ennoble an interdisciplinary convergence between technological know-how (and, in particular, connected to digital technologies) and managerial knowledge in order to capture the relevance and the impacts that the former can take on managerial choices. More in depth, the development of an advanced research framework in this study has not yet been illustrated in the sustainability management literature in general and in the footwear context in particular. Although literature has proposed tools to support sustainability management such as guidelines, indicators, or international standards, their effectiveness in terms of decision making is vain. On the contrary, the analysis proposed can represent a useful approach for a better decision making in terms of strategic analysis and measurement of the effectiveness of implemented actions. In this direction, the overall framework proposed can be implemented to support decision support systems (DSSs) through which corporate sustainability can be analyzed, managed, measured and aligned with corporate strategies. Furthermore, the employment of technologies like Twitter, green (i.e. non-polluting), cheap and focused on people's opinion, is in itself a practice oriented towards the environmental as well as economic and social dimension of sustainability. In this regard, this work could contribute to give an impulse to the development of the scientific debate that involves academics, Non-Governmental Organizations (NGOs), professional bodies and government agencies to reflect on more complying management systems, related digital tools and applications to enhance/improve corporate sustainability.

Practical implications also emerge from the study. First of all, the study can enhance managerial capabilities for those footwear companies actively engaged in the sustainability-oriented business strategies. The systematic analysis of points of view, preferences and expectations would allow the development of innovative eco-value propositions in terms of both products (i.e. environmentally friendly shoes) and services (i.e. reverse logistics). By doing this, companies could improve ecological and social value in concert with financial value.

Moreover, the findings invite managers of footwear companies, engaged in sustainable strategies, to reflect on the most appropriate actions. According to the big data analysis carried out, consumers' behavior appears as influenced not so much by the concept of sustainability in itself but by other factors considered relevant such as quality, image and price. This implies two main considerations. First, sustainability has not been fully popularized yet in the shoes market and in particular in the shoes fashion one. Secondly, consumers who are involved in fashion footwear do not assume a negative attitude towards sustainability. These considerations suggest the need to adopt coherent marketing advertisement strategies. In particular, marketers should put in place many efforts in communicating value and values that sustainable shoes consumption can generate for both

individual consumers and society. For example, marketing messages should emphasize that sustainability is synonymous with high-quality because, for example, it is related to handmade shoes produced with respect for the environment and human health. In this case, the traceability of products should be emphasized in terms of supply chain design and management. Another example is to emphasize that sustainability is synonymous to product innovation complying with the actual more dynamic life style, or, even to launch a lifestyle. Hence, also aspects related to products design should be accentuated by highlighting that shoes are eco-friendly products designed by considering green principles from the beginning of the manufacturing process and by making the packaging recyclable and reusable to minimize its environmental impact.

In any case, it is important that marketers spread sustainability information through the use of various promotional tools to enhance a more positive attitude about their sustainable brands. In sum, a strategic communication assuming also an educational role should be pursued with the aim to make consumers able to understand that an ethical consumer behavior incorporates a sustainable well-being.

Ultimately, from the study interesting food for thought comes for policymakers, who, now more than ever, are called to stimulate the spread of awareness about the benefits of sustainable development through the definition and implementation of policies able to enable both private and public companies to operate in compliance with the dictates required by economic, environmental and social sustainability (Geels *et al.*, 2015; Cohen and Munoz, 2016). Sustainability is the basis of the current and future well-being of the world community and, therefore, it has to be taken into account in all actions having repercussions on consumers and, more generally, on citizens. Among other things, the results of the big data analysis performed underline the urgency with which the governments of the various countries of the world should act to stimulate an inversion of tendency, capable of preventing the dramatic and dangerous exceeding of limit thresholds beyond which the negative effects could create an emergency on a global scale (Luthra *et al.*, 2016; Lehner *et al.*, 2016). To this end, however, it is necessary to adopt concrete economic, social and environmental policies, unlike what often has occurred, when actions simply “a little less unsustainable” than traditional alternatives have been undertaken (Bly *et al.*, 2015).

7. Conclusions

The aim of this paper is to provide new insights into the corporate sustainability management related to footwear companies. Although sustainability represents a widely discussed topic when related to footwear companies, it is still in a primordial state. In fact, sustainability needs to be engaged in corporate management as a proactive strategic choice to enhance business competitiveness. In this respect, sustainability could be managed as a fundamental competitive differentiation lever to increase market share. In such perspective, managers need to improve their

understanding in terms of both effective actions and implications that lie behind these multifaceted choices. The role played by the abundance of information and, through it, by the possibility of exploring new actionable knowledge, in the wide domain of behavioral dynamics of the demand, appears critical and relevant. In an explorative way, this research has embraced a big data analysis through an important *social network* such as Twitter, taking part to the wide and complex scenario of studies devoted to the theme of the variables that people tend to take into consideration in their purchasing choices. To this end, the authors have made a big data analysis with the help of specific software. In detail, the data collection has been realized by deploying a web crawler on Twitter. Subsequently, the extracted tweets have been analyzed by using SentiWordNet, a software capable of distinguishing people's positive and negative opinions.

The analysis has been carrying out for a rather extended period (about one year) to avoid distortions associated with seasonality and, consequently, to allow for a sufficiently reliable generalization of the results. Basically, the strength of this work is that the research has been conducted by analyzing a very large number of opinions (tweets) expressed by means of people's posts on a *social network*. However, this *modus operandi* also presents a limit, due to the fact that the automated collection of people's posts has prevented from going more in depth in understanding their real ideas about the variables more capable of orienting their shoes purchasing behavior. Therefore, in the future, it could be useful and interesting to develop/organize another project related to the same theme but by using a qualitative approach (i.e. the in-depth interview technique) in order to compare its possible findings with the result emerged from this research.

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