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Supply chain management: New professional and academic perspectives

Selected papers from Adaci-Smart Conference 2018

Tivoli Terme, Roma, Italy, November 8-9

Guest editor: Francesco Rizzi

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Original research papers

Useful information for readers and authors

Aphorisms

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1. *There is no elevator to success. You have to take the stairs*
   (Zig Zaglar)

2. *Whoever receives more receives from someone else; he is no greater or better than someone else: he has only greater responsibilities. He must serve even more. Live to serve*
   (Hélder Câmara)

3. *If you are persistent you will get it, if you are consistent you will keep it*
   (Harvey mac Kcay)

4. *Only those who dare to fail greatly can ever achieve greatly*
   (Robert F. Kennedy)

5. *A man needs to stock up on his dreams*
   (José Saramago)

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Introduction to the special issue on the ADACI-Smart conference

Francesco Rizzi

In times of scarce resources, efficiency is a crucial matter. This concerns not only material flows in production processes, but also time, money, creativity and other intangible resources that might lead to progress in the relationship between academia and industry.

The search for such efficiency has been the guiding force behind the organization of the ADACI's (Associazione Italiana Acquisti e Supply Management) SMART (Supply Management Academic Research Table) conference, held in Rome on 9th November 2018. The conference introduced a new format of collaboration between practitioners and scholars aimed at enhancing synergies between supply chain managers, who can provide access to relevant research environments and the benefits of privileged access to scientific stimuli, and researchers, who can apply scientific methods to solve urgent problems and are constantly challenged to advance their research and teaching performance. This format consists of a two-year cycle with periodical meetings among practitioners supervised by a Scientific Committee (Table 1) that stimulate collaboration between companies and academia and prepare the grounds for a bottom-up definition of the key topics to be discussed during the final conference. The SMART conference follows a call for papers and a peer-review process where contributions are selected based on their scientific and practical relevance, which is a prerequisite for enabling synergies among the conference attendees. The best contributions are then divided into thematic panels where both practitioners and researchers act as discussants so as to ensure the necessary interaction and stimuli for improvement within a lively and dynamic environment.

Tab. 1: SMART 2018 Scientific Committee

Alessandro Ancarani	Università di Catania
Barbara Gaudenzi	Università di Verona
Corrado Cerruti	Università degli Studi di Roma Tor Vergata
Francesco Rizzi (coordinator)	Università di Perugia
Francesco Testa	Scuola Superiore Sant'Anna
Ivan Russo	Università di Verona
Lorenzo Zanni	Università di Siena
Luca Ferrucci	Università di Perugia
Luciano Fratocchi	Università dell'Aquila
Luigino Filice	Università della Calabria
Marco Frey	Scuola Superiore Sant'Anna
Riccardo Lanzara	Università di Pisa
Ruggero Golini	Università di Bergamo
Silvia Bruzzi	Università di Genova
Marco Giannini	Università di Pisa

Source: ADACI, 2018

This format is applied to avoid duplications and overlapping with existing community-specific events, and to generate added value in terms of increased capability to design and develop meaningful and timely research.

The 2018 SMART conference, despite its experimental nature, attracted contributions from over 40 scholars from 12 different universities. Selected contributions were divided into 4 thematic round tables: new perspectives on public procurement, purchasing and business development, supply chain risk management and sustainable supply chain management. More than 60 managers, from such companies as -just to cite a few- Aptar Group, CONI Servizi, CONSIP, DeWalt Industrial Tools, Eli Lilly, Hugo Boss, Stanley Black Decker, and TUV Rehiland, attended the conference and contributed to the discussion by sharing their personal experience and comments.

This Special Issue aims at disseminating the main outcomes of this process. To this end, it collects the full-length version of the selected papers that, under the approval of the Scientific Committee, have been submitted to Sinergie-Italian Journal of Management for a regular peer review process.

The first paper, authored by Ivan Russo and Nicolò Masorgo (University of Verona), is entitled "Searching for the right operations strategy to manage the repair process across the reverse supply chain". It builds on the definition of reverse logistics by Rogers *et al.* (2002) to compare different outsourcing and insourcing strategies in the repairing process. The case study provides managers with an analytical framework to evaluate the pros and cons of open and closed-loop supply chains.

In the second paper, entitled "Managing resources and innovation inside the industry (Industrial) 4.0 Revolution: The role of Supply Chain", Niccolò Fiorini, Matteo Devigili, Tommaso Pucci and Lorenzo Zanni (University of Siena) investigate to what extent digitalization and the application of artificial intelligence to supply chain management processes drive firms' innovation process (Terjesen and Patel, 2017). The study's results contribute to the discussion on the rationale for Industry 4.0 by highlighting the importance of investments in the development of 4.0-related internal resources and of horizontal partnerships.

The third paper, entitled "How do firms interpret extended responsibilities for a sustainable supply chain management of innovative technologies? An analysis of corporate sustainability reports in the energy secto", authored by Eleonora Annunziata (Scuola Superiore Sant'Anna), Francesco Rizzi (University of Perugia) and Marco Frey (Scuola Superiore Sant'Anna), sheds light on the collaborative dynamics throughout the supply chain that might lead to the long-term sustainability of resource-intensive products. In particular, this study adopts an extended producer responsibility perspective (Hickle, 2017) to provide evidence of the vulnerability of a booming -and resource-intensive- technology, namely Lithium-ion batteries, to the consequences of difficulties in coordinating investments in proper end-of-life management.

In the fourth study, entitled "Building long-term supplier-retailer relationships in the jewellery sector: antecedents of customer loyalty", Elisa

Martinelli (University of Modena and Reggio Emilia) provides an analysis of the power vs. trust dichotomy in supplier-retailer relations (Kumar *et al.*, 1998). The results confirm the importance of building trustworthy and long-term relationships to realize the full market potential of luxury products.

The fifth paper, entitled "The new frontiers of procurement in the digital age. Results of an empirical survey on procurement 4.0 in Italy", authored by Silvia Bruzzi (University of Genova), Vincenzo Genco and Nicola Balbi (ADACI Lombardia-Liguria), provides a first attempt to describe what Italian supply chain managers know and think about Industry 4.0 and its potential for innovation in procurement processes (Ronchi *et al.*, 2010). The results - and lack thereof - reveal that, despite increasing interest and investments in e-procurement, the fourth industrial revolution is still at its infancy stage.

In the sixth paper, entitled "Manufacturing back-shoring and sustainability: a literature review", Cristina Di Stefano and Luciano Fratocchi (University of L'Aquila) review current literature on back-shoring (Wiesmann *et al.*, 2017) in order to build a conceptual model that depicts the motivations, drivers, outcomes, barriers and enabling factors of improvement in environmental performance.

Luca Ferrucci and Antonio Picciotti (University of Perugia), in their paper entitled "The social clause in public tenders: strategic interdependence among companies and economic distortions", analyze possible distortions in the strategies that companies implement to benefit from the social clause (Ghera, 2001) of public tenders. The results draw implications for employees' management, innovation and service quality, as well as recommendations for improving the quality of public tenders.

The last paper, entitled "Social enterprise and market orientation: roles and relationships for the management of sustainable supply chains", authored by Marina Gigliotti, Antonio Picciotti and Andrea Runfola (University of Perugia), describes the ways in which social enterprises (Kerlin, 2013) manage sustainability throughout their supply chain in order to deliver ethical products capable of obtaining enduring legitimacy among consumers.

As a whole, this collection of papers covers the most relevant Italian industries and opens a debate on some priority challenges for the evolution of procurement in view of modern supply chain management (Kraljic, 1988). The Scientific Committee of the 2018 SMART conference is thus confident that this special issue will help strengthen relationships between the Italian community of researchers in management sciences and the ADACI community, while laying the valuable foundations for the 2020 SMART conference.

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Selected papers

Searching for the right operations strategy to manage the repair process across the reverse supply chain[1]

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17th July 2019
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2nd August 2019

Ivan Russo - Nicolò Masorgo

Abstract

Purpose of the paper: *The paper aims to study the impact of different repair process strategies on a retailer's product returns management operations by focusing on a make-or-buy analysis for an outsourcing-insourcing decision-making process.*

Methodology*: An action-based research study on a single case study of an Italian small-sized retailer operating in the online commerce was carried out.*

Results*: Results shed light on the determination of the repair process strategies implemented by the retailer, the identification of the returns rate and the cost and benefits of each single strategy, and the definition of the best practice to be selected.*

Research limitations: *The main limitation of this research is the focus on a single case study that provides an insight on a specific industrial sector and on determined products.*

Practical implications: *This study bridges existing gaps in the literature at both theoretical level, by presenting a further case study on the repair process strategies, and at practical level, by determining a fully focused step-by-step analysis of the managerial decision-making process, while choosing the best practice in a make-or-buy framework.*

Originality of the paper: *This paper provides a make-or-buy analysis of the outsourcing-insourcing reverse logistics activities concerning an e-commerce retailer struggling with the best operations strategy to manage the repair process across the reverse supply chain.*

Key words: reverse logistics; repairing strategy; case study

1. Introduction

The returns management process is a core supply chain management process that comprises the activities related to returns avoidance, gatekeeping, reverse logistics and value maximisation in the recovery process of items (Rogers *et al.*, 2002). In 2017, the total merchandise entered in the American retailing reverse logistics was worth approximately US$350 billion (National Retail Federation, 2017), whereas the product returns rate in Europe (2016) was between 6% and 14% (Ecommerce News, 2016), with

[1] We would like to thank Polo Scientifico Didattico Studi sull'Impresa of the University of Verona and Fondazione Studi Universitari di Vicenza for their support and funding. This research was part of the research project "#BIT-Business Innovation and Digital Trasformation @ Vicenza" (2017-2019).

an estimated overall cost for return deliveries of more than US$230 billion (Statista.com, 2015). These costs represent an issue for retailers, who have started to identify the specific costs of items related not only to returns management (Ram, 2016) but also to reverse logistics (Bentz, 2015).

There is a specific call to explore strategies aimed at the managing supply chain backward flow and solve the trade-off between cost minimisation, customer service level and the total value recoverable from products (Dapiran and Kam, 2017). This need has been growing in relevance in online commerce, where the returns rate for e-tailers is reaching even higher rates (Dennis, 2018), causing retailers to re-evaluate the returns policy dimensions (Janakiraman *et al.*, 2016) and define the impact of the policy on the overall profitability (Hjort and Lantz, 2016).

A better returns management process requires specific characteristics that provide the consumer with an accurate consumer service: for instance, the speed at which the parcel travels along the reverse supply chain might influence the consumer's perception of the company's effort in managing returns (Griffis *et al.*, 2012), and an easy-to-return policy is among the first determinants in choosing where to buy (KPMG, 2017).

While product returns policies have been recognised as creating value for customers by improving the effectiveness in the activities related to "the physical flow of returned product and the timeliness and accuracy of the operations group in processing such products..".(Mollenkopf *et al.*, 2011, p. 393), product returns management represents for retailers a cost that is disproportionate compared with the forward logistics (Bernon *et al.*, 2012). Consequently, practitioners are trying to determine the right strategy for managing returns, both to provide consumers with an efficient and effective service and to guarantee a cost minimisation operation for the company by solving the existent trade-off between customers' experience of returning and the best strategy to be implemented by the focus company (Mollenkopf *et al.*, 2007a). Indeed, one of the main issues that managers struggle with is the solution to the cost-benefit analysis concerning the outsourcing-insourcing (i.e. make or buy decision) of returns management activities (Driansky *et al.*, 2016).

Currently, third-party logistics (3PLs) providers play an increasingly important role, not merely in logistics operations but also in returns management activities. The reduced risk in the logistics activities in terms of more resilient shipper-3PL relationships, the maximisation of value for customers realised from the overall network and the capabilities offered are among the main benefits that lead shippers to take advantage of 3PLs providers (Langley and Capgemini, 2018). Thanks to these aspects, recent trends have seen an increase in the use of 3PLs to effectively manage both the product returns and the activities of reverse logistics (Deepen *et al.*, 2008), with the identification of specific drivers that lead to this choice in order to be competitive in the market (Stock *et al.*, 2006). Accordingly, make-or-buy frameworks, which help to solve this dilemma, are important for the management of the reverse logistics (Vaz *et al.*, 2013).

Among the returns management activities, the repair process represents a concern for practitioners, first in terms of the service management as a means to differentiate themselves (Amini *et al.*, 2005), and second in terms

of the consumers' perceived quality of the recovered products (Wang and Hazen, 2016). The repair process concerns the return of products that cannot be directly reused: their working order is restored through the reparation or replacement of some components and then they are returned to legitimate customers (Agrawal *et al.*, 2016).

Drawing on the issues discussed above, this study aims at exploring the value of recovery practices in managing returns and examining different strategies in the repair process by determining the best choice among insourcing-outsourcing, thus expanding the current literature with a focus on a real case study. In addition, this research implements a make-or-buy analysis of the strategies by determining the critical factors affecting the various reverse logistics frameworks (Lee *et al.*, 2002; Vaz *et al.*, 2013) and thus uses the perspectives of the transaction costs theory related to the establishment of links with logistics service providers (Rabinovich *et al.*, 2007). In doing so, this research contextualizes the action-base study within a setting of make-or-buy analysis in the reverse supply chain context versus, contributing toward developing a middle-range theory for the operations and supply chain management field (Pellathy *et al.*, 2018).

Indeed, the paper provides a cost-benefit analysis of three different strategies to manage product repairs, answering precise questions regarding the profitability of this process, the impact on consumers' satisfaction and the competitive position of the company in terms of timeliness and control over the process, under the logic of the make-or-buy decision process.

The paper is organised as follows. The next section introduces the literature related to the repair process from an insourcing-outsourcing decision-making perspective, followed by an explanation of the methodology and the data collection process. Findings and results are then presented and subsequently discussed to determine the main theoretical and managerial implications. Finally, concluding remarks are provided, including the limitations of the research and recommendations for future development.

2. Literature review

For the purpose of this study, this section provides two main streams of literature: the first is focused on the outsourcing of returns management processes and, consequently, of the reverse logistics practices. The second aims at explaining the repair process and how the literature has been evolving in researching this topic.

2.1 Outsourcing the returns management activities

The activities of returns management were early identified as returns avoidance, gatekeeping, reverse logistics and disposal (Rogers *et al.*, 2002; Mollenkopf *et al.*, 2007b). This definition has lately been expanded to include other functions, such as returns authorisation, product recovery, processing and crediting (Russo, 2008; Russo and Borghesi, 2008; Mollenkopf *et al.*, 2011; Shaharudin *et al.*, 2015a; Bernon *et al.*, 2016; Huang *et al.*, 2016).

Recently, the environment in which companies operate has evolved into the online market, requiring management to likewise adapt the returns management process to e-commerce requirements (Mollenkopf *et al.*, 2007b; Bernon *et al.*, 2016). Accordingly, literature has focused its attention on the implications of the reverse flow of products becoming higher and higher (Rao *et al.*, 2018), by studying how the product returns policy may lessen these flows (Janakiraman *et al.*, 2016), and by identifying the economic advantage coming from product returns (Shaharudin *et al.*, 2015b). The returns management process has now emerged as one of the main issues within retailers' operations strategies (Griffis *et al.*, 2012) because of the increased effort and resources needed to manage product returns (Wang *et al.*, 2017; Daugherty *et al.*, 2019).

Therefore, relevant contributions uncovered the impact of these returns (online returns) on the retailer's profitability, whereas others have focused on the investment of the company in managing returns. Indeed, Hjort and Lantz (2016) determined that a free returns policy brings short-term benefits for the retailer, such as an increase in sales, but it may negatively affect the profitability, due to the higher costs to manage returns; Xia and Zhang (2017) developed a model to determine whether a manufacturer is incentivised to invest in the service management in order to reduce the chance of product returns.

Because of the growing complexity resulting from online product returns operations, authors have partially switched their focus to the convenience of outsourcing reverse logistics activities (Ordoobadi, 2009; Cheng and Lee, 2010; Wang *et al.*, 2017). Indeed, potential economic profitability has also been a driver for managing the limited availability of resources, thus determining the outsourcing of the reverse logistics as a preferred strategy (Meade and Sarkis, 2002), due to the competitive advantage that might be achieved with third parties that not only can perform a quicker and more accurate product returns (Stock *et al.*, 2006), but they can also reduce the related total costs (Li *et al.*, 2018). In this context, the make-or-buy analysis determines the right strategy to be implemented and is consistent with the transaction costs theory in determining the costs of participation in a market (Xu *et al.*, 2017). This theory assesses the convenience for a firm to favour market governance rather than opt for internal organisation (Paiola *et al.*, 2013; Enz and Lambert, 2015).

The literature provides several case studies regarding returns management functions that have been externalised to third parties (Karakayali *et al.*, 2007; Lu *et al.*, 2014; Li *et al.*, 2018). These examples help explain how the decision to outsource has brought benefits to companies (McCarthy *et al.*, 2013). However, more empirical results are required to extend the current literature (Li and Olorunniwo, 2008; Guarnieri *et al.*, 2015).

2.2 Repairing customer service and the recovery process

While the early literature defined the repair process as part of the product recovery management by referring to options for products to be returned to a "working order" (Thierry *et al.*, 1995), other authors have

included this process within reverse logistics activities, in particular as a form of reuse (Fleischmann *et al.*, 1997; Stock, 1998).

The link between reverse logistics and repair has also been defined as a service provided within service management, and thus an activity aimed at offering a service to consumers (Blumberg, 1999; Amini *et al.*, 2005). However, the difference between the repair process functioning as a product recovery practice and the repair service issued to consumers has been lately reconciled under the umbrella of reverse logistics processes (Rogers and Tibben-lembke, 2001; Bernon *et al.*, 2011). In fact, the repair service as a service management activity depends heavily on reverse logistics operations (Srivastava, 2008) since the repair service issues peculiar challenges to reverse logistics operations (Blumberg, 1999). The online retailer's dilemma to reconcile cost-efficiency and customer satisfaction (Walsh *et al.*, 2016) reflects the higher customers satisfaction obtained through a time efficient repair service (Amini *et al.*, 2005).

The repair process provides a company with competitive value regarding service management (Amini *et al.*, 2005), which compares different market opportunities in terms of efficiency and effectiveness (Blumberg, 1999; Dowlatshahi, 2010). Further, because the online market has led to a fiercer competition, retailers must accurately design their reverse logistics operations. As a result, companies tend to find a balance between reverse logistics costs and efficiency improvement by outsourcing these activities, thus allowing them to focus on their core business and consumer satisfaction (de Araújo *et al.*, 2018).

Consequently, management should determine the impact of outsourcing the repair process on repair costs, shipping costs and customers (Varadarajan, 2009). Moreover, they should attempt to determine the complexities introduced by reverse logistics activities, thus balancing the company's goals with customer requirements (Pellathy *et al.*, 2018; Russo *et al.*, 2018). This leads to a cost-benefit analysis of reverse logistics activities, which has been described in depth in the literature through both theoretical contributions (Dowlatshahi, 2000; Govindan *et al.*, 2012) and explanations of case studies (Lau and Wang, 2009; Dowlatshahi, 2010).

Nevertheless, the literature currently lacks further case studies able to provide evidence of the convenience of outsourcing or insourcing the repair process (Agrawal *et al.*, 2015). Thus, this study aims to reveal the main benefits and costs when different strategies are applied.

3. Methodology

The purpose of this research was to investigate the impact of an outsourcing-insourcing decision-making strategy concerning the repair process on a retailer's profitability. Because of the exploratory nature of the research questions, a case study approach was implemented, as recommended by Ellram (1996) and is evident in other studies in the existing literature (Falle *et al.*, 2016; Sgarbossa and Russo, 2017; de Araújo *et al.*, 2018).The case study approach has an action-based research context (Falle *et al.*, 2016), in which researchers collaborate with practitioners (Enz and Lambert, 2015) to conduct in-depth investigations into practical

concerns (Stringer, 2007; Näslund *et al.*, 2010). While the action-based context has been recognised as having a relevant and valid role in the discipline of operations management (Coughlan and Coghlan, 2002), it represents a less popular research process in other disciplines (Näslund, 2002; Sachan and Datta, 2005). However, some studies concerning outsourcing operations (Momme and Hvolby, 2002) and the selection of reverse logistics providers (de Boer *et al.*, 2006) have been published illustrating how action-based research might be applied to specific case studies.

3.1 Case study

A single case study approach was chosen because of the existence of certain elements of uniqueness of the case company (Ellram, 1996; Yin, 2013). First, it appeared that the company applied three different strategies to manage the repair process. Second, the data collected during the action-based study refer to a period of three consecutive years (2015-2017), covering the outcomes obtained by each strategy. Third, the possibility of directly accessing primary sources avoided any manipulation of information flow.

Another element to explain the uniqueness of the case study is the industry sector: the analysis regards the returns management of housewares industry, which was recognized as being among the first retail categories of product to be returned (National Retail Federation, 2017; National Retail Federation, 2018). In addition, the online retailing channel in which the company operates provides a further interesting aspect, offering a valuable insight.

The case company was an Italian e-commerce retailer distributing coffee and hot drink capsules, and loaning coffee machines to consumers. The retailer operated in a niche market, where only branded high-quality coffee was distributed to consumers, who counted for a total of 1723 in 2015, 1973 in 2016 and 2000 in 2017.

The supply chain was structured as follows: the retailer directly bought all the items produced by a unique first-tier supplier, then sold the products to final customers through either the online market or agents hired by the company, and finally shipped the parcels through 3PLs providers. While the forward supply chain had been following a well-organised scheme, the reverse supply chain design had changed over time. The focus of the current analysis was on the repair process. More specifically, the research only concerns the reverse logistics of two items corresponding to two models of coffee machine: M4 and M8.

On average, the retailer shipped 600 M4 items per year and 500 M8 items per year to consumers. The retailer sold both new and reconditioned coffee machines to consumers.

3.2 Data collection

The primary data were collected through daily observations conducted by visiting the retailer's warehouse facilities and offices, and examining the available recordings, documents and reports of the company. In addition,

two qualitative semi-structured interviews with the retailer's managers formed part of the research aims: a preliminary interview to define the historical development of the company and its reverse logistics activities, and a final interview to determine the future course of action.

The following specific information was provided by the company: the retailer's employment labour cost per hour and the required time for each reverse logistics activity operated by the retailer. The data were collected between January 2017 and March 2017.

The analysis presents the outcomes concerning two models of coffee machines loaned simultaneously by the retailer. This allowed us to compare the internal outcomes and provide a clearer picture of the retailer's operations. To assess the figures concerned with the forward and reverse logistics activities of these two distinct models, we utilised the only characteristic that marked the unicity of each machine. Each item had a unique serial number, which was used to trace the items; thus, whether the specific item had been returned at least once during the analysed period could be ascertained. Our analysis counted a total number of 2120 for the M4 item serial number and 1126 for the M8 item serial number.

4. Findings

4.1 Three repair process strategies

The preliminary interviews delivered the first finding of this research. The company consecutively applied three different reverse logistics and repair process strategies over three consecutive years, without distinguishing the strategy for the two types of items, because they followed the same reverse logistics process.

The first reverse logistics strategy was the result of an already established framework between the retailer and the first-tier supplier: the producer's know-how and the standard fare paid per unit for the repair process were the determinants of a competitive strategy. The reverse supply chain presented a design based on the collection of a minimum required number of products by the repairing centre, that is, approximately 130 items. The collection process was internally managed in order to control whether the supposed number of items to be returned matched with the actual sent back coffee machines. Indeed, once the single unit entered the company warehouse facility, it was temporarily stocked on a pallet until the achievement of the threshold. Thereafter, the items were submitted to the repair centre of the first-tier supplier, repaired and shipped back to the retailer in a total of two months. The two main drawbacks of this strategy were the lack of agility in the repair process, because of the quantity requirements and the excessive time expenditure, and poor control over the repair process quality. Thus, the quality control on the (re)forwarded coffee machines represented a fundamental activity that was internally operated.

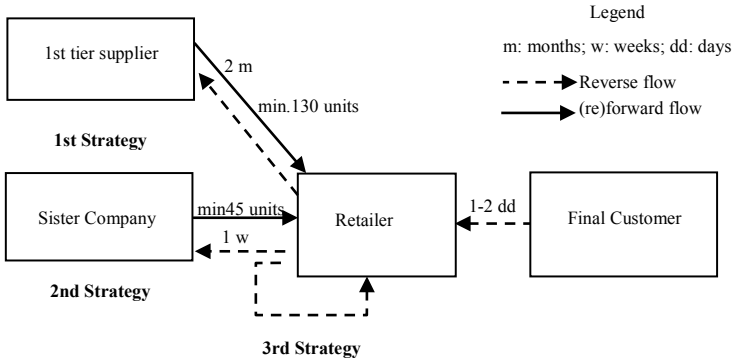
The second reverse logistics strategy was implemented to solve the aforementioned issues: while the collection process was insourced, the

retailer outsourced the repair process to a company pertaining to the same group of companies. The two companies were sharing the warehouse, which also constituted the location of the outsourced repair process. Thus, the repair company could provide the retailer with more control and a cut of the haul costs to the repair centre. In addition, the time and thresholds to repair the items were reduced to one week and 45 units, respectively, allowing the retailer to be more agile. In contrast, the repair costs rose, affecting revenues and thus reducing economic competitive advantage.

The third reverse logistics strategy derived from the benefits encountered in the second strategy. Observing the reduction of the transport cost to the repair centre, the increased control over the repair process quality and the obtained agility, the retailer internalised the entire repair process by hiring staff and procuring the necessary equipment and components.

The three reverse logistics strategies are depicted in Figure 1.

Fig.1: Three reverse logistics strategies



Source: Own elaboration

4.2 Average cost per repaired unit

The cost of the repair process was estimated using a cost function comprehending the direct and indirect operational expenditures pertaining to each strategy. The cost items were summarised into five categories: the reverse logistics cost, the unit's evaluation cost, the repair cost, the quality control cost, the packaging cost and the (re)forward logistics cost. It must be underlined that the comparative analysis among the strategies was conducted by focusing on the average cost per repaired unit, which was estimated by determining the cost of each single operation for each single unit, as shown in Table 1.

Accordingly, different outcomes were obtained for each strategy and for the two types of item (Table 2). While the first strategy presented some cost advantages, such as a standard fare for the repair and the unnecessary unit's evaluation, the reverse logistics and (re)forward logistics costs were relatively higher than in the other two strategies. In contrast, the second strategy showed a progressive increase, not only in the repair cost but also in the packaging cost for both items. Finally, the insourcing strategy brought about a cut in the repair cost but the emergence of the unit's

evaluation cost. Overall, item M4 was slightly more expensive than M8, except for the standard fare of the first strategy.

Tab.1: Cost estimation sources

Cost Activity	Estimation sources
Reverse logistics	Third-party logistics provider invoices
Unit's evaluation	Workforce: Internal accounts (time/unit) in €
Repairing	1st Strategy: Standard fare-first-tier supplier invoices 2nd Strategy: Workforce-sister company invoices; components-first-tier supplier invoices 3rd Strategy: Workforce (time/unit) in €; components-first-tier supplier invoices
Quality control	Workforce: Internal accounts (time/unit) in €
Packaging	1st Strategy: Standard fare- first-tier supplier invoices 2nd Strategy: Workforce-sister company invoices; components-first-tier supplier invoices 3rd Strategy: Workforce-internal accounts (time/unit) in €; components-first-tier supplier invoices
(Re)forward logistics	Third-party logistics provider invoices

Source: Own elaboration

Tab. 2: Average cost per repaired unit for each strategy

	1st Strategy		2nd Strategy		3rd Strategy	
	M4	M8	M4	M8	M4	M8
Reverse logistics	€ 9.48	€ 9.48	€ 7.98	€ 7.98	€ 7.98	€ 7.98
Unit's evaluation	€ -	€ -	€ -	€ -	€ 1.40	€ 1.40
Repairing	€ 18.00	€ 18.00	€ 21.76	€ 18.80	€ 15.71	€ 11.69
Quality control	€ 0.28	€ 0.28	€ 0.28	€ 0.28	€ -	€ -
Packaging	€ 3.00	€ 3.00	€ 5.32	€ 5.60	€ 5.32	€ 5.60
(Re)forward logistics	€ 8.50	€ 8.50	€ 7.00	€ 7.00	€ 7.00	€ 7.00
Average cost per repair	€ 39.26	€ 39.26	€ 42.34	€ 39.66	€ 37.41	€ 33.67

Source: Own elaboration

4.3 Return rate

Once the three strategies had been defined, the analysis proceeded by determining the return rate and consequently the number of units that were repaired in the specific period. First, we distinguished two types of product returns: items that the final customer wanted repaired and those that constituted returns owing to consumers' remorse or dissatisfaction.

The return rate was determined by analysing the serial number of each item to obtain the exact number of items returned over a specific time, distinguishing the reason behind the return (repair, remorse). The following formulas were then implemented:
where $r(t)_{REP}$ is the return rate at time t for the repaired items, $r(t)_{REM}$ is the return rate at time t for returned units for remorse, $Q(t)_{REP}$ represents the total returned units to be repaired at time t, $Q(t)_{REM}$ represents the total returned units for remorse at time t, $Q(t)_{S}$ is the total units shipped at time t and $Q(t)_{C}$ is the total units already by consumers at time t.

$$r(t)_{REP} = \frac{Q(t)_{REP}}{Q(t)_S + Q(t)_C}$$

$$r(t)_{REM} = \frac{Q(t)_{REM}}{Q(t)_S + Q(t)_C}$$

Tab. 3: Return rate

		1st Strategy	2nd Strategy	3rd Strategy
M4	$r(t)_{REP}$	12%	17%	14%
	$r(t)_{REM}$	3%	3%	2%
M8	$r(t)_{REP}$	5%	11%	12%
	$r(t)_{REM}$	1%	1%	2%

Source: Own elaboration

The return rate regarding the items to be repaired increased over the implementations of the second and third strategies, although the third brought a benefit compared with the second strategy. Moreover, these findings suggest that the returns for repairing were the real concern of this company. Indeed, the return rate for remorse or consumer dissatisfaction represented only a residual percentage.

5. Discussion

Our study emphasises the difficulties in managing e-commerce returns and reverse logistics practices, supporting the previous literature (Griffis *et al.*, 2012; Rao *et al.*, 2018), by showing how the repair process strategies have evolved in a small-sized e-commerce retailer who sought a solution for this issue. The research also identifies the cost items that might be associated with insourcing or outsourcing the reverse logistics activities, thus introducing in the literature a study also comprehending expert opinions as well (Ordoobadi, 2009). In addition, the cost-benefit analysis presents further evidence concerning the advantages and disadvantages that the single strategy brought, thus attempting to bridge the current gap in the literature.

First, the research extends the literature with a unique case study of an e-commerce retailer, which presents some peculiarities that justify the choice to opt for a unique case study analysis. More precisely, the description of the three different strategies and the outcomes obtained satisfy the need to provide more insights, not only into the outsourcing of reverse logistics activities (Li and Olorunniwo, 2008; Cheng and Lee, 2010; de Araújo *et al.*, 2018), but also on which cost items the retailer considered for the evaluation process (Ordoobadi, 2009).

Second, the repair service, seen as a reverse logistics activity, has increasingly played a competitive role for the case study company. Thus, an implication of the research concerns the choice, based on actual outcomes, between internalising or externalising the process, which helps to expand the literature by determining the possible disposition strategies that can

be implemented (Agrawal *et al.*, 2016) and considering the critical factors of a make-or-buy decision for reverse logistics activities (Vaz *et al.*, 2013). Comparatively, the analysis has highlighted the two main drivers that were relevant for the case company: the possibility for the retailer to control the repair procedures and the time and quantity constraints represent the main determinants that led the company to switch from one strategy to another. In addition, the costs of each operation have likely influenced the decision to outsource or insource the repairing within a specific period.

Third, the study aimed at measuring the impact of the various strategies on both the retailer's profitability, thus enriching the literature with this new analysis (Hjort and Lantz, 2016), and the customers' service perspective using the middle range theory (Pellathy *et al.*, 2018), that is, the company's ability to match the consumers' requirements through an appropriate strategy. Although the retailer had opted for different solutions to manage the repair process, which should theoretically have left the customer service unvaried, the evidence supports an impact on customer satisfaction concerning the items. More precisely, the fact that changing strategies implies a change in the returns rate demonstrates the direct effect of the different repair process on the final customers' evaluation of the repaired item.

Finally, the research develops a make-or-buy analysis in an action-base study, thus contributing toward the literature at theoretical level by presenting a valuable insight for the middle-range theory applied to the supply chain management.

6. Managerial implications

Our study reveals the impact that different strategies for the repair process had on the reverse logistics design; moreover, a cost-benefit analysis provides a base for the strategies' comparison. In detail, the research determines, through an exploratory study, the implications that an outsourcing-insourcing decision-making process brings to returns management processes carried out by a small-sized e-commerce retailer.

First, it appeared that the repair process was a concern for this firm, which attempted to solve it by applying three strategies. This analysis presents a pattern that practitioners might follow to determine costs and benefits of their reverse logistics practices. Indeed, the current study has revealed to the host company the main advantages and disadvantages of each strategy under an economic and operational point of view.

Second, the cost analysis displays an analytical estimation of relevant cost items that practitioners can implement to obtain a holistic view of the expenditure of their reverse logistics processes. In addition, other variables that might be unlikely evaluated together were considered to provide a comprehensive cost-benefit analysis.

Third, we developed a method to compare different repairing strategies under both an economic and the best practice point of view, which provides a full insight into a unique single case study of a small-sized Italian e-commerce retailer struggling with the reverse logistics process. The make-or-buy framework allowed the company to determine which

of the three strategies was the most feasible and convenient. In detail, the middle-range theory can help scholars to improve their relevance and interactions with managers when disseminating knowledge and improving practices (Lambert and Enz, 2017)

Finally, an appropriate best practice in the product returns management is to determine the more suitable strategy by considering the trade-off between different drivers, such as: efficiency, level of control and final customers satisfaction, as suggested by Sajjanit and Rompho (2019).

7. Limitations and future research

Despite its contributions, this study has certain limitations. Although it has been recommended in the literature to employ a single case study when it presents unique characteristics (Ellram, 1996; Yin, 2013), the research focuses on two products sold by a single company operating as an online retailer in the household appliance industry sector, limiting the scope of application of the strategies to other case studies. In addition, the analysis was carried out covering a certain period of three consecutive years, limiting the outcomes and the analysis. Nevertheless, the purpose to study and determine the best operations practice to manage the repair process was achieved. Future research should expand the case study to a greater number of companies, to an increased time framework and eventually to other industry sectors. Moreover, the evolving e-commerce scenario requires new capabilities to manage product returns and reverse logistics activities (Daugherty *et al.*, 2019).

Further, the research does not directly consider the impact that the strategies had on the final consumers, thus further studies might define the consequences for the consumers of the outsourcing or insourcing repair process in a reverse logistics context. Indeed, as recommended by Russo *et al.* (2019), different alternatives in managing returns might be implemented to increase the customers' satisfaction.

Finally, the company did not operate any form of returns avoidance, that is, the opportunity to avoid unwanted returns (Lambert and Enz, 2017), thus allowing consumers to complain liberally and return the item at any time. Future research could determine the implications that the implementation of this returns management activity has on consumers and on the rate of return, both in the case of repairs and in the case of remorse or dissatisfaction.

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Managing resources and innovation inside the industry (Industrial) 4.0 Revolution: The role of Supply Chain[1]

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Abstract

Purpose of the paper: *On the lights of Resource Based View (RBV), this research aims to analyse the impact of resources on Process Innovation (PI) in the context of Industry 4.0 (I4.0), thus proposing stimuli coming from Supply Chain (SC) as moderator of this relationship.*

Methodology*: Our conceptual model was tested on a sample of 115 Italian firms and data were collected through a structured survey submitted to purchasing and buyer agents/managers.*

Results*: The econometric analysis shows a positive impact of resources 4.0 on PI, and horizontal stimuli coming from SC (Competitors, Universities, Consultants, and Technology Transfer Offices) were found to positively moderate this relationship. Moreover, post-hoc analysis shows that firms can obtain higher PI outcomes combining the exploitation of horizontal 4.0 stimuli with changes on BM.*

Research limitations*: This research presents three main limitations: (i) geographic location, all firms are Italian; (ii) timing, it assesses I4.0 in an early stage for the Italian entrepreneurial ecosystem; (iii) moderate sample size.*

Practical implications: *This study contributes to the understanding of both academic and practitioners of the impact of I4.0 on SC, trying to grasp not only the effect of internal resources but also of external stimuli.*

Originality of the paper*: To the best of our knowledge this paper is the first one analysing the impact of I4.0 stimuli on SC. Moreover, the survey involved a relevant number of on-field experts in comparison to similar studies on Supply Chain and I4.0 effects.*

Key words: industry 4.0; supply chain; innovation; technological resources; business model

1. Introduction

I4.0 has been a trend topic over the last few years, reaching almost a thousand works published in 2017 (see Figure 1). Moreover, as Table 1 highlights, this research topic has engaged the academic attention from several disciplines, such as engineering, computer science, business and so forth (see also: Kang *et al.*, 2016; Hermann *et al.*, 2016 and Liao *et al.*, 2017).

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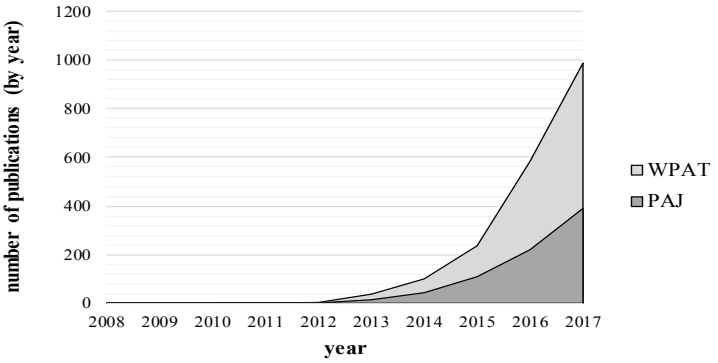
Fig. 1: Works on Industry 4.0



Source: SCOPUS, January 2008-December 2017

Research strategy: "Industry 4.0" OR "Industrie 4.0" in "Title, Abstract, and Keywords".

This area graph shows trends in the number of Industry 4.0 articles. WPAT = works published in all document types; PAJ = articles published in academic journals.

Tab. 1: subject areas of works on Industry 4.0

Subject Area	No.	%
Engineering	583	74,84%
Computer Science	224	28,75%
Business, Management and Accounting	179	22,98%
Materials Science	134	17,20%
Decision Sciences	116	14,89%
Chemistry	49	6,29%
Social Sciences	44	5,65%
Physics and Astronomy	40	5,13%
Chemical Engineering	25	3,21%
Energy	23	2,95%
Mathematics	23	2,95%
Economics, Econometrics and Finance	18	2,31%
Environmental Science	12	1,54%
Arts and Humanities	10	1,28%
Biochemistry, Genetics and Molecular Biology	7	0,90%
Earth and Planetary Sciences	6	0,77%
Agricultural and Biological Sciences	5	0,64%
Pharmacology, Toxicology and Pharmaceutics	4	0,51%
Medicine	3	0,39%
Psychology	2	0,26%
Neuroscience	1	0,13%

Note: The sum is not 100% because works overlap different subject areas

Source: Our elaboration

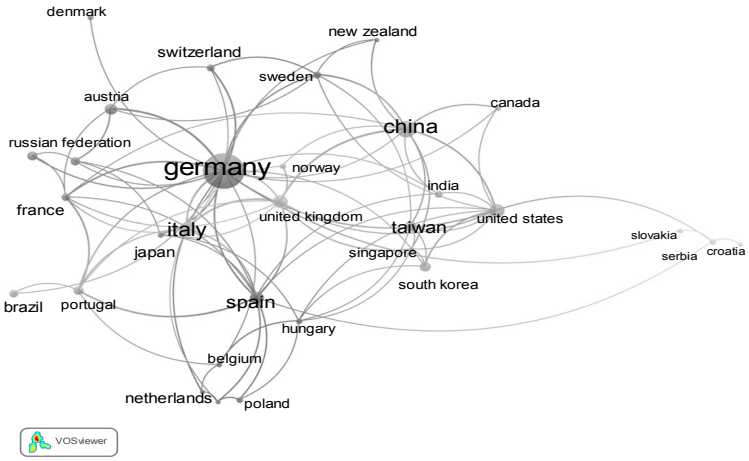
This interest is stimulated by the pervasive ability of I4.0 to integrate and merge the digital and virtual world both vertically and horizontally (Ghobakhloo, 2018). Indeed, we can consider I4.0 as a further step towards the digitalization of the manufacturing sector, driven by the (i) rise of available data, (ii) improvement of analytics and business-intelligence, (iii) enhancement of human-machine interaction, and (iv) progress in transmitting digital instructions to the non-digital reality (Sung, 2018). However, while technical aspects and the impacts of I4.0 technologies have been broadly discussed analytically, there is still need for both theoretical and empirical studies (Ben-Daya *et al.*, 2017; Bienhaus and Haddud, 2018).

The term *Industrie 4.0* (Industry 4.0) and its paradigms were designed in Germany (Kagermann *et al.*, 2013) to secure the future of the national manufacturing industry. The design and implementation processes were linked and supported by the "HightechStrategie" (HTS) plan launched by the German Ministry of Education and Research (Horst and Santiago, 2018). Following the German attempt, other countries introduced their own I4.0 plans: the UK ("UK Catapult - High Value Manufacturing"), USA ("Manufacturing USA", 2014), France ("Industrie du Futur", future industry, 2015), The Netherlands ("Smart Industry", 2014), and Italy[2] ("Piano Nazionale Industria 4.0", National Plan on industry 4.0, 2016). Nevertheless, the leading role of Germany on I4.0 emerges also at a research level, where this country authors (i) account for almost the 40% of the total work published and (ii) gain a central position in the international research scene as the most cited (see figure 2). Other countries extensively dealing with I4.0 are China, Italy, Spain, the US and the UK.

While differing *in* introduction and development policies, all the national plans aiming to introduce I4.0 focus on the same technologies and paradigms. However, scholars have not been able to reach a shared definition about I4.0, offering a noticeable variety of them (Bittighofer *et al.*, 2018), which were more than 100 until 2016 (Bidet-Mayer andCiet, 2016). This is why Pereira and Romero (2017) defined I4.0 as an "umbrella term" for a new paradigm regarding future industrial developments renouncing to identify a sole definition of I4.0.

[2] The "Piano Nazionale Industria 4.0" (PN4.0), also called "Piano Calenda" from the surname of the Ministry of economic development who promoted it, was presented for the first time in Milan in September 2016. It involved the government, some universities, some nation-wide research centres, some industrial organisations, as well as trade unions and the Italian investment bank CDP Spa. The PN4.0 aims to encourage investments in innovation as well as competencies. It helps companies in acquiring I4.0 technologies via tax breaks, and innovative start-ups to design I4.0 business thanks to venture capital financing. Moreover, there is help also coming from universities and research centres which are requested to perform researches in the I4.0 field. Several "Digital Innovation Hubs" (DIH) play the role of dissemination, technology transfer and help for companies and organisations. Moreover, the "Competence Centres 4.0" (CC4.0) are in charge of I4.0 formation, launch and participation in innovative processes (both at local, national and international level), and field testing. (www.mise.gov.it).

Fig. 2: Countries



Source: SCOPUS, January 2008-December 2017

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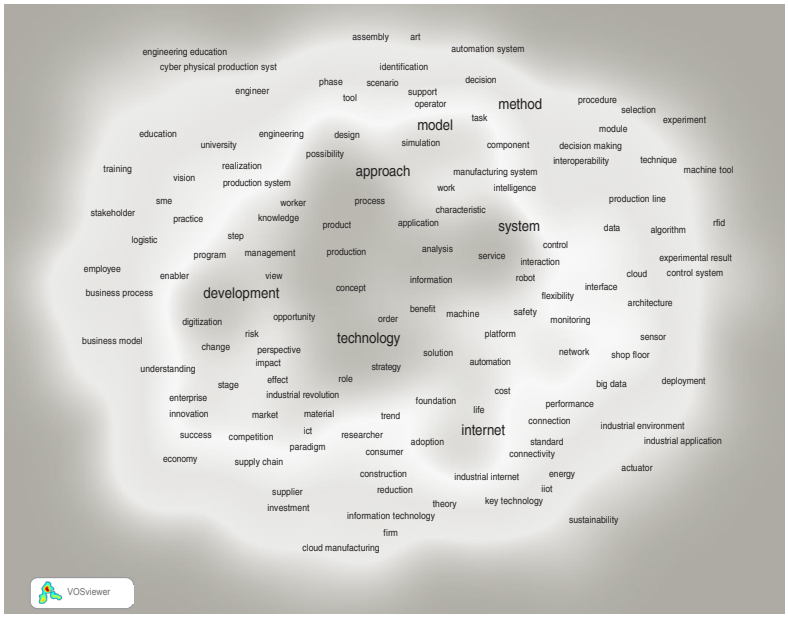
Nevertheless, analysing technical details of the fourth industrial revolution, we understand that I4.0 bases its pillars on existing technologies rather than on new ones: the difference relies on the exploitation of those technologies (Baur and Wee, 2015). For example, according to Schmidt *et al.* (2015) big data and cloud computing are driving forces for I4.0, but those technologies have already been used in several other contexts and for different applications (Drath and Horch 2014). Therefore, superior benefits come from a more integrated connectivity of all the actors and factors involved along the whole chain. Some scholars underline the important trend leading to the integration between physical and virtual spaces (Li Da Xu *et al.*, 2018), especially in manufacturing sectors. Indeed, not only machines, but also products, data, "things" and humans are connected according to the new I4.0 paradigms (see among the others: Kang *et al.*, 2016; Lin *et al.*, 2017; Lu, 2017; Wahl, 2015), thus leading to a necessary rethinking and reorganization of the whole industrial processes (Hermann *et al.* 2016). However, connection affects not only production systems, being the cornerstone for new organizational structures (Fantoni *et al.* 2017b), but also the value chain as a whole, especially in manufacturing industries (Rüßmann *et al.,* 2015). Indeed, according to Schrauf and Berttram (2016), the digital supply chain is the core of all the activities 4.0 implemented in the ecosystem, and in the near future, always more actors will count on digitised horizontal and vertical value-chain processes (Geissbauer *et al.*, 2016). Indeed, this adoption process of technologies and methods 4.0 aiming at both integration and interconnection of the SC, is also visible at regional level (Bertini, 2017). This careful attention paid to integration and interconnection is due to the fact that Integrative Technologies, such as Big Data, Internet of Things, and Additive Manufacturing, are considered core driving forces to increase profitability and competitiveness modifying SC outline through interconnectivity (Bucy *et al.*, 2016; Zhong *et al.*, 2016),

or to grasp advantages from synergies based on customisation (Kumar *et al.*, 2016). Hence, starting from the enabling technologies individuated by the "Piano Nazionale 4.0" and by the literature above concerning the I4.0 paradigm, we defined the following technologies as *Resources 4.0:* advanced manufacturing solutions, additive manufacturing, augmented reality, simulation, horizontal/vertical integration, industrial internet, blockchain, cloud, cyber-security, big data and analytics.

Recently, the I4.0 Paradigm has also captured the attention of SC literature, thus investigating the effect of 4.0 technologies on SC management (see among *other*: Tjahjono *et al.*, 2017, Ben-Daya *et al.*, 2017). Indeed, implementing I4.0 on SC may enhance flexibility, quality standards, efficiency, productivity, and product customization (Tjahjono *et al.*, 2017). However, to the best of our knowledge, no significant research has been conducted to understand the impact, attitude, and behaviour of all the SC actors towards new I4.0 resources. Furthermore, employing VosViewer, we performed a bibliometric analysis of 778 articles1, thus obtaining Figure 3 that shows the presence of SC theme in the I4.0 literature, *emphasising* also its peripheral position.

Fig. 3: Works density



Source: SCOPUS, January 2008-December 2017

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Therefore, much more investigations are needed to grasp richer insights on this phenomenon in order to investigate linkages and influences among SC and the most I4.0 core topics (see also: Kersten and Blecker, 2015).

Furthermore, from the literature emerges that I4.0 will not only impact on products but also on the design and manufacturing processes (Tjahjono

et al., 2017; Ghobakhloo, 2018). Indeed, the innovation of firms' processes is crucial to gain both productivity and efficiency improvements, and an effective competitive advantage (Terjesen and Patel, 2017; Trantopoulos *et al.*, 2017). However, given "*the complexity of identifying, developing, and implementing process innovations*" (Terjesen and Patel, 2017, p. 1421), firms should rely on external sources such as SC actors (Trantopoulos *et al.*, 2017). This is also due to the fact that I4.0 technologies, by integrating services and guaranteeing access to industrial ecosystem's information, offer a significant contribution to all the partners of the SC (Li Da Xu *et al.*, 2018). Moreover, I4.0 has a positive impact in process optimisation (i.e. in PI) during the engineerization process thanks to virtual simulations (Müller *et al.*, 2018). Furthermore, scholars point out not only the importance of I4.0 for product development, but also indicate the crucial role of I4.0 in increasing, optimising and, more generally, positively affecting processes in the whole SC (see, among others, Pereira and Romero, 2017 and Popkova *et al.*, 2019). Even though I4.0 affects both process and product innovation, focusing on the SC, I4.0 significantly affects mainly the processes (Lin *et al.*, 2017, and Fernández-Miranda *et al.* 2017). Among several positive influences of I4.0 on SC in terms of PI, some authors underline flexibility, greater communication and efficiency (among others, see: Ding, 2018, and Dalenogare *et al.*, 2018), while Kovács and Kot (2016) point out PI effects on logistics as a whole. Hence, when considering SC and I4.0 we believe it is relevant to focus our attention on I4.0 impact on PI.

Unfortunately, not only PI literature lacks quantitative analysis (Trantopoulos *et al.*, 2017) and a conclusive understanding of PI's antecedents (Keupp *et al.*, 2011; Terjesen and Patel, 2017), but also the research on the impact of I4.0 on PI is still scarce and fragmented.

Therefore, to enhance the discussion over these literature gaps, this research relies on the resource-based view (RBV) approach (Barney, 1991; Armstrong and Shimizu, 2007). Indeed, it is widely recognized that both internal resources (and capabilities) and external sources are able to affect firms' innovation, alone or jointly (Arora and Gambardella, 1994; Veugelers and Cassiman, 1999; Caloghirou *et al.*, 2004; Di Stefano *et al.*, 2012). Therefore, understanding (i) how resources are internally exploited according to the new I4.0 paradigm and (ii) what is the impact of external stimuli on PI, will promote a deeper understanding of Supply Chain 4.0 (SC4.0). Hence, from the perspective of internal firm resources, we aim to investigate the following research question: (RQ1) *What is the impact of Resources 4.0 on PI?*

From the perspective of external sources coming from suppliers, partners, and customers (Thomke and Von Hippel, 2002; Von Hippel, 2007) or from the "environment" (e.g. institutions. Lee *et al.*, 2001), we considered the impact of what we defined *Stimuli 4.0 coming from SC*. Based on Trantopoulos *et al.* (2017) we individuated the possible players bringing innovation in the SC (i.e. suppliers of materials, suppliers of machineries, suppliers of software, customers B2B, customers B2C, distributors/trade, competitors, university and public research centres, consultants, and technological transfer offices), whose impact was evaluated by interviews, and that were then divided, through factor analysis, into upstream,

downstream and horizontal sources. Hence, we want to understand: (RQ2) *What is the role of stimuli 4.0 coming from SC on PI?*

Lastly, a key strength of this research concerns the target respondent of the survey, namely purchasing and buyer agents/managers. Indeed, since this category plays a significant role in the development and procurement of resources, they are expected to have a substantial stake in the acquisition of key 4.0 resources. Therefore, thanks to the valuable collaboration of ADACI[3], we were able to gather data from a consistent panel of on-field experts.

The article is organized as follows: Section 2 discusses the theoretical framework, the conceptual model, and the research hypothesis; Section 3 outlines the sample characteristics, variables operationalization, and empirical methodologies; Sections 4 presents and discusses the findings; Section 5 draws some conclusions and discusses possible limitations and further research topics.

2. Theoretical Background and Conceptual Model

Considering the theoretical background exposed in the previous section, and looking at the origin of resources in a deeply interconnected and mutating environment, an internal/external investigation of resources' flows (Kogut and Zander, 1992 and Wahl, 2015) will allow a deeper understanding of the mutual influences exerted by actors involved in the SC4.0.

For what concerns the internal perspective, RBV theory stresses the importance of resources as they grant a competitive advantage to the company owing them thanks to their value, rareness, inimitability, and sustainability (Barney, 1991; Grant, 1991; Barney, 2001). However, firms are borderless in the SC, having both inter-organizational relationships as well as integrated business processes, (Halldórsson *et al.*, 2015; Zanni and Pucci, 2012). Thus, the RBV theory applied to SC4.0 should be analysed under a more flexible lens, admitting (i) the coexistence of different boundaries (Carlile, 2004) and (ii) the twofold impact of resources 4.0 coming both from inside the firm and from other SC actors. However, we should still define what we mean *by* "I4.0 resources". The current literature has highlighted several technologies enabling I4.0 and deeply influencing the firms' processes and production (Kreipl and Pinedo, 2004; Carbonneau *et al.*, 2008; Sahay and Ranjan, 2008; Visich *et al.*, 2009; Gebbers and Adamchuk, 2010; Lopez *et al.*, 2012; Maslarić *et al.*, 2016; Tian, 2016; Nakasumi, 2017; Wamba *et al.*, 2008; Witkowski, 2017; Majeed and Rupasinghe, 2017; Barreto *et al.*, 2017; Khaqqi *et al.*, 2018), thus bringing disruptive changes to the whole SC (Lu, 2017), and

[3] ADACI, Associazione Italiana Acquisti e Supply Management (Italian Association for Purchasing and Supply Chain Management) is the leading Italian association for procurement and supply chain management. Founded in 1968, ADACI is also the founder of the International Federation of Purchasing and Supply Management (IFPSM), the union of 48 National and Regional Purchasing Associations worldwide (sources: https://www.adaci.it and http://www.ifpsm.org/).

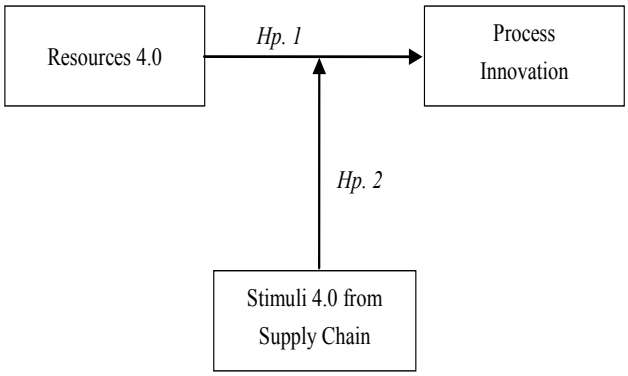
fostering SC progress (Witkowski, 2017). Among the other, they underline: advanced manufacturing solutions, additive manufacturing, augmented reality, simulation, horizontal/vertical integration, industrial internet, cloud, cyber-security, blockchain, big data and analytics. Given these theoretical bases, our first research hypothesis is: (Hp.1) *the procurement and development of resources linked with the I4.0 paradigm has a positive impact on the PI of a firm.*

For what concerns the external perspective, while Trantopoulos *et al.* (2017) focused on firms search for external stimuli, this inquiry aims to reverse the perspective looking for external stimuli influencing firm's process innovation.

The new SC4.0 is completely integrated, coordinated and controlled using an ICT platform (Atti, 2018b), and it has become a crystalline integrated ecosystem (Schrauf and Berttram, 2016). Moreover, Atti (2018b) states that the SC4.0 helps the co-creation and co-innovation thanks to the integration of procurement. The supply network structure of independent but well-connected actors looks after a collaborative advantage for everyone in the chain (Chen and Paulraj, 2004). Indeed, the integration among different firms of the SC is both horizontal (with Universities, Consultants, Technology Transfer Offices etc.), within the value chain, and vertical (with Suppliers, Customers, Distributors etc.), with linkages aiming to increase performances for outward-facing firms (Frohlich and Westbrook, 2001). Moreover, since the literature underlined how external sources, which might be vertically or horizontally linked with the company, are able to influence the adoption of innovations (Terjesen and Patel, 2017; Trantopoulos *et al.*, 2017), a similar result should be expected also in the case of 4.0 resources. Hence, we believe that stimuli coming from other players in the SC are able to moderate the effect of resources 4.0 on PI. Therefore, our second hypothesis is: (Hp.2) *stimuli 4.0 coming from the SC are able to positively moderate the impact of the Resources 4.0 on PI.*

Our research questions and hypothesis are visually summarized in Figure 4, thus showing our conceptual model.

Fig. 4: Conceptual Model



Source: Our elaboration

3. Methodology

3.1 Data Collection

Data were collected through a survey submitted both online and offline from July to October 2018 to Italian firms.

For what concerns the online channel, the e-mail survey was submitted to 467 firms obtaining 31 usable answers (redemption rate of 6, 64%). A presentation letter, outlining both research objectives and privacy information, was attached to each e-mail. For what concerns the offline channel, the research team attended several Conferences and Workshops organized by ADACI (Italian association for purchase and supply management), distributing the questionnaire directly to purchasing and buyer agents/managers, thus collecting 93 answers. Of these responses, 9 did not specify the company name, consequently were excluded. Data concerning the number of employees and years from the constitution were then gathered through secondary sources, namely the Chamber of Commerce. Therefore, we obtained 115 usable answers from: 33 Micro firms (employees < 10), 34 Small (10 ≤ employees < 50), 31 Medium (50 ≤ employees < 250), and 17 Large firms (employees ≥ 250). Respondents are mainly located in the north of Italy (62%).

3.2 Measures

The variables here presented are outlined in table 2, thus showing items description and Cronbach alpha when necessary.

Dependent Variable: Process Innovation is the outcome variable of our analysis and was measured through a multi-item construct developed by the research team, starting from Terjensen and Patel (2017). Firms were asked to state if they had introduced systems improvements concerning (1) supply, (2) storage, (3) production, (4) distribution, or (5) sale and post-sale in the last three years. Each item was operationalized as a dummy *where* 0 stands for not introduced, while 1 for introduced. Consequently, the PI variable was operationalized as the arithmetic mean of the five items.

Independent Variables: Resources 4.0 was operationalized starting from the *Piano Calenda* (2016). Firms were asked to state if they had introduced one or more of the following resources in the last three years: (a) advanced manufacturing solutions, (b) additive manufacturing, (c) augmented reality, (d) simulation, (e) horizontal/vertical integration, (f) industrial internet, (g) blockchain, (h) cloud, (i) cyber-security, (l) big data and analytics. Each item was operationalized as a dummy *where* 0 stands for not introduced, while 1 for introduced. Consequently, the Resources 4.0 variable was operationalized as the arithmetic mean of the 10 items. *Stimuli 4.0 from Supply Chain* was adapted from Trantopoulos *et al.* (2017), thus distinguishing among 10 possible players acting as sources of innovation: [1] suppliers of materials, [2] suppliers of machineries, [3] suppliers of software, [4] customers B2B, [5] customers B2C, [6] distributors/trade, [7] competitors, [8] university and public research centres, [9] consultants, and [10] technological transfer offices. Then, firms were asked to evaluate the

impact held by each actor on their learning process regarding Industry 4.0, from 1 "no impact" to 5 "high impact". Finally, through factor analysis, we obtained three variables merging [1], [2], and [3] in *upstream sources*, [4], [5], and [6] in *downstream sources,* and [7], [8], [9], and [10] in *horizontal sources*. The reliability test over these three constructs provided satisfactory results, showing Cronbach's alphas greater than 0, 7 (Hair *et al.*, 2010).

Tab. 2: Measures description

Variables	Items	Cronbach's α
Process Innovation		-
(dummy, 1 = "selected")	Technological improvements to supply systems	
Source: our processing and adaptation starting from	Technological improvements to storage systems (incoming logistics)	
Terjensen and Patel, 2017	Technological improvements to production systems	
	Technological improvements to distribution systems (outbound logistics)	
	Technological improvements to sales and after-sales processes	
Resources 4.0		-
(dummy, 1 = "selected")	Advanced Manufacturing Solutions	
Source: Piano Calenda, 2015	Additive Manufacturing	
	Augmented Reality	
	Simulation	
	Horizontal/Vertical Integration	
	Industrial Internet	
	Blockchain	
	Cloud	
	Cyber-security	
	Big Data and Analytics	
Stimuli 4.0 from Supply Chain		
(likert scale 1-5)	Upstream	0, 727
Source: our processing and adaptation starting from	Suppliers (materials)	
Trantopoulos *et al.*, 2018	Suppliers (machinery)	
	Suppliers (software)	
	Downstream	0, 730
	Customers (B2B)	
	Customers (B2C)	
	Distributors/Trade	
	Horizontal 0, 800	
	Competitors	
	Universities and Public or Private Research Centres	
	Consultants	
	Technological Transfer Offices	
Control variables		
(Natural logarithm of the number of years since the constitution)	Age (log)	-
(Natural logarithm of the number of employees)	Size (log)	-
(Percentage of foreign sales on total turnover)	Foreign sales	-
(Percentage of R&D expenditure on total turnover)	R&D expenditures	-
(dummy, 1 = "selected")	Busin. Model Innovat.	-

Source: Our elaboration

Control Variables: To reliably test the relationship among dependent and independent variables and to control for endogeneity, we introduced several control variables able to influence PI. We employed the natural logarithm of (i) the number of years since the constitution and (ii) the number of employees, to control respectively the firm's Age and Size, and the percentage of (i) foreign sales on the total turnover and (ii) R&D expenditure on the total turnover, to control *the Foreign Sales and R&D expenditures* (Terjensen and Patel, 2017; Trantopoulos *et al.*, 2017). Moreover, we added *Business Model (BM) Innovation* as a further control variable. This was operationalized asking firms if the innovation brought by Industry 4.0 changed their business model (dummy 0/1), thus the strategic and organizational procedures through which firms generate value (Pucci, 2016).

4. Findings

Table 3 outlines the descriptive statistics and Pearson's correlation among dependent, independent, and control variables. The correlation indicators do not reveal problems in terms of multicollinearity, as confirmed by low VIF scores and high Tolerance for all variables, see Table 4.

Tab. 3: Descriptive statistics and correlations

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
[1]	Process Innovation	1,000									
[2]	Age (log)	0,117	1,000								
[3]	Size (log)	0,092	0,481	1,000							
[4]	Foreign sales (%)	0,242	0,223	0,405	1,000						
[5]	R&D Expend. (%)	0,122	-0,365	-0,070	0,278	1,000					
[6]	Busin. Model Innovat.	0,333	-0,029	0,171	0,041	0,052	1,000				
[7]	Resources 4.0	0,374	0,165	0,298	0,144	0,110	0,287	1,000			
[8]	Stimuli 4.0 from SC (Upstream)	0,152	0,181	0,307	0,272	0,131	0,204	0,280	1,000		
[9]	Stimuli 4.0 from SC (Downstream)	0,169	0,125	0,128	0,198	0,066	0,367	0,154	0,344	1,000	
[10]	Stimuli 4.0 from SC (Horizontal)	-0,012	0,221	0,331	0,199	0,077	0,157	0,143	0,481	0,457	1,000
	Mean	0,400	2,819	3,475	0,355	0,082	0,426	0,232	3,388	2,597	2,841
	Std. Dev.	0,244	1,021	1,880	0,351	0,106	0,497	0,186	0,948	0,934	0,930
	Min	0,000	0,000	0,000	0,000	0,000	0,000	0,000	1,000	1,000	1,000
	Max	1,000	4,248	8,497	1,000	0,800	1,000	0,700	5,000	5,000	4,500

Note: N = 115; Correlation coefficients greater than 0, 198 in absolute value are statistically significant at 95%.

Source: Our elaboration

Tab. 4: VIF scores and tolerance

	VIF scores	Tolerance
Age (log)	1,66	0,60
Size (log)	1,72	0,58
Foreign sales (%)	1,45	0,69
R&D Expend. (%)	1,44	0,70
Busin. Model Innovat.	1,30	0,77
Resources 4.0	1,24	0,81
Stimuli 4.0 from SC (Upstream)	1,47	0,68
Stimuli 4.0 from SC (Downstream)	1,50	0,67
Stimuli 4.0 from SC (Horizontal)	1,60	0,63

Note: Mean VIF 1, 49; Condition number: 16, 366

Source: Our elaboration

In order to investigate the relationship between Process Innovation and Resources 4.0, as mediated by Stimuli 4.0 from SC, we employed a linear regression analysis. Table 5 shows the results of the hierarchical regression divided in 6 tested models: in Model A, we entered only control variables; in Model B, we introduced the main effect; in Model C, we inserted the moderating variables; from Model D to F, we introduced interaction terms.

Tab 5: Linear Regression Results

	Mod. A	Mod. B	Mod. C	Mod. D	Mod. E	Mod. F
Age (log)	0,043	0,034	0,037	0,038	0,038	0,042
	0,027	0,027	0,028	0,029	0,028	0,028
Size (log)	-0,017	-0,026*	-0,021	-0,021	-0,022	-0,018
	0,013	0,012	0,013	0,013	0,014	0,013
Foreign sales (%)	0,148*	0,155*	0,150*	0,149*	0,152*	0,145*
	0,072	0,069	0,071	0,072	0,071	0,068
R&D Expend. (%)	0,233	0,117	0,154	0,154	0,134	0,261
	0,185	0,172	0,181	0,182	0,191	0,201
Busin. Model Innovat.	0,171***	0,135**	0,135**	0,136**	0,134**	0,141**
	0,045	0,045	0,047	0,047	0,048	0,046
Resources 4.0		0,385***	0,376**	0,109	0,587	-0,737
		0,111	0,119	0,475	0,443	0,475
Stimuli 4.0 from SC (Upstream)			0,008	-0,006	0,006	0,025
			0,026	0,038	0,026	0,028
Stimuli 4.0 from SC (Downstream)			0,010	0,011	0,027	0,016
			0,031	0,030	0,051	0,032
Stimuli 4.0 from SC (Horizontal)			-0,042	-0,039	-0,043	-0,123*
			0,034	0,035	0,034	0,053
Resources 4.0 X Stimuli 4.0 from SC (Upstream)				0,075		
				0,129		
Resources 4.0 X Stimuli 4.0 from SC (Downstream)					-0,077	
					0,150	
Resources 4.0 X Stimuli 4.0 from SC (Horizontal)						0,369*
						0,147
Constant	0,194*	0,183*	0,22*	0,256*	0,190	0,352**
	0,078	0,075	0,098	0,116	0,120	0,110
R2	0,188	0,260	0,276	0,278	0,278	0,314
Adj. R2	0,151	0,218	0,214	0,208	0,208	0,248

Note: N = 115; * p<0.05; ** p<0.01; *** p<0.001

Source: Our elaboration

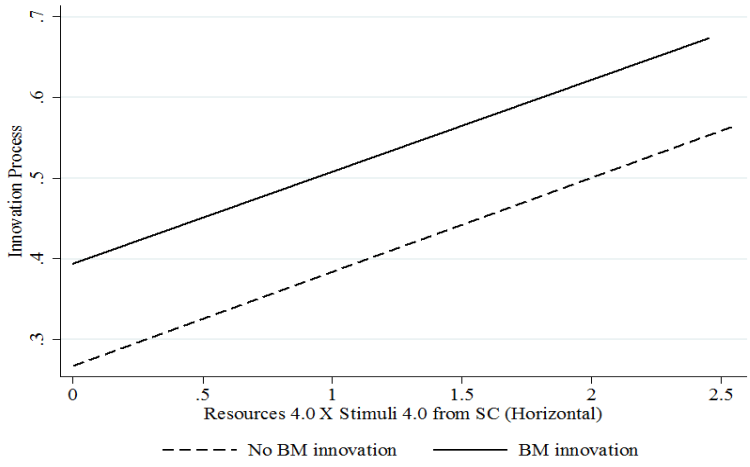
For what concerns control variables, both Age and R&D expenditures are not significant in all models, while Size is significant at 10% only in Model B, but its magnitude is almost negligible. On the other hand, Foreign Sales and BM innovation show a positive and significant impact on PI in all models, respectively at 10% and 5% levels.

For what concerns Hp.1, Model B confirms a positive and significant effect of Resources 4.0 on Process Innovation (at 1% level). This effect is almost the double in magnitude if compared to Foreign Sales and BM Innovation. Additionally, Model C suggests that there is not a direct effect of Stimuli 4.0 from SC on PI, and this is true regardless of the source.

For what concerns Hp. 2, both Model D and E show an insignificant interaction term, thus upstream and downstream sources are not able to moderate the relationship among Resources 4.0 and Process Innovation. On the other hand, Horizontal sources are able to act as moderators, as shown in Model F. Consequently, Competitors, Universities, Consultants, and Technological Transfer Offices can enhance the ability of Resources 4.0 to bring PI in firms. Therefore, we can conclude that Hp. 2 is partially supported.

Given the magnitude and significant levels of both BM innovation and the interaction term Resources 4.0 X Horizontal stimuli we conducted the post-hoc analysis shown in Figure 5. What emerges from the interaction among resources, horizontal stimuli, and business model is that firms, not introducing changes in their business model, are less able to gather advantages from both resources 4.0 held and horizontal stimuli received. Therefore, to adapt and change both organizational and strategic procedures it seems fundamental to obtain higher PI results.

Fig. 5: Three-way interaction among Resources 4.0, Horizontal stimuli, and BM innovation



Source: Our elaboration

5. Discussion and conclusions

This research points out three main results. Firstly, resources 4.0 have a positive impact on firms' PI. Hence, following the RBV perspective, the procurement and development of resources 4.0 enhances the competitive advantage of firms fostering PI. Secondly, our panel of respondent reveals that the positive relationship among resources 4.0 and PI is nurtured by horizontal partners (such as University, Consultant, etc.), rather than from upstream or downstream actors. However, we should highlight how these results may be affected by both sample composition and the timing of data collection. For what concerns the former, our sample is largely composed by medium and large companies (more than 40% of the interviewed). Indeed, their behaviour is different from the micro and small ones, since they have more public sector linkages (Rothwell and Dodgson, 1991) especially for technical inputs. Moreover, the SC sees the involvement of two main actors: the broker, pushing for the I4.0 introduction in SC, and the receiver, adapting to technological changes required from brokers. While the first are usually larger companies, the second are usually smaller subcontractors. For what concerns the timing of data collection, since the sample is mainly composed by Italian manufacturing firms (73%), we should take into account that the Italian 4.0 plan was introduced only in 2016. Therefore, given the initial stage of the Italian I4.0 and the complexity and abstraction level required for the I4.0 implementation, firms may be searching for stimuli from Universities, consultants and horizontal partners in general. Indeed, being at the early stage of I4.0, the competencies linked with resources 4.0 mainly come from Universities, research centres and specialised experts. Therefore, we expect a different relationship among 4.0 stimuli and PI in future I4.0 stages of implementation. Thirdly, from the post-hoc analysis emerges that firms can obtain higher PI results if they combine the exploitation of horizontal 4.0 stimuli with changes on BM. In general, the adoption of new and distinctive resources lays the foundations for the whole business model reconfiguration inside firms (Morris *et al.*, 2005), thus enhancing efficacy and efficiency of value creation, provision, and capture (Amit and Zott, 2001; Venkatraman and Henderson, 1998; Pucci *et al.*, 2013; Pucci *et al.*, 2017). Additionally, the literature underlines how new technologies, or existing technologies applied for other purposes (Casprini *et al.*, 2014), may enable the appearance of new BMs (Baden-Fuller and Haefliger, 2013; Teece, 2010; Zott *et al.,* 2011; Baden-Fuller and Mangematin, 2013; Casprini, 2015; Teece, 2017). Indeed, companies will be asked soon to compete on quickness in delivery, execution of processes and decision making (Atti, 2018a), therefore the exploitation of I4.0 resources will be crucial to develop an adequate and competitive BM. Therefore, our findings confirm resources ability - in this case 4.0 resources - to impact on the BM outline, thus influencing how companies are organised and how they deal with suppliers, partners and competitors (Prause, 2015; Bauer *et al.*, 2014; Russo, 2018).

This paper contributes both to the academic and the non-academic literature thanks to its integration of scholars' knowledge and the expertise of a renewed national association of procurement and supply chain

management (ADACI). Moreover, there are several implications also from a managerial point of view. First, this study shows the importance for companies to be at the forefront of technological adoption, following the I4.0 paradigm, since this will turn in a positive influence for PI. Second, it demonstrates to managers and companies the importance of horizontal chains, as also pointed out in the literature by Lin *et al.* (2017), e.g. the connections with universities and consultants. Hence, when we are at an early stage of technological introduction companies rely more on external providers which already have available these technologies to close the gap as soon as possible. This is definitely true, considering the size of the companies in our sample, for medium and big size companies, which are in turn those usually acting as leaders for the whole chain. Moreover, managers should consider that BM changes allow companies to obtain higher PI results than the ones gained thanks to resources 4.0 and/or external stimuli 4.0 alone. This will allow all the companies to benefit both from (internal) adoption of I4.0 technologies and from external influences of the SC, with a special role played by horizontal partners with whom companies should always collaborate.

Considering the results about the impact of I4.0 on the players of the SC both directly, thanks to the positive impact of I4.0 technologies adoption within the companies, and indirectly, as well as the results about the positive horizontal influence of technologies 4.0, for what concerns the theoretical contribution, we can enlighten the comprehensive impact of I4.0 for the whole chain: the technology linked with the I4.0 paradigm has an effect in the whole chain, both directly and indirectly.

It is interesting to point out that this research signals which actors need to be supervised in further studies, as also pointed out by Lin *et al.* (2017) in their study about China and Taiwan: the horizontal partners.

In conclusion being, to the best of our knowledge, the first one on this topic, this study contributes in developing the current report-based knowledge with an empirical study based on an experts' survey. Moreover, the results showing the impact of resources 4.0 and PI, the drivers of innovation in SC4.0 as well as the effects on BM represent a first impulse to further analysis on these topics.

There are several limitations in this study. First, the sample of this study is limited to Italian companies, thus it would be extremely fruitful to extend the survey to other countries. Indeed, a comparison between the current maturity level of I4.0 and the policies in the Italian context with other countries would be extremely interesting both from a practical and an academic point of view. Second, we analysed the Italian context at an early stage, while a replication of this study later on will allow a comparison of different maturity stages within the same country and additionally a better analysis of the effects of Piano Nazionale 4.0, leading to significant and stimulating discussions both for scholars and practitioners.

Third, due to the small size of our sample, this paper may be threatened by biases regarding sample characteristics. Further studies based upon similar RQs, might offer interesting and stimulating results to the audience.

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How do firms interpret extended responsibilities for a sustainable supply chain management of innovative technologies? An analysis of corporate sustainability reports in the energy sector

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Abstract

Purpose of the paper: *This paper aims to analyze how companies fulfill their responsibility in shaping sustainable supply chain strategies for innovative technologies. To this end, it describes a decade of evolution of Lithium-ion batteries (LIBs) end-of-life management practices among leading energy utilities.*

Methodology*: Using GRI's Sustainability Disclosure Database, a content analysis of 172 corporate sustainability reports of 16 European energy utilities was conducted.*

Results*: The content analysis provides a clear idea of the actual commitment to foster LIBs end-of-life management by highlighting that energy utilities are still far from taking lead responsibilities on this emerging -yet potentially critical- issue. Apart from minor initiatives, LIBs are crucial for building short-term business strategies that, however, overlook their relevance for the implementation of the extended producer responsibility principle.*

Research limits: *The main limitations are the use of publicly accessible web sites and corporate sustainability reports, which are concise and secondary data sources, and the lack of comparison of energy utilities with sustainability leaders from other industries.*

Practical implications: *The study helps managers to more fully comprehend environmental issues associated with emerging and soon to be widespread products and, thus, to better focus on the opportunities and problems of end-of-life management for innovative technologies.*

Originality of the paper: *The study is unique in its purpose to complement publicly accessible information from the Internet with sustainability reports to provide a systemic view on how crucial actors within the supply chain of innovative technologies implement specific environmental practices that might affect the future of these technologies.*

Key words: end-of-life; extended responsibility; supply chain management; sustainability report

1. Introduction

The implementation of comprehensive environmental strategies and disclosure in the context of supply chain management has become a crucial issue for companies (Beske and Seuring, 2014). Companies are increasingly asked by stakeholders and consumers to improve their

environmental performance. For this reason, companies must understand and decide how to tackle sustainable challenges in supply chain management, which has a broad influence on many issues, including: product innovation, organizational structures, and relationships with customers and stakeholders (Neutzling *et al.*, 2018).

Comas Martì and Seifert (2013) note that suitable environmental strategies require the implementation of a comprehensive environmental management system encompassing a clear identification of relevant environmental aspects, their location in the supply chain or product life cycle, and the mobilization of adequate resources. According to this framework, each company in the supply chain is free to tackle sustainable challenges and to disclose related information with different levels of commitment (Meckenstock *et al.*, 2016), which poses additional challenges when environmental performance is highly interdependent.

In this framework, the scientific literature provides some insights on how sustainability principles can be turned into operational practices across the supply chain and to what extent they ensure the sound management of environmental issues beyond corporate regulatory compliance (Comas Martì and Seifert, 2013; Meckenstock *et al.*, 2016). The increasing interest in the link between internal environmental practices and environmental practices at the supply chain level (Zhu *et al.*, 2012; Graham, 2018) is, in particular, shedding light on why and how companies should consider and assume their role in end-of-life management from an extended producer responsibility perspective (Toffel, 2003; Hickle, 2017). In fact, the implementation of end-of-life management practices is a controversial feature of sustainability along the supply chain. Some companies consider them as cost to be minimized, whereas others are actively engaged in the development and implementation of end-of-life management practices to achieve strategic opportunities (Pagell *et al.*, 2007).

Studies on end-of-life management often analyze the implementation of win-win solutions ranging from waste collection and material recovery to reuse, refurbishment and remanufacturing, as well as cooperation among relevant stakeholders in the product life-cycle and product design (Atlason *et al.*, 2017). However, although these studies offer a clear rationale for the business case of sustainability in the short run, they often overlook the investigation of corporate strategies and associated partnerships aimed at affecting of more systemic changes in the supply chain (Stewart and Niero, 2018). As a consequence, little is known on how core actors along the supply chain can support or, moreover, lead the coordination of efforts to manage big environmental issues that seem to fall above of the corporate agenda.

In this paper we investigate how energy utilities are making their part in building a sustainable Lithium-ion batteries (LIBs) end-of-life management moving beyond the predominance of retailer-manufacturer research and providing more insights on the role of core actors in the supply chain according to the collaborative paradigm. We aim to develop a better understanding of LIBs end-of-life management practices and collaborative relationships implemented by energy utilities to integrate sustainability into LIBs supply chain.

The contribution of this study is threefold. First, we contribute to the sustainable supply chain literature by exploring the role of core actors along the supply chain and their collaborations to tackle the controversial role of product end-of-life management in an emerging supply chain (Pagell *et al.*, 2007). Second, we integrate the analysis of sustainability reporting by investigating supply chain dynamics (Wijk and Persoon, 2006). Third, we provide empirical evidence of the state-of-the-art of LIBs end-of-life management practices (Mayyas *et al.*, 2019).

In particular, we analyze what 16 leading European energy utilities disclose about their environmental practices and strategies through corporate sustainability reports, which constitute an effective source of information to investigate companies' commitment to sustainability and associated practices (Comas Martì and Seifert, 2013; Meckenstock *et al.*, 2016; Stewart and Niero, 2018). In fact, sustainable reports, complemented by supplementary data, can show the level of priority that companies assigned to activities to tackle sustainable development challenges (Hickle, 2017). A content analysis on the collected evidence from sustainability reports and supplementary data (i.e. company websites and online press releases) is thus used to explore product end-of-life management activities and their effects on the evolution of the supply chain.

The remainder of the article is structured as follows. In section 2, we provide the theoretical background on the integration of product end-of-life management practices into sustainable supply chain management, and sustainable disclosure of supply chain strategies from which we derive the research questions. In section 3, we introduce the methods used to address our research questions, after which, in section 4, we present the results from the analysis of the corporate sustainability reports. Finally, we discuss the main evidence and conclude by shedding light on the limitations of the present study and providing the theoretical and managerial implications of the results.

2. Theoretical background

2.1 Sustainable supply chain management and the challenges of product end-of-life management

Several scholars highlight the integrative framework that sustainable supply chain management provides, which informs a broad range of decisions affecting the product life cycle (Gupta and Palsule-Desai, 2011). In fact, companies that adopt a sustainable supply chain management approach often tend to consider and address stakeholders' pressure to reduce their environmental and, increasingly, social impacts and other potential risks (Neutzling *et al.*, 2018; van Bommel, 2011), which often lead to the implementation of comprehensive strategies to improve their environmental, social and economic performance (Carter and Rogers, 2008).

Considering that sustainable supply chain management encompasses several activities ranging from products to process-related innovations

(Hickle, 2017; Neutzling *et al.*, 2018), companies can assume different approaches for the translation of sustainability principles into operational practices, as well as different levels of comprehensiveness of environmental strategies within the supply chain (Comas Martì and Seifert, 2013; Meckenstock *et al.*, 2016). Aligning internal environmental practices and the promotion of environmental practices at supply chain level is thus a complex task that requires a good understanding of corporate and systemic dynamics, given that a company cannot be considered without its business environment (Zhu *et al.*, 2012; Graham, 2018). Monitoring the evolution of the relationships between actors throughout the value chain might help to understand the problems and opportunities posed by end-of-life management activities, including those hidden behind waste collection, material recovery, reuse, refurbishment and remanufacturing, as well as the potential for cooperation among key stakeholders in the product life-cycle and product design (Toffel, 2003; Hickle, 2017; Atlason *et al.*, 2017).

Scouting business threats and opportunities related to end-of-life management can help companies to take a responsible approach to supply chain management. This does not just mean implementing closed-loop supply chains, but also extending the boundary of the analysis of possible direct and indirect impacts of corporate strategies (Defee *et al.*, 2009). Moreover, companies can be more agile in responding to uncertainties and complexities associated with the supply chain (Prater *et al.*, 2001), given that they can implement solutions and practices fostering flexibility and innovation to achieve a sustainable supply chain (Ciccullo *et al.*, 2018).

Whatever the influence exerted on the supply chain might be, it requires cooperation with relevant stakeholders involved in the product design (Atlason *et al.*, 2017) and in the product life-cycle (including producers and consumers/end users) (Hickle, 2017). Nonetheless, some studies highlight the importance of collaborative relationships between companies and their business ecosystem or of initiatives with consumers/users in the implementation of sustainability paradigm (Vachon and Klassen, 2006; Formentini and Taticchi, 2016). The analysis of corporate strategies for product end-of-life management and of the related strong collaborations (i.e. partnerships) aimed at affecting a systemic change in terms of the reconfiguration of resources and capabilities among supply chain members is still needed (Stewart and Niero, 2018), thus leading us to our first direction of investigation:

1) Given the increasing awareness on sustainability challenges in the LIBs industry, do energy utilities develop end-of-life management strategies to take a proactive approach to sustainability and develop systemic changes at the supply chain level?

2.2 The use of sustainability reports in spreading awareness on sustainability issues at the supply chain level

Corporate sustainability reports have increasingly become an effective way to provide information on corporate strategies and activities towards sustainability (Comas Martì and Seifert, 2013; Meckenstock *et al.*, 2016; Stewart and Niero, 2018).

The voluntary nature of these instruments allows for some degrees of freedom in defining the content and level of disclosure of corporate sustainability (Meckenstock *et al.*, 2016). Therefore, sustainability reports inform researchers on both how companies report their engagement in sustainability in specific areas and whether they ignore others.

Wijk and Persoon (2006) highlight the potential for researchers to investigate supply chain dynamics on sustainability reports. The analysis of sustainability reports can focus on how a single company shapes sustainability practices and performance of their partners along the supply chain (Tate *et al.*, 2010) or on how companies that are responsible for different phases of the product life cycle (e.g. upstream, midstream and downstream) pursue synergies along the whole supply chain (Halldórsson *et al.*, 2009). The coexistence of these two perspectives characterizes the corporate sustainability reporting of those companies that have a crucial role in sustainable supply chain management, since they can both foster the dissemination of internal environmental practices and absorb external scientific and technological capabilities from partners throughout the supply chain. Considering that Meckenstock *et al.* (2016) show that pressures toward sustainability are typically stronger in the downstream supply chain, where companies have closer relations with stakeholders and in particular with consumers, the selection of the supply chain phase to be investigated is thus relevant for accessing valuable information about the systemic changes underway in the supply chain for integrating sustainability. End-of-life management activities typically involve more downstream companies with a high potential of cooperation with an open network of incumbents and new entrants of a sustainable value chain also in open loop-supply chains (Atlason *et al.*, 2017; Rizzi *et al.*, 2014), which leads to our second direction of investigation:

2) When pursuing systemic changes at the supply chain level, is there a prevailing attention among energy utilities towards the coordination of internal or external resources?

Taking a comprehensive approach, by focusing on an evolutionary perspective of supply chain management practices, this study aims to answer the following research questions:

RQ1: How is end-of-life management of LIBs practices and related partnerships evolved according to corporate sustainability reports of downstream companies?

RQ2: Which internal and external dynamics associated with end-of-life management practices and related partnerships in downstream companies have led to systemic changes of the LIBs supply chain?

3. Methods

3.1 Research context

LIBs are a rapidly evolving technology constantly gaining market shares because of their high technical performance in electric mobility and energy storage, i.e. high energy and power density, low weight, and long

life. In fact, the global LIBs market reached $29.86 billion in 2017 and is expected to skyrocket to $139.36 billion by 2026 - a growth rate of 18.7% (Stratistics Market Research Consulting, 2018). However, LIBs still have uncertain value chains after their use and rapid depreciation.

The growing demand for this technology, often boosted by anticipated substitutions for staying aligned with the-state-of-the-art standards of performance, generates the rise of prices for raw materials and negative environmental impacts primarily associated with the mining activities for supplying rare and scarce materials and disposal of spent LIBs and their hazardous materials in landfills, which are far away from market users but might facilitate the development of alternatives technologies (Mayyas *et al.*, 2019). Therefore, LIBs end-of-life management, including recycling, has become an environmental -not yet industrial- priority that is challenging all the various actors involved in the supply chain and different energy storage-based business models. Among these actors, energy utilities, which are increasingly using LIBs for network stabilization and for the integration into the grid of renewable -and by nature non-programmable- energy sources, play a key role in shifting the LIBs supply chain towards sustainability (Lebedeva *et al.*, 2017).

3.2 Sample definition

The sample of companies included in this study was compiled using GRI's Sustainability Disclosure Database[1]. This database includes thousands of reports published from 1999 until present, the majority of which (around 65%) are based on GRI guidelines or standards and the remaining (around 35%) of which comprise reports, including sustainability disclosures.

We analyzed corporate sustainability reports of European energy utilities, because the increasing use of LIBs in energy storage for network stabilization and for the integration of renewable energy sources in the energy system poses relevant environmental challenges to the energy industry as a whole (Lebedeva *et al.*, 2017). It is worth noting that the European Union considers the development, production, use and end-of-life management of batteries, especially LIBs, a priority also for the automotive industry (Science for Environment Policy, 2018; Tutore *et al.*, 2014).

In order to determine the key players that might influence the development of end-of-life management of LIBs, we identified 124 European energy utilities in GRI's Sustainability Disclosure Database. However, we selected sustainability reports of only those European energy utilities that explicitly reported actions related to "batteries" or/and "storage" between 2006 and 2016.

After this selection, the final sample contains 172 corporate sustainability reports from a little bit more than a decade of disclosures of 16 European energy utilities. Table 1 provides the list of analyzed companies and some descriptive information.

[1] The GRI's Sustainability Disclosure Database is constantly changing because some companies add or remove certain reports. The selection of reports to be used in this study was made between July 5th and 10th, 2018.

Tab. 1: List of analyzed energy utilities and some descriptive information

Company	Country	Number of employees (2018)	Turnover (2018), thousands USD
ACEA	Italy	656	3,467,618
EDP (Energias de Portugal)	Portugal	11,631	18,137,682
EnBW	Germany	21,524	24,216,533
Endesa	Spain	9,763	23,123,287
Enel	Italy	69,272	86,246,023
E.ON	Germany	43,302	35,648,448
HERA	Italy	8,622	7,587,232
Iberdrola	Spain	28,750	40,919,828
Naturgy Energy Group S.A	Spain	12,700	28,058,239
Orsted Energy A/S	Denmark	6,080	11,778,998
Red Eléctrica de España S.A	Spain	1,799	2,245,616
REN (Redes Energéticas Nacionais)	Portugal	692	826,029
Snam S.p.A	Italy	3,016	2,960,971
Statkraft A.S	Norway	3,229	6,471,001
Terna S.p.A.	Italy	4,252	2,653,997
Vattenfall	Sweden	19,910	17,613,385

Source: Authors' elaboration from ORBIS database

3.3 Content analysis

Content analysis consisted of a systematic categorization of the collected data (Hsieh and Shannon, 2005). We first grouped information from raw data by relevant recurring themes and then coded the textual content of sustainability reports according to our research framework by using NVivo software 2011.

Then, we carried out qualitative and inductive analysis of the content of sustainability reports (Thomas, 2006). Initially, we identified how selected energy utilities addressed and integrated the concept of energy storage into their sustainable strategy and related initiatives. This phase of the analysis was supported by supplementary information collected from company websites and online press releases. Then, we referred to two key themes (end-of-life management activities and related partnerships) for exploring the ten-year evolution of sustainable practices throughout the LIBs supply chain. These themes were subsequently further developed and adapted according to the ideas emerging from the data analysis. At the end of this inductive process, we formed 27 categories grouped under three broad themes and seven sub-themes. In total, we coded 926 excerpts from the reports. For both key themes (product end-of-life management activities and related partnerships for LIBs addressed in this study), we used segments derived from 14 categories, grouped into three sub-themes: short-term orientation in planning for the use and replacement of LIBs, volatility of partnership in sustainability-oriented projects and lack of end-of-life perspective in designing a sustainable supply chain management. To ensure the accuracy of the analysis, we employed two verification strategies. First, the interpretation of information contained in

the sustainability reports was supported by the definition of the categories (Miles and Huberman, 1994). Accordingly, these definitions allowed the standardization of the codification process. New categories were discussed by researchers involved in the process during two meetings. Second, the first coded reports helped the evaluation of clarity of categories in order to achieve a common understanding of the coding tree (Thomas, 2006). A double-blind coding was carried out for the first 15 reports to compare categories created by the two researchers. At the end of this phase, we merged some categories. This analysis highlighted the different companies' interpretation of end-of-life management practices for LIBs.

4. Results

The analysis of product end-of-life management activities and related partnerships for LIBs in sustainability reports reveals that, even though several companies mention their interest in energy storage as solution for the development of effective smart grids and the integration of renewable energy sources into grids, but also for fostering recharge infrastructures for electrical vehicles (e.g. charging columns and other innovative solutions), few of the analyzed energy utilities have already committed to end-of-life management of LIBs and related evolution of supply chain along ten years. In particular, sustainability reports emphasize associated benefits in terms of network stabilization and reduction of CO2 emission. Therefore, companies highlight their involvement in the technology development of energy storage through pilot projects for boosting the adoption of LIBs at large scale. Companies often carry out more than one pilot project in order to test different fields of application (micro-grids, electrical mobility, etc.). Table 2 summarizes the pilot projects implemented by the analyzed energy utilities.

Overall, the collected evidence can be clustered into three interdependent topics that characterize the possible evolution of LIBs supply chain towards sustainability:

- a short-term orientation in planning for the use and replacement of LIBs;
- the volatility of partnerships in sustainability-oriented projects;
- the lack of end-of-life perspective in designing a sustainable supply chain management.

4.1 Short-term orientation in planning for the use and replacement of LIBs

The commitment to the development and diffusion of LIBs has not compelled most analyzed companies to plan and adopt LIBs end-of-life practices. In fact, only three companies (Endesa, Enel and Vattenfall) disclose the implementation of actions to address LIBs end-of-life issues in their sustainability reports. In particular, Endesa, Enel and Vattenfall have promoted initiatives and programs for second life applications suitable for re-using LIBs from electric vehicles (Table 3). In fact, these companies tried to find and test other applications for LIBs from electric vehicles that have

lost 75-80% of their initial capacity in stationary energy storage. Vattenfall has worked to re-use LIBs from electric vehicles as an energy storage for the integration of renewable energy sources into grids since 2013. Endesa declared initiatives for promoting the second life of LIBs in 2015. Even though Enel has made the effort to recycle and recover lead batteries since 2006, the company has implemented the first initiative for fostering second life of LIBs only since 2017.

These results confirm the difficulty of companies to implement and accordingly report end-of-life management practices (Stewart and Niero, 2019). One solution is to implement second life initiatives for addressing some of the short-term challenges related to a sustainable LIBs supply chain because this option can postpone some critical issues associated with LIBs end-of-life management (e.g. the lack of viable collection mechanism for spent batteries and low volume and high costs of LIBs recycling) (Mayyas *et al.*, 2019). Moreover, LIBs end-of-life practices are not yet considered as a priority by most energy utilities that place less emphasis on their role for achieving sustainability within the LIBs supply chain. This attitude may be explained by their downstream position along LIBs supply chain and not their direct linkage with LIBs manufacturing. In fact, Meckenstock *et al.* (2016) argue that companies belonging to midstream or downstream supply chain echelons can have different attitude in the integration of sustainability practice into supply chain.

Tab. 2: Pilots projects for boosting energy storage and electric vehicles, and batteries end-of-life practices mentioned in corporate sustainability reports

	Pilot projects		
Company	Energy Storage for Smart grid	Energy Storage for Renewables	Diffusion of Electric vehicles
ACEA	-		-
EDP (Energias de Portugal)	-	-	-
EnBW	-		-
Endesa	-		-
Enel	-	-	-
E.ON		-	-
HERA		-	
Iberdrola		-	-
Naturgy Energy Group S.A	-		-
Orsted Energy A/S		-	-
Red Eléctrica de España S.A		-	-
REN (Redes Energéticas Nacionais)	-		-
Snam S.p.A		-	
Statkraft A.S		-	
Terna S.p.A.	-	-	
Vattenfall		-	-
Total	8	11	12

Source: Authors' elaboration

Tab. 3: LIBs and generic batteries end-of-life practices mentioned in corporate sustainability reports

Company	LIBs end-of-life practices	Generic batteries end-of-life practices
ACEA		
EDP (Energias de Portugal)		
EnBW		
Endesa	-	
Enel	-	
E.ON		
HERA		-
Iberdrola		-
Naturgy Energy Group S.A		-
Orsted Energy A/S		
Red Eléctrica de España S.A		-
REN (Redes Energéticas Nacionais)		
Snam S.p.A		-
Statkraft A.S		
Terna S.p.A.		-
Vattenfall	-	
Total	3	6

Source: Authors' elaboration

4.2 Volatility of partnership in sustainability-oriented projects

The majority of analyzed companies report some collaborations and partnerships for the diffusion of electric vehicles, the development of energy storage, but rarely for LIBs end-of-life management (Table 4). Companies describe these partnerships by highlighting associated benefits mainly in terms of research and technology development projects. However, the network of partners is highly heterogeneous and volatile.

Six companies (EnBW, Endesa, Enel, Orsted, REN and Vattenfall) mention partnerships for fostering electric mobility through the development of fast and smart recharge systems and electric vehicles as movable energy storage from renewable sources. In particular, companies have mainly established partnerships with car manufacturers: Daimler (EnBW); Renault, Nissan, Mitsubishi, Peugeot and Toyota (Endesa); Smart, Nissan and BYD (Enel); Volvo, Mitsubishi and Scania AB (Vattenfall). Car manufactures support energy utilities by providing electric vehicles for pilot projects and then increase the visibility of their models or prototypes. Orsted declared a past partnership with BetterPlace, company that developed and sold battery-charging and battery-switching services for electric cars.

Other partnerships involve research centers and universities in order to experiment innovative solutions for recharging electric vehicles: University of Zaragoza and Research Centre on Energy Resources and Consumption (Endesa); INESC TEC - Institute for Systems and Computer Engineering, Technology and Science (REN); KTH - Royal Institute of Technology in Stockholm (Vattenfall).

Tab. 4: Partnerships for electric mobility, energy storage and LIBs end-of-life management mentioned in corporate sustainability reports

Company	Partnership for electric mobility	Partnership for energy storage	Partnership for LIBs end-of-life management
ACEA		-	
EDP (Energias de Portugal)			
EnBW	-		
Endesa	-	-	-
Enel	-	-	-
E.ON			
HERA			
Iberdrola			
Naturgy Energy Group S.A		-	
Orsted Energy A/S	-		
Red Eléctrica de España S.A		-	
REN (Redes Energéticas Nacionais)	-		
Snam S.p.A			
Statkraft A.S			
Terna S.p.A.		-	
Vattenfall	-		
Total	6	6	2

Source: Authors' elaboration

Acea, Endesa, Enel, Naturgy, Red and Terna mention partnerships with companies, international associations and research teams for acquiring and increasing knowledge and expertise in energy storage systems. Naturgy, Red and Terna are members of the European Association for Storage of Energy, which promotes the development of innovative and cost-effective technologies for energy storage.

Other energy utilities have partnerships with information technology companies and universities able to provide suitable software, networks and platform for developing effective energy storage systems: NEC (Acea); CapGemini, Polytechnic Universities of Madrid and Malaga (Endesa); Tesla (Enel); Joint Spanish Platforms for Energy Storage (Naturgy).

Only two companies (Endesa and Enel) have already established partnerships for addressing LIBs end-of-life management. In particular, Endesa signed an agreement with Enel for carrying out the "Green eMotion" project on the second life of electric vehicle batteries in 2015. Enel has established a partnership with the Italian non-profit private Consortium COBAT[2] for promoting effective batteries end-of-life practices in terms of second life applications, collection and recycling of batteries, and particularly LIBs. However, the analysis of sustainability reports does not highlight the implementation of partnerships between energy utilities and LIBs recycling companies (e.g. Umicore).

[2] COBAT promotes and arranges all the necessary activities for the correct management and disposal of the waste electrical and electronic, batteries, solar panels and tires. For more details, see: https://www.cobat.it/

These results evidence that partnerships are a competitive advantage action for fostering the exchange of information and knowledge between the analyzed energy companies and potential partners of associated supply chains (i.e. energy storage and electric vehicles) (Vachon and Klassen, 2006). Moreover, they prefer to focus on technological innovation aspects by ignoring consumer-based research and design (Stewart and Niero, 2018). The strong interest in technological aspects results from the initial diffusion of energy storage systems and electric vehicles and the understanding of their great potential for development in the near future.

The scarcity of disclosure concerning the existence of partnerships for addressing LIBs end-of-life management issues confirms a weak long-term orientation in terms of sustainability within the overall supply chain. Moreover, this result highlights that all analyzed energy utilities, except for Endesa and Enel, have not yet felt the urgency of a partnership for LIBs end-of-life management practices. Therefore, energy utilities lose the chance to build long-term relationships with partners by increasing trust and removing uncertainties within a sustainable supply chain. A possible reason of this lack of partnerships can be supply chain echelons where companies operate and then the distance from LIBs producers (Meckenstock *et al.*, 2016). Thus, it becomes crucial that energy utilities understand their potential role played within LIBs supply chain for addressing sustainability and particularly end-of-life issues.

4.3 Lack of end-of-life perspective in designing a sustainable supply chain management

Companies do not mention any specific long-term strategy associated with LIBs end-of-life management and furthermore sustainability issues within LIBs supply chain in their sustainability reports. As already discussed, most energy utilities do not even report isolated initiatives or projects for promoting LIBs end-of-life management.

However, among the few, Endesa, Enel and Vattenfall have implemented and reported initiatives for the second life of LIBs, although companies do not describe if these initiatives have already generated benefits in terms of the integration of effective end-of-life practices within LIBs supply chain. The sustainability reports of these three energy utilities do not indicate the evolution of mentioned initiatives toward an integration of end-of-life management into LIBs supply chain in terms of material recovery to reuse, refurbishment and remanufacturing, and a stable cooperation among pivotal stakeholders in the product life-cycle and product design.

Overall, clear evidence emerges of the lack of an actual commitment of energy utilities towards LIBs end-of-life management and of the fact that these companies do not yet consider environmental issues associated with the emerging and soon to be widespread application of LIBs as a priority to be tackled through proactive environmental practices at supply chain level.

The lack of diffused and detailed disclosure of LIBs end-of-life management practices according to a systemic perspective shows that much remains to be done in terms of integration of LIBs end-of-life

management strategies and systemic changes into the supply chain. On the one hand, as Comas Martì and Seifert (2013) argue, the untapped potential for improvement in terms of comprehensiveness of LIBs end-of-life management practices and strategies might be linked to the relevance of stakeholder pressures within LIBs supply chain. On the other hand, it might be linked also to an informed negligence of this industry towards a clear participation in building a resilient supply chain from an extended producer responsibility perspective.

5. Discussion and conclusions

In the absence of sound and sustainable material recovery processes, the LIBs supply chain has the typical open-loop structure, with producers that invest in product innovation without prioritizing take-back options, key users urged to implement upstream and downstream sustainable procurement strategies and a variety of end-of-life management companies performing some trial and error search for the more sustainable solutions. Therefore, our explorative study, which covers a ten-year evolution of sustainable supply chain management strategies in energy utilities, focuses on decision makers that are pivotal for the development of industrial partnerships and, thus, central for understanding the dynamics in terms of reconfigurations of resources and capabilities among supply chain members that characterize the early structuration of practices for addressing LIBs end-of-life management.

This study contributes to the sustainable supply chain literature by exploring the role of core actors along the supply chain (i.e. energy utilities) and related collaborations in the implementation of product end-of-life management by considering its controversial nature in an emerging supply chain (Pagell *et al.*, 2007). Second, the analysis of sustainability reports shows all actions and collaborations that demonstrate the integration of the tenets of sustainability into the supply chain (Wijk and Persoon, 2006). Moreover, the content analysis of 172 sustainability reports published between 2006 and 2016 by the 16 European energy utilities, which disclosed a tangible commitment to reduce LIBs environmental externalities, highlights both opportunities and threats for the long term development of a LIBs sustainable supply chain.

Surprisingly, despite the awareness on the strategic importance of the topic, only 3 energy utilities over 124 report some initiatives and projects on LIBs end-of-life management. The resulting network of collaborations for promoting LIBs end-of-life management is fragmented and volatile, with a prevailing focus on the reuse of second-life of LIBs in electric vehicles. Furthermore, material recovery still seems to be an undeveloped option, and the pace of introduction of end-of-life solutions is by far slower than the introduction of user-oriented improvements. This evidences that LIBs end-of-life management is still not considered as a strategic opportunities by the majority of core actors within the supply chain (Pagell *et al.*, 2007),

Even though LIBs performances are improving at a pace that is imposing premature substitutions and shorter life cycles, which are both environmentally and financially relevant for designing corporate strategies,

the 16 energy utilities tend to support LIBs end-of-life management initiatives mainly by joining highly volatile partnerships in external projects given that supply chain members are still not committed to environmental challenges resulting from LIBs end-of-life. Being only marginally based on internal and structured R&D activities, these initiatives and projects reflect corporate frugal and short-term perspectives on LIBs end-of-life management that often lead to the release of just incremental innovations of soft procedures. Therefore, the collaborations (partnerships) implemented are not able to address the complexities associated with the LIBs end-of-life management (Hickle, 2017).

Nevertheless, it is important to note that most of the above-mentioned projects and collaborations originate from the downstream supply chain, which leads to two important considerations. First, the innovation process is led by a variety of SMEs that look at energy utilities as a key player for demonstrating the market potential of their solutions. Energy utilities, thus, influence innovation pathways throughout the supply chain because they aggregate large volumes of demand. Moreover, since energy utilities are not involved in similar initiatives with LIBs producers interested in take-back options, which means that LIBs producers are far from closing the loop of LIBs materials, they de-facto are alone in fostering the coordination of the LIBs sustainable supply chain management. Therefore, they need new relationships with third parties not generally associated with the supply chain (Miemczyk *et al.*, 2016). Second, the lack of structuration of the partnerships between energy utilities and, upstream and downstream LIBs supply chain actors leaves some open questions concerning the actual possibility for this industry to achieve full compliance with the LIBs extended producer responsibility principle for an effective and economically efficient product recovery system. In fact, there are still many uncertainties on how the variety of initiatives from the upstream and downstream side of the supply chain might lead to the structuration of a sustainable LIBs supply chain.

Therefore, LIBs should be considered a promising technology with unclear futures due to the lack of evidence that the large amount of investments in user-oriented performance improvement will be able to adequately address also all those environmental issues that, throughout the life-cycle, are instead becoming more and more urgent. Given the recorded inertia in structuring a LIBs sustainable supply chain along the last ten years, it is not unlikely that the final solution will consist in the introduction of alternative technologies and, thus, in the substitution of LIBs with intrinsically "greener" solutions.

Therefore, the research provides two main theoretical implications. First, the lacking mention of LIBs end-of-management initiatives in corporate sustainability reports reveals a stasis in the nature of the related collaborations by confirming similarities of strategic postures among supply chain actors in terms of the identification and adoption of short-term and marketable solutions. This limits the availability of options for tackling future challenges within the supply chain.

Second, the long-term structuration of the supply chain is negatively affected by the existing collaborations, which hinder a strategic and

systemic vision for the sustainable supply chain and accordingly increase the supply chain vulnerability to alternative technologies.

Moreover, the findings of this study also provide some managerial implications. First, companies can employ the currents trends in sustainability reporting to design and implement strategies in sustainable supply chain management for building their legitimacy as sustainability leaders.

Second, managers involved in capital-intensive investments on fast evolving technologies should be encouraged to reflect on the opportunities for end-of-life management practices not simply because of cosmetic reasons regarding the corporate reputation but also because of the need to reduce risks associated with the volatility of the extended value chain by evaluating the possible measures and key partners to modify the existing supply chain or integrate/create new ones.

Third, companies located in focal positions of the supply chain, such as energy utilities, in lack of signals of a structuration of downstream networks for end-of-life management, should balance demonstration projects both on the downstream and upstream sides of the supply chain, so as to scout possible emerging and green-by-nature technologies by gathering all information to assess all possible environmental impacts and make informed decisions.

However, some limitations must be acknowledged. First, we derive our results from the cross-validation of secondary data sources, namely company websites, online press releases and corporate sustainability reports. Since we analyzed the subjectivity of corporate thinking concerning sustainability strategy and practices, we do not need the same level of objectivity in the raw data as investigations on sustainability indicators and, thus, we assume the reliability and consistency of this data for our study. Despite that, we do not have access to information regarding undisclosed strategic activities of energy utilities, which can provide evidence of future corporate initiatives and activities. Second, the use of publicly accessible web sites and corporate sustainability reports consists of concise bunches of information describing practices that have achieved a certain maturity within the organization. Consequently, the information provided in sustainability reports might be sufficient to understand the positioning of similar companies, but not enough detailed to fully appraise the actual commitment and efforts towards LIBs end-of-life management when compared with other internal priorities. Third, since our sample is based on energy utilities, which are very often considered sustainability leaders, some caution should be used when applying our insights to companies that do not have the same level of maturity in sustainability and its reporting.

Future research should expand our analysis by further exploring the internal tensions and motivations of adoption or non-adoption of LIBs end-of-life management practices based on interviews or focus groups with the involved managers. Moreover, future studies can develop a cross-analysis extending the search for end-of-life management initiatives in other sectors influenced by the diffusion of LIBs.

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Building long-term supplier-retailer relationships in the jewellery sector: antecedents of customer loyalty

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Abstract

Purpose of the paper: *The paper aims at exploring the antecedents of customer loyalty in supplier-retailer relationships, with the final goal to identify the contribution of technical and relational factors.*

Methodology*: The research consisted in administering a structured questionnaire to a sample of retail customers of a well-known Italian manufacturing company operating in the jewellery sector. Data was processed applying a hierarchical multiple regression.*

Results*: Findings confirm the importance of building trustworthy relationships with retailers in order to maintain and enhance a good long-term relationship with them. Dependence resulted as a crucial factor in determining retailer customer loyalty.*

Research limitation*: The paper focuses on a sole company and sector (Jewellery). No control variables and moderating factors were considered. Next studies should apply the proposed model to other companies and sectors.*

Practical implications*: Given both the costs and risks associated with mismanaging a potentially valuable and loyal business partnership, deeper insights into the factors affecting a long-term supplier-retailer relationship is quite useful both for managers and business practitioners.*

Originality of the paper: *The building of a long-term oriented supplier-retailer relationship results to be less investigated in comparison with the higher attention given to the supplier-customer relationship by the industrial management literature. Moreover, research on supplier-retailer relationships tends to concentrate on the grocery sector, stressing the role of power rather than the impact of relational constructs on the relationship. This work aims at filling in these gaps in a barely investigated sector as the jewellery one.*

Key words: supplier-retailer relationships; customer loyalty; dependence; trust; jewellery sector

1. Introduction

The benefits of forming strategic partnerships between suppliers and their business customers appears to be well documented in the academic literature (Cannon and Perreault, 1999; Dwyer *et al.*, 1987; Dyer and Singh, 1998; Ganesan, 1994). However, the building of a long-term oriented supplier-retailer relationship results to be less investigated in comparison with the higher attention given to the supplier-customer relationship by the industrial management literature (Ren *et al.*, 2010; Jain *et al.*, 2014).

Focusing on the supplier-retailer relationship, extant literature tended to concentrate on the grocery sector (Schleper *et al.*, 2017; Maglaras *et al.*, 2015), stressing the role that power plays between parties, rather than the impact of relational constructs (Bloom and Perry, 2001; Lummus *et al.*, 2003; Kumar, 2005; Sutton-Brady *et al.*, 2015). This was found as particularly true in the Italian context (Lugli, 1998; Fornari, 1999; Varaldo and Fornari, 1998), even if later works strengthen the importance of cooperative and trustworthy relationships in order to support a win-win approach between parties (Castaldo, 1994, 2010; Pellegrini, 2008). But given both the costs and risks associated with mismanaging a potentially valuable and loyal business partnership, a deeper insight into the factors affecting a long-term supplier-retailer relationship is quite useful both for scholars, managers and business practitioners (Sheu *et al.*, 2006). In actual business practice, suppliers are increasingly aware of the need to adopt approaches aimed at rising closer relationships and a partnering attitude with their retail customers in order to achieve lower manufacturing and R&D costs, reduced time-to-market, improved quality and/or customer service, obtaining higher sales and profitability. However, despite this awareness and the literature suggestions, building long-term relationships with retailers in the reality of business patterns might result in a complex task (Hingley, 2005). So, further empirical studies, aiming at surveying the retail customers' attitude and perception towards their suppliers, should help in acquiring a more comprehensive understanding of the business customer loyalty antecedents. Moreover, extant literature calls for broadening the view to non-grocery sectors (Sheu *et al.*, 2006). So, the research questions for this study can be identified in the following: in a supplier-retailer relationship, does customer loyalty depend on the same drivers identified by the industrial B2B literature? And is this true also when a non-grocery sector, belonging to a creative industry, is involved? Do relational factors add their impact to technical factors or do they overcome the latter?

In this context, the paper presents the results of a study performed on a sample of retail customers of a well-known Italian manufacturing company operating in the jewellery sector in order to explore the antecedents of customer loyalty (measured as intention to repurchase from the supplier in the long run).

The jewellery sector is an interesting study context as it is considered as the best performing category in the personal goods in the near future (Euromonitor International, 2018a). However, only a few papers have been concentrated on this sector, mainly purposed in an industrial district perspective (De Marchi *et al.*, 2014; Gaggio, 2006, 2007). Specifically, the current study aims at deepening the knowledge on the supplier-retailer relationships in this particular and attractive sector, exploring technical and relational factors that would contribute to a loyal relationship. In fact, along with technical factors (i.e.: product quality and service, supplier flexibility and support), the role of key relational constructs such as trust, dependence, information sharing and idiosyncratic investments in the business relationship are verified.

The present work is structured as follow: after having depicted the

current role and trends that are shaping the jewellery industry at a global, European and national level, a brief review on the evolution of supplier-retailer relationships is accomplished, followed by the description of the proposed model and of the research hypotheses. Then, the methodology employed to perform the empirical work is presented, highlighting the measurements used and the sample features. Subsequently, the survey findings are illustrated, followed by their discussion in order to derive the main theoretical and managerial implications rising from the work. A final paragraph reporting the major conclusions, study limitations and further research avenues of the research end the manuscript.

2. The jewellery sector: a high profile and performing business

Jewellery entails small decorative items used for personal adornment, such as brooches, rings, necklaces, earrings, pendants, bracelets, and cufflinks. Its manufacturing is based on a process involving a number of phases such as creation, design, mold, cast, polish and finish, using precious stones, gems and/or metals - which can be gold, platinum, silver, titanium or any other metal.

The jewellery industry possesses a high profile worldwide and it is believed to be in a position to enjoy a sparkling future. Actually, it is considered as the best performing category in personal goods in the near future (Euromonitor International, 2018a), as it is an industry highly dynamic, greatly globalized, and intensely competitive, shaped by the following trends (McKinsey, 2014): internationalization and consolidation, the growth of branded products, a reconfigured channel landscape, "hybrid" consumption, and fast fashion.

The industry is composed by three main market segments: luxury, demi-fine jewellery and costume jewellery. While fine jewellery is traditionally crafted using precious metals and stones and sold at high prices, costume jewellery is made using alloys and crystals and it is sold at lower prices as fashion accessories. Demi-fine jewellery is a mix of the two. It is usually made in 14k gold and semi-precious stones. The latter two segments, with particular regard to the demi-fine one, are increasing nowadays as jewellery companies are trying to push on affordability and appealing designs in order to let consumers buy the products category more often and on-trend, attracting also young people. To target this segment, omnichannel strategies are also becoming important for manufacturers and big retailers.

Western Europe is the third largest region in terms of sales of jewellery at a global level, although accounted for just 9% of global sales, at USD 30.6 billion in 2018. The UK, Germany, France and Italy represent over half of the region's value sales (Euromonitor, 2018b). The jewellery category is expected to continue to increase in the future in the EU countries, with a moderate 1.3% CAGR over 2018-2023.

Focusing on the Italian market, jewellery is one of the flagship manufacturing sectors of the Made in Italy. In fact, it accounts within the most export-oriented, with a propensity equal to over 80% of turnover.

Exports rose to 5.176.602, 000 euros against 4.567.428, 000 euros registered in the same period of 2016 (ICE, 2018), while the domestic demand recorded a value growth rate in 2018 for the second consecutive year (Euromonitor International 2018c). At a national level, sterling silver jewellery is paving the way due to consumer price sensitivity, at the expense of the more costly gold and platinum jewellery. As regards the competitive landscape, the market leader is an Italian company that reaches this rank thanks to its policy based on offering fine jewellery at affordable prices with modern designs and manning distribution by increasing the outlet numbers. At the second place another domestic manufacturer is maintaining its position thanks to the positive performance of its brand, strongly reinforced by its adverting campaigns focused on womanhood. Domestic manufacturers continue to express Italian excellence and to occupy most of the top rankings, even if international jewellery and fashion brands have started to acquire some local companies.

Concentrating on distribution, this has become a key lever for jewellery companies for its importance in creating a strong brand identity. In Europe mono-brand stores are growing as they enable manufacturers to better manage their brand image, create closer contact with consumers and develop a higher margin potential. As a consequence, today mono-brand stores are subtracting market share to mail-order players and some multi-brand boutiques; on the other hand, department-store sales are stagnating. At the same time, the on-line channel is developing, posing new threats to the relationship that manufacturers are pursuing with offline retailers, also because internet sales continue to register an ongoing growth (Panayiotou and Katimertzoglou, 2015). In Italy, specialist jewellery and watch retailers firmly maintain the highest value share, with 90% of sales in 2017 (Euromonitor International 2018c). In fact, consumers appreciate the possibility of receiving specialized advice as well as seeing and directly evaluating jewellery items before buying them; consequently, specialist retailers are still strongly positioned on the national market and sales are expected to substantially remain store-based.

As regards the studies purposed on the jewellery sector at an academic level, the attention given to it by researchers has been limited so far, claiming for a deeper understanding. This is particularly true in the Italian context, notwithstanding its long history and importance. The sector has mainly been used as a study context for researches on industrial districts (De Marchi *et al.*, 2014; Gaggio, 2006, 2007), such as Arezzo, Vicenza, Valenza Po, but also Birmingham (De Propris and Lazzeretti, 2009), or on the role of contract design in overcoming critical demand management issues (Brun and Moretto, 2012), rather than for comparing patterns of marketing activities at an international level (Simoni *et al.*, 2010). From a strategic point of view, some authors proved that jewellery manufacturers are consistently transforming into niche producers whose competitiveness is based around a process of customisation through a co-production relationship with customers, the delivery of service experiences and a continual process of design-intensive innovation (Bryson and Taylor, 2009). Recently, the sector was used for an exploratory study in a Corporate Responsibility (CR) perspective, providing examples of how complex

harm networks operate within and across the fine jewellery industry, and demonstrating the inter-relationships that exist across the different stages of the fine jewellery harm chain (Carrigan *et al.*, 2017). But as today distribution has become a key competitive lever for this category, a deeper empirical knowledge on the antecedents of jewellery retailers' customer loyalty could be of particular interest for the companies operating in this sector.

3. Supplier-retailer relationships

Traditional relationships between suppliers and retailers have been often described as arm's-length market relationships, characterized by non-specific asset investments, minimal information exchange, and separable marketing and functional systems within each firm (Dyer and Singh, 1998). Into this perspective, suppliers and retailers are considered as independent economic entities aimed at maximizing their own interests. On one hand, the manufacturer wants to maximize its own brands profit, selling the greatest possible volume of goods at the highest price; on the other hand, the retailer wants to maximize the profit of its entire product range, negotiating the lowest price for the goods bought from the supplier (Lugli, 1998; Fornari, 1999). Into this view, the supplier-retailer relationship is conceived as a transactional relational exchange, based on a competitive approach leading to conflict. The value that a firm can appropriate from commercial relationships largely depends on the firm's power position over their partners (Ellegaard *et al.*, 2009). But this perspective started to become gradually more inadequate to the market landscape and dynamic: studies have increasingly indicated the need for shifting the view of inter-organizational relationships from arm's-length to long-term, cooperative relationships (Kumar, 2005; Sutton-Brady *et al.*, 2015; Varaldo and Dalli, 1989).

Suppliers began to acknowledge that establishing long-term relationship with retailers could enable them to achieve a competitive advantage by obtaining information on the best-selling products, planning more effective cooperative advertising, arranging for special displays for their merchandise, etc. (Ganesan, 1994). Concepts like power, trust, commitment and collaboration have been linked to logistics' efficiencies (Won Lee *et al.*, 2007), as well as higher levels of product availability (Fernie and Sparks, 2019). Therefore, the supplier-retailer relationship literature matured in a long-term oriented relationship where collaboration is the key. Through the development of cooperation strategies, both parties can diminish their transaction costs and reach their goals, as they might improve inventory systems, share forecasting and information, pursue joint strategic planning, truly collaborate to exceed customer expectations in a win-win perspective (Castaldo, 2010) and engage in value-added activities (Sheu *et al.*, 2006). The on-going relationship between a retailer and a supplier is based on becoming partners able to agree on objectives, policies, and procedures. Some partnerships also include agreements for packing (Gustafsson *et al.*, 2006), price marking, new product development and

testing, and/or joint sales promotion activities. The assumption featuring the partnership approach is that suppliers have product knowledge and marketing responsibility, while retailers know well the shopper's behavior (Kracklauer *et al.*, 2001). Moreover, the retailers are considered as having control of assortment planning, pricing and in-store activities, displaying a stronger power position towards their suppliers (Lindblom and Olkkonen, 2006). This acknowledgement led to develop collaborative projects and tools such as the efficient consumer response (ECR), vendor managed inventories (VMI) and collaborative category management (e.g. Kracklauer *et al.*, 2001; Subramanian *et al.*, 2010) as well as improved merchandising and promotional plans (Aastrup *et al.*, 2008).

Engaging retail customers in a partnership relationship is critical for suppliers. To this aim, and in order to bond them and boost their loyalty, is important to understand their perceptions and the impact of the key antecedents of their customer loyalty. This would be better explained in the next paragraph.

4. Research hypotheses and model

The current research is aimed at investigating some key antecedents of retailer's customer loyalty in the jewellery sector.

Customer loyalty is an evergreen topic in the marketing literature. Scholars have addressed this subject with particular attention to final consumers. However, the subject represents a key importance also in the business-to-business (B2B) literature. B2B customer loyalty can be defined as a buyer's intent to repurchase from a given supplier (Russo *et al.*, 2016). Jambulingam *et al.* (2011, p. 40) define this loyalty as "repeat episodes of intent to rebuy from a supplier". When distributors experience superior relationship value with their suppliers, they are likely to maintain the relationship, less susceptible to switch to competitive offerings and more likely to increase their purchases in the future.

To study the retailer's customer loyalty, this research applies a relationship marketing perspective. Into this view, Grover *et al.* (2002) suggested that supplier-retailer relationships can be better understood through the study of different dimensions, such as technical and social.

From the former point of view, customers are not motivated to continue the relationship unless the supplier can procure a product that meets their needs (Čater and Čater, 2010). In fact, a key criterion for the selection of a supplier is the technical support and capability to consistently provide high-quality products, promote successful development efforts and future improvements (Kahraman *et al.*, 2003). Moreover, a retailer would typically rely more on a supplier who gives good service and support. From this perspective, the correctness in the delivery of an order is very important to stay operational (Ulaga and Eggert, 2005) and refers to the supplier's ability to deliver accurately, on schedule, with supply flexibility and the ability to be responsive to changes in the market. Reliability in delivery leads to the benefits of holding a smaller inventory and less idle stock. Consequently, the suppliers who are able to procure qualitative products

and that are flexible and helpful in the customer service and supportive from a technical point of view might stimulate the intention to repurchase of their retail customers. We can therefore derive the following hypotheses:

H1: Product Quality significantly and positively affects the retailer's customer loyalty.

H2: Flexibility and Support significantly and positively affect the retailer's customer loyalty.

According to Ganesan (1994), trust is an essential antecedent to the long-term orientation of the relationship between manufacturers and retailers. Morgan and Hunt (1994) define trust as the belief of one exchange partner in the reliability and integrity of the other. Trust reduces the perception of risk linked to opportunist behaviours by the supplier, while guarantees both actors that short-term difficulties and inequalities in the relationship would be solved in the long run. Moreover, the presence of trust in the relationship diminishes transaction costs. Trust therefore appears to have a positive impact on the likelihood of a long term relationship when the partner keeps his word and does not act in a way that negatively affects the other (Kumar, 2005; Sheu *et al.*, 2006). As a consequence, the more a retailer trusts the supplier, the more the retailer would display loyalty (De Ruyter *et al.*, 2001). This acknowledgement leads to postulate the following hypothesis:

H3: Trust significantly and positively affects the retailer's customer loyalty.

It is well established that the existence of investments specific to a relationship are a signal of sound and strong bonds between business partners. Studies have shown that successful partnerships rise when both buyers and suppliers demonstrate a willingness to commit a variety of assets to a set of future transactions (Dyer, 1996). When firms are willing to make transaction- or relation-specific investments they are showing commitment to the business relationship. Thus, transaction-specific investments should enhance coordination and cooperation between partners (Bensaou and Anderson, 1999; Dyer, 1996). Dyer and Singh (1998) suggest that firms can create the potential for achieving a competitive advantage by moving away from an arm's-length relationship through tangible investments in relation-specific assets, substantial information exchange, complementary resources and capabilities. So, our forth hypothesis is as follow:

H4: Idiosyncratic investments significantly and positively affect the retailer's customer loyalty.

Successful buyer-supplier relationships are usually associated with high levels of information sharing (Cannon and Perreault, 1999). Mohr *et al.* (1996) recognized the importance of communication in inter-organizational relationships, and evidenced its association with commitment. Retailers that stand closer to the consumers may gain important information for the suppliers, but if they are not willing to pass them, and in the proper contents, to their supplier, the relationship value does not display its potential. If both sides keep secrets, this will affect the efficiency and the performance of the supplier as well as the one of

the retailer, negatively impacting on their relationship. Consequently, it is possible to propose the following hypothesis:

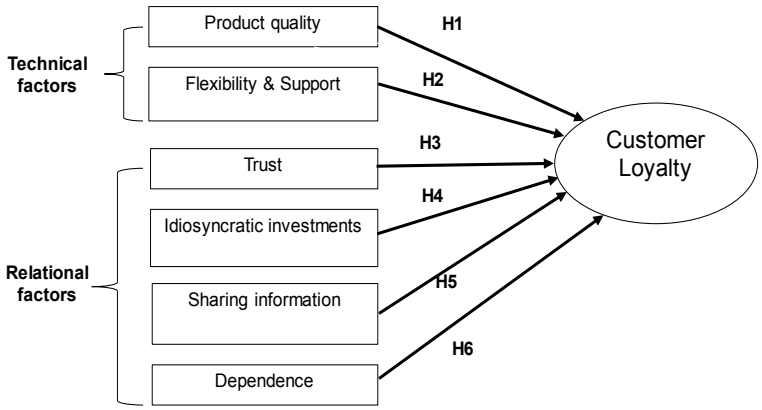
H5: Sharing Information significantly and positively affects the retailer's customer loyalty.

Several researchers recognize the importance of understanding the power situation in terms of the dependency between buyer and supplier in a business relationship (El-Ansary and Stern, 1972; Pfeffer and Salancik, 1978). Power is one of the key characteristics of business relationships (Moore *et al.*, 2004). According to Kumar (2005, p.864), "*When a firm possesses resources that generate for its partner rewards and benefits that cannot be easily replaced, the partner is dependent on the firm*". Therefore, dependence leads to investments within the relationship, both from the part of the retailer and from the part of the supplier. By agreeing to specific investments in the relationship, partners create an incentive to maintain the relationship over a long term. Consequently, our last hypothesis is as follow:

H6: Dependence significantly and positively affects the retailer's customer loyalty.

In sum, the model that the survey aims at verifying is presented in figure 1.

Fig. 1: The model



Source: own elaboration

5. Methodology

5.1 The survey

In order to reach the research aims, a survey was performed on a sample of retail customers of the jewellery company cooperating in the study.

The method employed consisted in administering a structured questionnaire to the overall number of the company's distributors in Italy and Europe. Operationally, each retail customer was mailed an

introductory letter that explained the purpose of the research together with the questionnaire. The latter remained open online for 3 weeks, but the majority of the answers were registered in the first 2-3 days after communicating the opening of the survey, and during the 2-3 days after the recall, based on a second e-mailing that took place in proximity of the deadline. Moreover, in order to increase the response rate, two weeks after the opening mailing the salesforce agents of the company were involved, asking them to push on their retail customers to get for an answer.

The most cooperative market has been the Italian one, while the German speaking countries have been the less responding area. The survey was administered through mail-chimp, the channel used by the company for all its institutional communications.

The aim of the questionnaire was to investigate the way in which retail customers perceived the brand and the products offered as well as the relationship with the company, addressing in particular dimensions such as the degree of cooperation and investment, the level of trust and dependence within the relationship, the intention to continue buying from that jewellery manufacturer. The questionnaire was firstly prepared in the Italian language and then translated in English and German. So, at the end of the day, three versions of the questionnaire were arranged and administered in three different languages.

The survey took place in the period October-November 2017.

Overall, 72 full questionnaires were collected, equal to a response rate of 24% of the entire observed population. This resulted in a very good response rate, especially when bearing in mind the following considerations: firstly, the response rate in the web survey on average is approximately 11% lower than that of other survey modes (Manfreda *et al.*, 2008); secondly, enquiring businessmen, in this case retailers, usually results in a lower response rate compared to surveying consumer samples.

Half of the questionnaires were filled in by Italian retailers, and the other half by retailers located in a wide number of other EU countries.

5.2 Measurements

Measurements were found in adapting validated scales from extant literature on supplier-customer relationships.

Intention to buy (INTB) was measured by a three-item scale (reduced) taken from Ramaseshan *et al.* (2013). Product quality (PQ) consisted in a two-item scale adapted by Čater and Čater (2010), while Flexibility and Support (FLEXSUP) was assessed with a two-item construct by Verma and Pullman (1998). The relational constructs of Trust (T - 4 items), Idiosyncratic Investments (IDI - 2 items), Sharing Information (SHI – 3 items) and Dependence (DEP – 2 items) were caught from Zineldin and Jonsson (2000).

Each item was assessed on a five-point Likert scale ranging from 1=strongly disagree to 5=strongly agree. In the following table (Tab. 1) the items used and their reliability measures (i.e. α-Cronbach) are reported for each investigated constructs.

Tab. 1: Items and Reliability measures for each construct

Constructs	Items	Mean	Cronbach alpha
Intention to Buy (INTB)	I would continue to consider this manufacture as one of my main choice in the future	4.2361	.845
	I believe I will be buying from this company for a long time		
	I have the intention to continue to source from this manufacturer		
Product Quality (PQ)	The product quality orientation of the company is high	4.1481	.765
	Overall, my opinion on the product offer is very good		
Flexibility & Support (FLEXSUP)	Availability to split orders delivering in different times/places	3.9722	.791
	Technical support		
Trust (T)	We trust this supplier	3.8889	.926
	This supplier has high integrity		
	This supplier keeps promises		
	This supplier is always honest with us		
Idiosyncratic Investment (IDI)	This supplier is willing to customize its products for us	2.8611	.917
	This supplier is willing to adjust its production processes for us		
Sharing Information (SHI)	Knowledge and confidence in each other are built up	3.8843	.675
	This supplier keeps us informed on new developments		
	The supplier frequently discusses new possibilities with us.		
Dependence (DEP)	Our future profits are depending on maintaining a good working relationship with this supplier	3.6667	.901
	Our future goals are best reached by working with this supplier rather than against it		

Source: own elaboration

5.3 Sample

Information about the sample include the business role of the respondent, the country, the turnover (year 2016), the number of employees (2016), the total number and SQm of the stores owned. As far as the respondent role is concerned, the majority of the questionnaires were filled in by the retail owner (73, 6%), followed by the store manager (23, 6%) and only residually by the brand manager (2, 85). Main respondents operate their stores in the following countries: Italy (50%) and the United Kingdom (20%), followed by Austria (7%), Germany (7%) and the Netherlands (7%).

Data associated with the total number of stores show that the majority of the respondents operates through a single store (70, 8%), so they are usually independent small retailers. Given that half of the retailers considered are Italian, this data perfectly reflects the Italian jewellery distribution system, which is characterized by small stores, generally based on running one shop. During the questionnaire design it has been taken into consideration that retailers are not generally willing to share some

private information, such as the turnover and it has therefore been decided not to put the question as compulsory, resulting in a very low response rate to this item.

Finally, results show that the majority of the interviewed retailers has been working with the manufacturer company observed since many years: between 6 and 10 years (30%) or more than 10 years (27% of the sample). 15% of the respondents declared to be customers of the observed jewellery company since 1 to 5 years.

6. Findings

Data were then processed applying a hierchical regression analysis using SPSS 25.0 to test the proposed hypotheses. Hierarchical regression models allow an examination of the relationship between a set of independent variables and the dependent variable.

The regression used a procedure by steps, using customer loyalty as a dependent variable.

Firstly, the effect of technical factors such as Product Quality and Flexibility and Technical Support were used as customer loyalty antecedents.

Secondly, the relationship factors - namely: Trust, Idiosyncratic Investments, Sharing Information and Dependence were added, to investigate how they affect the intention of the retailer to continue to buy from the supplier, together with the predictors already used in the first model.

Analysing in detail the results of the regression (Table 2), it is firstly important to notice that the values of R^2 are pretty high, evidencing a good predicting ability of the tested model. However, adding the relational factors, the R^2 evidences a very big increase and in a highly significant manner ($p \leq 0.001$). We can therefore state that the chosen independent variables are strongly contributing to customer loyalty, explaining approximately 60% of the total variance of the dependent variable.

The coefficients of the regression model evidence the main importance of the relational antecedents over technical features (see table 2). When the relational constructs are added into the regression model, the latter significantly improves ($p<0, 001$) and technical factors lose their significance. Only Flexibility and Support maintain a weak significance, borderline. Among the relational antecedents, dependence and trust play a key role.

Consequently, H3 and H6 are strongly supported, H2 is slightly verified, while H1, H4 and H5 are rejected.

Tab. 2: Regression coefficients

Model	B	SE B	β
1 (a)			
Constant	1.622	.484	
Product Quality	.345	.131	.320*
Flexibility & Support	.298	. 119	.303*
2 (b)			
Constant	1.356	.465	
Product Quality	.104	.111	.097
Flexibility & Support	.196	.110	.199***
Trust	.218	.106	.245*
Idiosyncratic	.110	.073	.164
Investments	-.143	.103	-.151
Sharing information	.289	.074	.388**
Dependence			

Note: R^2=.303 for step 1; Δ R^2=.302 for step 2 (p<.001)
* p<.05
** p<.001
*** p<.1

Source: own elaboration

7. Discussion and implications

Findings confirm the importance of building trustworthy relationships with retailers in order to make them loyal to the manufacturer. In fact, when different kinds of antecedents are considered, such as technical features together with relational factors, the latter significantly improves and technical factors lose their significance.

Among the relational antecedents, dependence and trust resulted as key dimensions. Specifically, dependence emerges as a crucial antecedent of retail customer loyalty as the retailers interviewed acknowledged their need to maintain a relationship with the partner in order to achieve their goals, confirming Heikkilä (2002) statements. From this point of view, these findings are in line with the prevailing literature on the topic and enable us to make some further reflections on the opportunity to sustain the dichotomy Power versus Trust. The literature is increasingly supporting a perspective in which this dichotomy is considered as incorrect (Kumar, 2005), as authors are recognizing that the relational effects might depend on the kind of power. In fact, two main forms of power have been identified: dependence-based power and punitive capability based power (Kumar *et al.*, 1998). Implications are highly differentiated between the two power-based forms. The one that is based on mutual dependence is taking place together with trust. This view of the power concept is coherent with the kind of power rising from the current research. Unexpectedly, the manufacturer's willingness to specifically invest resources into the relationship and to share information with the retailer did not evidence any significance. It might be that when the level of dependence and of trust with the manufacturer are so high, idiosyncratic

investments and sharing information result as ancillary in the relationship with the supplier. This result might also be due to the specificity of the respondents, laying a long or even very long business relationship with the jewellery company participating in study. Interpersonal trust facilitates coordination efforts, and complementary capabilities facilitate both effort and investments. Trust helps manufacturer-retailer relationships realize their full potential. A trusting party would not feel the need to monitor its counterpart's behavior, avoiding monitoring costs. In sum, the sample of jewellery retailers interviewed are heavily dependent on their supplier as they strongly rely on its integrity and capacity to keep promises, so they take for granted its good level of product quality and do not need to share information with it as for them trust acts as a substitute of information. In this perspective, the results obtained differ from previous studies in the industrial B2B context, where idiosyncratic investments and the partners' willingness to share information show an important and positive effect on customer loyalty. This seems to differ from what market trends in the sector are indicating (Bryson and Taylor, 2010): customization does not emerge as a need of the jewellery retailers composing our sample, as idiosyncratic investments did not show any significance.

From a managerial viewpoint, such research offers insights on how to proactively manage long term partnerships in order to reap the benefits of success, and to avoid the damaging costs inherent in their failure. The findings can help jewellery managers in identifying the factors to invest on in order to build, maintain and enhance a good long-term relationship with retailers. From this point of view, technical factors might be taken for granted as soon as the relationship matures, manning attention to maintain flexibility in delivery and giving technical support. The managerial implications to be drawn from this research relate therefore to the manner in which partners attempt to manage the future scope and tone of their relationship. The retailer trust and dependence from the manufacturer turned out to be the fundamental variables to guarantee the repurchase from the supplier. The more dependent the channel partner is on the relationship, the more likely the partner is to cooperate (Razzaque and Boob, 2003). And as dependence has been found to stimulate satisfaction with the relationship (Johnson, 1999) as well as performance (Osmonbekov and Gruen, 2013), suppliers should try to let it emerge in order to exploit its benefits. Assuming that cooperation is the desired dominant sentiment in channel relationships, this research suggests therefore that companies should focus on developing cooperation strategies with their customers able to develop their business, investing in sell-out strategies that might stretch and pull the retailer's business as well as creating relational ad personal bonds underpinning a trustworthy relationship with dealers.

8. Conclusions, limitations and further research avenues

This paper contributes to the supplier-retailer relationship literature investigating the effect produced on retailer's customer loyalty when technical and relational antecedents are both considered. In a creative

industry like jewellery, some specificities emerge in the loyal relationship linking one supplier to its retail customers compared to the results obtained in studies conducted on B2B relationships in industrial contexts and in the grocery sector, strongly prevalent. In this sense, this work sheds light on a highly performant and important sector, especially as it is considered one of the most important Italian industries supporting a positive "Made in" image, on which the current knowledge, in academic terms, is limited. Despite this acknowledgement, some limitations are present.

First all, the research focuses on a sole company and one specific sector. In order to increase the possible impact of the findings, it would be useful to extend the study to other non-grocery sectors or jewellery companies, performing a comparative analysis.

Secondly, no control variables and moderating factors were considered, even if the author is acknowledged that, for instance, the length of the relationship as well as the retailers' features (size, number of stores, etc.) might influence the proposed model. These measures should be considered in future studies.

Last but not least, the number of collected questionnaires, even if good enough considering the interviewees' nature (retailers), did not allow to perform a simultaneous evaluation of model construct relationships. In fact, we could only apply a hierarchical regression model. Further research avenues should consider increasing the sample size in order to apply structural equation modeling (SEM) and consequently allowing simultaneous analysis of all the variables in the model instead of independently. This could also permit to verify a more complex model in which mediating and moderating variables could be included. As recent literature suggested that, regardless of the quality of the manufacturer's product offering, trust could act as an antecedent of dependence as well as a moderator (Hopkins and Padgett, 2018), SEM might enable to verify a compound model taking into consideration these relationships.

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The new frontiers of procurement in the digital age. Results of an empirical survey on procurement 4.0 in Italy[1]

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Abstract

Purpose of the paper: *The paper presents the results of a research conducted through a university-business partnership, aimed at providing a first photo of enabling technologies in Procurement (Procurement 4.0) in Italian enterprises, both in terms of interest and cultural attitude and actual use.*

Methodology*: The research is conducted with a quantitative methodology, realized with an online questionnaire (CAWI), transmitted by the Italian Association of Procurement Managers (ADACI) via email to its members. The statistical analysis of the results is descriptive.*

Results*: The survey, with 51 recorded replies, collects a sample of innovative enterprises, with a good awareness of the role that enablig technologies can have and how strong the impact can be on business models procurement practice. These enterprises can therefore be considered as innovators able to act as a flywheel for the diffusion of enabling technologies along the supply chains they partecipate in.*

Research limits*: The research takes stock of a phenomenon that is still in the embryonic phase in Italy. The number of responses is therefore limited. New research will have to be carried out in order to strengthen and generalise the results, also through inferential statistical analysis.*

Practical implications*: The research provides information useful to researchers, policy-makers and practinioners to support their decision-making processes regarding a very innovative phenomenon, which is still little known in Italy.*

Originality of the paper: *Procurement 4.0 in Italy is still very little explored. The research, through a university-business partnership, provides a first original scientific contribution that will feed new research and support enterprises in this historical phase, which is crucial for the competitiveness of the Italian production system.*

Key words: enabling technologies; industry 4.0; procurement 4.0; innovation; change; Italy

1. Introduction

Enterprises and economic systems are today facing the important challenges of the fourth industrial revolution, which will deeply transform productive and economic activities.

[1] The Authors share the responsibility of the paper. Silvia Bruzzi wrote paragraphs 1, 2, 3, and 4.5 and 5; Vincenzo Genco wrote paragraphs 4.1 and 4.2; Nicola Balbi wrote paragraphs 4.3 and 4.4. Conclusions were written jointly by the Authors.

Scientific and technological innovation as well as economic-productive innovation have always been closely interconnected (Cipolla, 1989); this is evident when considering the different industrial revolutions that marked history. Think of the steam engine in the Eighteenth century and the development of the mechanical and textile industries, then electricity and the development of mass production, as well as the development of information technology in the 1970s and the introduction of programmable logic controllers (PLC) and robots that enabled the automation of industrial production processes (Vaidya, Ambad and Bhosle, 2018).

With the fourth industrial revolution based on digital technologies (Porter and Heppelmann, 2014), the production processes will be deeply influenced by Internet and by the communication opportunities between humans, machines and products in the so-called Cyber-Physical Systems (CPS)[2].

The new digital technologies are called Enabling Technologies (ETs) and represent the core of this revolution, baptized with the term Industry 4.0 (I4.0) in Germany by the Federal Ministry of Education and Research (Bundesministerium fur Bildung und Forschung, BMBF) to stress their impact on the industrial activity of the 21st century (Schütte, 2012)[3].

The disruptive impact of this technological change seems evident considering the definition of the European Commission (2009, p. 1), according to which the Enabling Technologies (or Key Enabling Technologies, KETs) "are knowledge intensive and associated with high R&D intensity, rapid innovation cycles, high capital expenditure and highly-skilled employment. They enable process, goods and service innovation throughout the economy and are of systemic relevance. They are multidisciplinary, cutting across many technology areas with a trend towards convergence and integration".

The introduction and diffusion of these technologies in the industrial landscape is leading to the development of new economic paradigms, where the labor force is still considered irreplaceable and the ability of integration becomes a fundamental atout for the competitive advantage.

With the pervasive application of enabling technologies, enterprises will become part of hybrid integrated systems (Porter and Heppelmann, 2014), where physical and virtual elements along with information flow in integrated processes.

In this context the capacity to create value will increasingly depend on the ability to integrate business functions and processes. Enterprises need to be able to integrate processes along the different stages of the supply chain, involving all their business functions. If Operations, which are responsible for the management of the production processes, constitute the

[2] CPS are systems composed of physical entities (for example machines or vehicles) equipped with specific technologies, such as sensors or microprocessors and IT systems, that are capable of generating data, processing it and communicating it to other systems, also activating autonomous decision-making processes (Thoben *et al.*, 2016).

[3] The Boston Consulting Group has identified nine enabling technologies: Big data and analytics, autonomous robots, simulation, vertical and horizontal integration, industrial internet of things (IoT), cybersecurity, cloud, additive manufacturing, augmented reality (Lorenz *et al.*, 2015).

business function that will be most involved in the changes taking place, the other functions will also have to reorient themselves in order to allow the enterprise to take on the challenges. Amongst these, Procurement plays a central role and can become a driving force for innovation. Procurement, by acting on the input side and as an interface between suppliers and customers, can give a fundamental contribution to value creation, which is growing because of the increasing importance of purchasing costs, in line with the outsourcing policies adopted by firms.

With enabling technologies, Procurement seems destined to acquire an even more important role; literature refers to Procurement 4.0, in step with the term Industry 4.0, in order to highlight the need for Procurement to support the development of integrated and digital operations and supply networks.

In particular, Procurement has a fundamental role in the construction of the new hybrid integrated systems. It must ensure, through adequate suppliers' management strategies, the creation of infrastructural systems, where materials and information can safely flow across enterprises' boundaries. In line with these considerations the article aims to support this process of renewal of Procurement in Italy, where Procurement 4.0 is still in its infancy (Atti (ed.), 2018).

The research, conducted in partnership with ADACI, the association of Italian Procurement Managers, aims to take a photo, through an empirical study, of the state of the art of Procurement 4.0 in Italy; the goal is to support the decision-making processes of all the actors (firstly managers and policy-makers) and to promote the dissemination of good practices, through a better understanding of a phenomenon that is in full evolution in terms of solutions adopted and emerging difficulties/needs.

To this end, the article consists of 6 Sections. In Section 2 a literature review on Industry and Procurement 4.0 is presented in order to take stock of the state of the art and identify the theoretical and empirical gaps that the article aims to fill; then, after a brief description of the research methodology adopted (Section 3), the article describes and discusses the results of the empirical research, focusing on enabling technologies in general and, in particular, for Procurement (Sections 4 and 5). The article closes with some concluding remarks and hints for future research in this field (Section 6).

2. A literature review to understand the managerial challenge coming from enabling technologies

Different definitions have been produced to describe the industrial revolution and the disruptive impact that enabling technologies can produce on production and economic systems. In particular Russmann *et al.* (2015, p. 3) highlight that "Industry 4.0 will make it possible to gather and analyze data across machines, enabling faster, more flexible and more efficient processes to produce higher-quality goods at reduced costs. This in turn will increase manufacturing productivity, shift economies, foster industrial growth, and modify the profile of the workforce - ultimately changing the competitiveness of companies and regions".

In the same way, Thoben *et al.* (2017) highlight how these technologies will lead to a passage from the paradigm of automated production of the third industrial revolution to the paradigm of intelligent production, a production that, thanks to information available in real time, succeeds in realizing products in the variations, quantities and time periods requested by customers. "The exclusive feature in I4.0 is to fulfill individual customer requirements with product variants in a very small lot size, down to one-off items. The availability of all relevant information in real time will enable manufacturing systems to meet customer requirements without waste due to reconfiguration of assembly lines or setup times through dynamic business and engineering processes" (Thoben *et al.*, 2017, p. 5)[4].

The Authors refer to an artificial intelligence, based on the use of technologies able to endow machines with learning and decision-making skills, which allow them to independently manage production processes.

This aspect is extremely important in order to understand the impact that these technologies can have in managerial and entrepreneurial terms.

In the first place, the intelligent production paradigm modifies the man-machine relationship that developed during the previous industrial revolutions. Vaidya, Ambad and Bhosle (2018) argue that while the technological innovation that characterized the third industrial revolution acted to reduce the role of man, with intelligent production man's role is essential for managing the interconnection between machines and information systems and for guiding them in the desired direction. In this regard, Lorenz *et al.* (2015, p. 3) highlight how the adoption of enabling technologies will lead to overcoming the trade-off between productivity and employment: "manufacturers will be able to increase their competitiveness, which will enable them to expand their industrial workforce at the same time that productivity increases". For example, the Authors estimate that in Germany the adoption of these technologies from 2015 to 2025 will lead to an overall growth in employment, despite a recomposition of the workforce to professional levels. In fact, employment with low added value will further decrease since repetitive tasks can be performed by machines and robots. However, the demand for highly skilled workers will increase (Stanton Chase, 2017; Vollmer and Machholz, 2018). Moreover, alongside high-profile technical skills, labor force will be asked to develop soft skills, such as flexibility, ability to adapt to change and openness to continuous interdisciplinary learning[5]. Brettel *et al.* (2014, p. 43) point out that "In the near future, labor work will change in content but will still remain irreplaceable, especially in view of customization resulting in an increased

[4] Literature also refers to Smart Manufacturing, a term coined by various US agencies, such as the Department of Energy and the National Institute of Standards and Technology, to highlight the role that information technology can have in the development of intelligent and efficient operations at the level of a single production unit, factory and supply chain (Thobe *et al.*, 2017).

[5] From this point of view, Industry 4.0 is an expression of the great socio-economic transformation that has been underway for decades and has not yet been completed, which places the enhancement of hard and soft skills at the basis of development and recognizes enterprises as primary learning environments (World Bank, 2002; Dutta *et al.*, 2014; Velo, 2007; Bruzzi e Anelli, 2014; Bruzzi, 2014).

need for coordination. Operators on the shop floor need to be skilled in decision making as the separation between device and executive work voids. Self-controlling and human systems communicate via the Internet, which alters the role of workers towards coordinators and problem-solvers in case of unforeseen events".

Even the relationships between the enterprises that operate along the supply chain is going to change. With the pervasive application of enabling technologies, enterprises will no longer act as isolated actors, even though managed in an optimized way, but will become part of an integrated system in which processes and information will flow across business boundaries (Vaidya *et al.*, 2018). The integrated and continuous communication between the actors in the supply chain will be the core around which the integrated system will work, making it possible to reduce stockpiles and waste and increase opportunities for customization and efficient production of small lots (Russmann *et al.*, 2015).

Supply chains can thus be transformed into hybrid supply networks (Porter and Heppelmann, 2014), composed of both physical and virtual elements, powered by information and processes flows, no longer exclusively linear, between the actors that are part of the network. This integration will make it possible to achieve higher levels of efficiency and greater flexibility on the production side and responsiveness with respect to changes on the demand side. The trade-off between variety, volume and variability of demand can be overcome, with a better business performance and greater satisfaction of demand (Slack *et al.*, 2013).

The impact can be radical if technological innovation is conceived in a supply chain or network logic, that is, if it includes all the actors involved, allowing the sharing and integration of their production and decision-making processes (Evry, 2016). As with industry 4.0 operations and supply chains of many sectors and enterprises are going to be redesigned (Pfohl *et al.*, 2015) in a logic of strong integration (Russo *et al.*, 2015), the capacity to create value and to acquire a competitive advantage will increasingly depend on the ability to integrate (Porter and Heppelmann, 2014) business functions and processes.

Processes constitute the fulcrum of the fourth industrial revolution and, consistently, it is through processes that the man-machine relationship and the relationship between enterprises operating processes can innovate.

The system of organizational and inter-organizational relations is, therefore, intended to undergo profound transformations. The issue is consequently not only technical, it also takes on a strong managerial and organizational value and require a cultural shift. In order to support this transformation it will be necessary to identify new business models to which enterprises can refer.

If the fourth industrial revolution will make it possible to overcome the trade-off between man and machine, confirming the enhanced role of the man in the economic activity (Caselli, 1995; Tagliagambe and Usai, 1998), and to integrate decision-making processes across business boundaries, the impact of such changes on management may take on an historical significance: a huge cultural challenge that has probably never been experienced in this dimension.

For this reason these changes deserve the maximum attention of management scholars, first of all to understand the phenomenon and then to help guide its evolutionary process.

This emerges clearly from the debate that developed on Industry 4.0. Glas and Kleeman (2016), in a recent study based on a Content Analysis from the literature on the subject, argue that, while still lacking a universally shared definition of the term Industry 4.0, the common element in the different definitions proposed by the literature is the relevance given to the organizational and managerial dimension of innovation: technologies do not constitute the fulcrum of Industry 4.0, but rather they are an enabling element to activate profound innovations at a managerial and organizational level.

Enabling technologies in fact will impact all business functions and processes across the board; they will change not only their operations, but also their way of relating to the other functions of the same enterprises and to the functions of the other actors in the supply chain.

Therefore, if Operations, which are responsible for the management of the production processes, constitute the business function that will be most involved in the changes taking place, the other business functions will also have to reorient themselves in order to allow enterprises to take on the challenges. Amongst these, Procurement plays a central role and can become a driving force for innovation (Nicoletti, 2018). The importance of Procurement has already been highlighted by Porter, who places it in the value chain among those activities that support the primary ones, underlining their strategic importance in order to gain competitive advantage (Porter, 1985). Procurement plays a role of supplying the enterprise, within the correct time frame, with everything that is necessary for its activities. It is, therefore, a function that, by acting on the input side and acting as an interface between suppliers and customers (Giunipero and Brand, 1996), can give a fundamental contribution to pursuit of value (Ellram and Carr 1994; Johnson and Flynn, 2015). Its contribution has also grown over time in light of the increasing importance of purchasing costs (Farmer and Day, 2002), in line with the outsourcing policies adopted by firms (Grant, 2016; Cantone, ed. 2003).

With enabling technologies, Procurement can acquire an even more important role; literature refers to Procurement 4.0, in step with the term Industry 4.0, in order to highlight the need for Procurement to support the development of integrated and digital operations and supply chains[6].

Geissbauer *et al.* (2016) highlight how Procurement, by bonding suppliers to enterprises, constitutes the link between the various enterprises in the supply chain and the node where all information relating to suppliers and their offers is concentrated. For this reason, they are the holders of strategic know-how. Hughes and Ertel agree in this regard (2016, p. 22): "Sitting at the intersection of a company and its external

[6] The term Procurement 4.0 also has a meaning that traces a boundary together with the already widespread e-procurement, which aims to exploit the potential of technology (lower costs and shorter times) for carrying out single purchase transactions (Ronchi *et al.*, 2010). In this regard Uygun and Ilie (2018) highlight the need for clarity, overcoming the confusion that still exists between e-procurement and the ongoing digital revolution.

suppliers, procurement can play a unique role in leveraging supplier assets and capabilities to drive innovation, actively support revenue growth and deliver competitive advantage - all while minimizing risk to a company's operations and reputation".

In particular, Procurement can have a fundamental role in the construction of the new hybrid integrated networks prefigured by Porter. Procurement must ensure, through correct suppliers' management strategies, the creation of a infrastructural system to support material and information flows in an efficient and agile, transparent, traceable, secure and confidential way (Mantey, 2015). In this sense, their contribution is decisive in the re-engineering of Operations according to a 4.0 logic, through the choice of innovative suppliers, defining contractual conditions and managing relations with them. Furthermore Procurement is called to contribute to the integration of the operations of all the actors of the network (suppliers and customers). The sharing of information and knowledge among all the actors is in fact essential for the network's ability to innovate and for its competitiveness. Procurement plays a decisive role in the construction of a framework that guarantees the secure management of this sharing. This is not only in relation to individual suppliers, but rather, in a network logic. The challenge of the new industrial context is, in fact, to build trust medium-long term relationships between all the actors in the network simultaneously and no longer only between two actors at a time (Bienhaus and Haddud, 2017).

In this regard, Bienhaus and Haddud highlight how the matrix of Kraljic (1983), formulated in 1983 for manufacturing enterprises and still a reference point for the decision-making procurement processes, needs to be renewed. In particular, the Authors highlight that some suppliers can assume strategic importance, for example those that provide digital inputs, despite the lower risk due to the transparency of the information flows enabled by the new technologies. Kraljic's matrix, which is too focused on commodities, should be renewed as also argued by Keith *et al.* (2016, p. 28): "The Achilles' heel of the Kraljic Matrix is that it does not recognize a new form of power - the power of highly strategic and collaborative supplier relationships".

The challenge for Procurement is, therefore, of great importance and requires new skills. At the centre of a system of processes and relationships in full transformation, Procurement is asked to contribute to re-engineer operations, make them more agile and secure, increase the potential that comes from the relationship with suppliers and their value propositions (Pellengahr *et al.*, 2016). Risk management, security, information sharing and protection of intellectual property are some of the issues that are at the heart of the renewal of Procurement (Stephens e Valverde, 2013; Barron *et al.*, 2016)

In a 4.0 perspective, Procurement must be able to renew itself in order to be able to take advantage of the opportunities offered by the new technologies (Umbenhauer and Youger, 2018).

This is an extremely important issue for the competitiveness of the Italian production system, where Procurement 4.0 is still in its infancy.

In Italy general interest in Industry 4.0 has matured only recently.

The Industry 4.0 National Plan, aimed at supporting knowledge and dissemination of enabling technologies in the Italian production system, was launched in 2017 by the Ministry of Economic Development. In July 2018, the latter published the results of a sample survey, conducted on 23, 700 enterprises between October 2017 and February 2018, showing that 86.9% of the total number of enterprises interviewed did not adopt non intend to adopt enabling technologies in the near future. On the other hand, 8.4% of enterprises use at least one enabling technology and 4.7% of enterprises are planning investments in them over the next three years (MISE, 2018). These are low values that require the adoption of adequate measures to promote the spread of a more open culture to innovation. A study by Deloitte (2018a) also highlights the persistence of a significant gap in Italy, compared with other countries, regarding the education and training of the workforce.

More specifically, the spread of digital skills in the workforce is in Italy well below the European average (29% versus 37%). Also with regard to the participation rate in training courses on 4.0 technologies, Italy records a lower value than the European average (8.3% versus 10.8%). Consistently, the robotics industry complains about an insufficient human capital to meet its need of professionals and skilled technicians[7]. The study also shows that the executives interviewed express a favorable opinion on the degree of knowledge about new technologies, although there is still considerable and widespread uncertainty about how to transform the business and organizational models of their enterprises so that the introduction of new technologies can allow the effective achievement of a competitive advantage.

This work aims to contribute to filling this gap and reducing this uncertainty by an empirical research that directly involves procurement executives and managers. Initiatives aimed at promoting attention towards enabling technologies, in the current historical phase, are extremely important in order to help the Italian production system to mature culturally and face a crucial transformation necessary for its global competitiveness. In particular, actions aimed at raising awareness with regard to the opportunities and criticalities linked to enabling technologies, can make an important contribution in this direction.

3. Research methodology

As Procurement 4.0 in Italy is still in its infancy, it was considered appropriate to proceed with a quantitative research methodology that would allow to grasp the initial dimension of the phenomenon. Therefore, a survey was conducted through an online questionnaire (CAWI detection technique - Computer Assisted Web Interviewing),

[7] The study by Deloitte (2018a) highlights the enormous gap that separates Italy from other European countries in terms of students enrolled in Higher Technical Institutes (9, 000 versus 760, 000 in Germany, 529, 000 in France and 400, 000 in Spain), against which the Government is allocating growing resources for the adjustment of the educational offer with respect to the development of new technologies.

based on multiple-choice, numerical and open-ended questions, which was sent to the members of the Italian Association of Procurement and Supply Management (ADACI) by email (about a thousand contacts). The questionnaire was designed to satisfy different cognitive needs without making the compilation too demanding and thus risk discouraging a complete response.

The definition of the questions took place in two stages. First, some international and Italian surveys that are available in the literature were consulted [Vollmer, Machholz (2018), Deloitte (2018b), von der Gracht, Giunipero, Schueller (2016), Pellegahr, Schulte, Berg (2016), Evry Survey (2016), Ministry of Economic Development (2018), Atti (2018)]. They were consulted to better understand the aspects that are of particular interest within the debate and to obtain comparable results from the survey. Second, the questionnaire was submitted to some procurement managers, who helped make the survey more consistent with the needs of the Italian production system and to test its usability and comprehensibility.

The questionnaire was organized in two parts: 1) the first aimed at understanding the state of the art of the procurement processes, regarding both the characteristics of the supplier base and the evolution of the management of the procurement processes. The objective was, in fact, to be able to grasp the level of development of Procurement and associate with it the effective use of technologies in procurement (or at least the cultural attitude toward them). 2) The second part was dedicated to new technologies and to Procurement 4.0. In order to classify enterprises, after the initial questions aimed at understanding the knowledge and cultural attitude towards enabling technologies, the questionnaire was constructed to provide for three alternative paths: 1) a path for those who have adopted enabling technologies, and in this context have adopted Procurement 4.0 solutions (Adopters), 2) a path for those who have not adopted enabling technologies, but who intend to do so in the near future (Interested), 3) the final option, substantially leaving the questionnaire, for those who have not adopted enabling technologies and do not intend to do so in the near future.

Since the objective of the survey is to describe the population of the enterprises observed and study the behaviors/attitudes based on their responses, the statistical analysis of the proposed results is descriptive. New surveys will be carried out in the future to strengthen and generalize the results achieved so far, also through inferential statistical analysis.

The survey form was made available to ADACI members by sending an invitation to fill in the questionnaire to the membership mailing list. The questionnaire remained open for 25 days (from 10 September to 5 October 2018) and two reminders were issued. There were 51 responses recorded, of which 44 complete.

4. The results of the empirical research

4.1 Description of the respondents

Respondents are medium to large[8] enterprises, which belong primarily to the secondary sector[9] and are characterized by a high weight of purchases on turnover (57% between 41- 60% and 25% over 60%), a high number of active suppliers (43% over 300), who operate in Italy (100% of respondents), in Europe (EU 67%, non-EU 47%) and in Asia (47%)

In order to understand the degree of development of the procurement processes, respondents were asked to describe their procurement processes in terms of: computerization/automation and formalization degree, time dedicated to different activities (strategic/operational/emergency), presence of a system of Key Performance Indicators (KPIs) and number of KPIs used for performance evaluation, presence of supplier qualification and monitoring systems and use of e-procurement.

With reference to the first aspect, 47% of respondents stated that their procurement processes are quite computerized (computerization/automation concerns 25-49% of the processes), while 63% state that the procurement processes are very formalized (4 and 5 on the Likert scale from 1 to 5, with 1 = no formalized at all, 5 = highly formalized). Respondents use a large proportion of their time in operational activities (39 out of 100), in the resolution of emergencies (20) and in the strategic planning of procurement (20). Much less time is dedicated to the definition of new procurement strategies (11) and to monitoring/evaluation activities (10) (Tabs. 1-2).

Tab. 1: Degree of computerization/automation of procurement processes

Highly computerised (50 - 74%)	24%
Very computerised (50 - 74%)	24%
Quite computerized (25 - 49%)	47%
Little or no computerised, mainly manual (<25%)	6%

Source: Authors' elaboration

Tab. 2: Average time dedicated to the different activities (total 100)

Procurement planning	20
Daily operational management	39
Emergency resolution	20
Monitoring and evaluation	10
New purchasing strategies	11

Source: Authors' elaboration

[8] Reference is made to the criteria established by the European Commission, in Recommendation 2003/361/EC of 6 May 2003, Commission Recommendation: definition of micro-enterprises, small enterprises and medium-sized enterprises, available from: https://eur-lex.europa.eu/legal-content/IT/TXT/HTML/?uri=LEGISSUM:n26026&from=IT

[9] The percentages relative to the registry data were calculated for 44 respondents, since this information was not provided by those who did not complete the questionnaire.

In almost all cases KPIs are used for performance evaluation (in 4% of cases they are not in place, in 4% of cases the response was 'I don't know'[10]), with 47% of respondents using 3-4 KPIs. The most used KPIs are Savings (86%), followed by Reduction of purchase order cycle times (49%), Lenghtening payment times (33%), Supplier's degree of innovation (29%).

Tab. 3: The KPIs used in the procurement process

Savings	86%
Reduction of the purchase order crossing time	49%
Lenghthening payment days	33%
Supplier's degree of innovation	29%
Reduction of number of suppliers	25%
Sustainability	25%

Source: Authors' elaboration

A supplier qualification system is present in 72% of the respondents, and it is well structured in 41% of the cases. A supplier performance monitoring system is, instead, present in 76% of respondents, with a share of 'yes, well structured' which drops to 31%. With reference to e-procurement, 43% of respondents declare that they are using it, but only for certain categories of purchase (only 8% use it pervasively)[11].

The level of respondents' satisfaction with respect to the performance of the procurement processes indicates a level of 3 for 51% and 4 for 37% (on a Likert scale from 1 - not at all, to 5 - highly). The desired interventions for improving performance are first and foremost for human resources: investments in skills and training (63%) and investments in new human resources (51%). Secondly, they concern investments in technologies: process automation actions (51%), investments in new technologies (43%) and process engineering actions (41%).

Finally, with reference to the perception of IT risks, the survey shows that respondents have a rather low perception of risk (41% do not believe that the enterprise is exposed to risk). This data, to be correctly interpreted, must be read together with that regarding the adoption of measures to manage risk, which were adopted by 69% of respondents (Tabs. 4-5).

Tab. 4: Do you think your enterprise is exposed to IT risk?

Yes, very high	0%
Yes, high	16%
Yes, but to a limited extent	39%
No, I don't think so	41%
I don't know	4%

Source: Authors' elaboration

[10] This may be due to the fact that in a few cases the respondents are not Procurement managers nor top managers (CEO).

[11] E-procurement has been addressed both to understand the degree of development of the procurement processes and to avoid confusion between the topic of the survey (Procurement 4.0) and e-procurement. See what has been highlighted previously in Note 5.

Tab. 5: Have measures been taken to address IT risk?

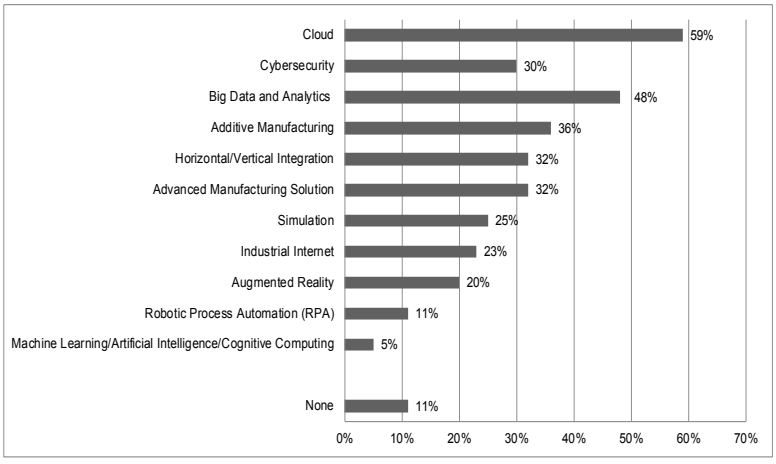
No, cyber risk is not a problem	4%
No, but we're going to do it	6%
Yes, we are organizing ourselves to implement systems and initiatives for the management of IT risk	22%
Yes, we have already implemented systems and initiatives for the management of IT risk	69%

Source: Authors' elaboration

4.2 Enabling Technologies: Knowledge and Cultural Attitude

In order to understand the cultural attitude of the interviewees with respect to enabling technologies, the survey investigated the degree of knowledge of these, as well as their expectations with respect to the impact that they will be able to generate in the future. Regarding the first aspect, we can see that the most well-known are those concerning data management, while 11% of respondents declare that they do not know about any of them. The most chosen are Cloud systems (59%) and Big Data and Analytics (48%), followed by Additive Manufacturing (36%), Horizontal/Vertical Integration and Advanced Manufacturing Solutions (32%) (Fig. 1).

Fig. 1: Knowledge of the different types of enabling technologies



Source: Authors' elaboration

With reference to the cultural attitude, the emerging widespread conviction is that enabling technologies are a radical innovation destined to change the way of doing business, as well as a rather high awareness of the impact they will have on Procurement. In the face of this, respondents believe that awareness of the impact that enabling technologies are destined to generate on business is moderate, as is the lack of awareness of the role that Procurement can have (Tab. 6).

Tab. 6: Degree of agreement/disagreement with some statements concerning enabling technologies

	absolutely disagree				absolutely agree
ETs are a radical innovation that will change the way we do business	0%	2%	34%	32%	32%
My company is aware of the impact that these technologies may have on the way of doing business	2%	32%	34%	23%	9%
My company is aware of the role that the Procurement Department can play in the introduction/implementation of enabling technologies	9%	41%	34%	11%	5%
My Procurement Department is aware of the impact that these technologies may have on the management/activities of the office itself	7%	30%	25%	34%	5%

Source: Authors' elaboration

Considering the impact that enabling technologies will have on Procurement, it is worth emphasizing how respondents view enabling technologies as an opportunity to enhance the strategic dimension of Procurement and identify the need to develop skills for managing complex contracts and for risk management (Tab. 7).

Tab. 7: How do you think Procurement will change in the near future with the adoption of enabling technologies? (Multiple response)

It will be necessary to strengthen the skills for the management of contracts regulating the sharing of information and know-how	66%
Automation will allow more time to be spent on strategic planning and scouting for new suppliers	59%
The Procurement Department will become strategic for product innovation	52%
Supplier management will play a much more important role	52%
Expertise in risk management and mitigation will need to be strengthened	52%
The Procurement Department will become strategic for process innovation	48%
Data management will become the focus of our business	39%
I don't think the enabling technologies will impact on the operations of the Procurement Department	5%

Source: Authors' elaboration

4.3 The Adoption of Enabling Technologies

With reference to the adoption of enabling technologies, 36% of respondents stated that they are introducing them (Adopters), 34% are in an exploratory phase and 25% will deal with them in the near future. We called this part of the sample (59%) the Interested enterprises. No enterprise has introduced them and also completed the introduction process. Only 5% stated that they do not intend to introduce enabling technologies (Tab. 8).

The analysis of the results will now focus on the Adopters' responses, in order to understand the enabling technologies adopted, with a specific

focus on Procurement, on the problems encountered and on specific characteristics of these enterprises with respect to the other respondents[12].

Tab. 8: What is the penetration degree of enabling technologies in your enterprise?

We have introduced them and the implementation process has already been completed	0%
We're introducing them	36%
We are interested, but we are still in an exploratory phase/we are drawing up a feasibility study	34%
We haven't introduced them, but we'll deal with them in the near future	25%
We have not introduced them and I do not believe that they will be taken into account even in the near future	5%

Source: Authors' elaboration

Enabling technologies in Adopters are primarily in the introduction phase (69%), but in 19% of the cases are already in the consolidation phase.

The most enabling technologies used are those that relate to the intensive and integrated use of information and data: in particular, Cloud systems stand out (63%), followed by Industrial Internet (38%), Big Data and Analytics, Cybersecurity and Horizontal/Vertical Integration (all with 25% of the responses) (Tab. 9).

Tab. 9: ET adopted or in the process of adoption

Cloud	63%
Industrial Internet	38%
Horizontal/Vertical Integration	25%
Cybersecurity	25%
Big Data and Analytics	25%
Simulation	19%
Advanced Manufacturing Solution	19%
Additive Manufacturing	19%
Robotic Process Automation (RPA)	19%
Augmented Reality	13%
Machine Learning/Artificial Intelligence/Cognitive Computing	13%

Source: Authors' elaboration

Enabling technologies involve several business functions: Operations (88%) and Procurement (81%) are in first place, but we also register Logistics (69%), Accounting/management control and Supply Chain (63%). In addition, they involve the other actors in the supply chain (69%)

[12] The survey also investigated 'Interested' respondents, which, however, stated that they intend to introduce technologies for Procurement only in 15% of responses (19% said they had no intention of introducing enabling technologies for Procurement, 66% said they didn't know yet). For reasons of expository synthesis, the results of this part of the survey are not presented here, because they are considered to be of little relevance to the research and not statistically robust.

more than internal processes (31% of cases)[13].

Procurement involvement deals primarily with the evaluation of suppliers' offers (38%) and with the choice of suppliers (31%), whereas, only in 13% of the cases Procurement is fully involved in the investment planning phase. Respondents believe that Procurement can create value by participating in decision-making processes, particularly in the management of complex contracts (indicated by 94% of respondents) and in risk mitigation (indicated by 75% of respondents).

With reference to the impact of enabling technologies, Adopters declare that the investment in enabling technologies aims to attain higher levels of efficiency (88%) and reactivity (63%) of the processes. At the level of the supply chain, enterprises aim to achieve better efficiency and to exploit the opportunity to share information among multiple actors (both 63%). The figure (63%) relating to a better predictivity is very important (Tab. 10).

With reference to difficulties, the Adopters first and foremost highlight problems in compliance with the scheduled timing and internal resistance to change (63%), but also problems of incompatibility with other actors in the supply chain (50%) and problems related to the high costs of implementation (38%) (Tab. 11).

Tab. 10: The 5 most important impacts of enabling technologies

Greater efficiency of business processes	88%
Sharing information along the SC	63%
Better predictivity	63%
Greater efficiency of the processes along the SC	63%
Greater reactivity of the processes	63%

Source: Authors' elaboration

Tab. 11: The first 5 difficulties encountered

Internal resistance to change	63%
Timing of the implementation process	63%
Incompatibility with other SC companies (suppliers and customers)	50%
Doubts about costs-benefits ratio	44%
High implementation costs	38%

Source: Authors' elaboration

4.4 The Enabling technologies for Procurement: Procurement 4.0

With reference to enabling technologies for Procurement (Procurement 4.0), 56% of Adopters are introducing them, while 13% have introduced them and already completed the implementation process. This process is very recent, since most introduced them in 2017, even if there are also enterprises that have introduced new technologies for more than three years (27%).

[13] Enabling technologies involve first upstream actors (38%), then downstream ones (25%). The cases in which the enabling technologies act only downstream of the supply chain are instead isolated (6%).

Also here Cloud systems are confirmed as the most used technologies (64%), followed by Big Data and Analytics and Industrial Internet (both 36%) (Tab. 12).

Tab. 12: Procurement 4.0 - Technologies adopted or in the process of adoption

Cloud	64%
Industrial Internet	36%
Big Data and Analytics	36%
Cybersecurity	27%
Horizontal/Vertical Integration	27%
Robotic Process Automation (RPA)	18%
Simulation	9%
Machine Learning/Artificial Intelligence/Cognitive Computing	9%

Source: Authors' elaboration

The introduction of enabling technologies for Procurement is a process that starts mainly within the enterprise (only in 18% of cases it aims to satisfy the requests of other actors along the Supply Chain), with the aim of increasing efficiency and reducing purchase processing time (91%), simplifying processes and procedures and increasing market opportunities (64%). Very important, in 55% of the cases enabling technologies are consistent with the enterprise's propensity for innovation.

Considering the difficulties encountered by the Adopters, the timing is confirmed as the most significant criticality (64%), along with incompatibility with other enterprises' supply chains (64%). Resistance to change by other actors within the supply chain is also very important (55%) (Tabs. 13-14).

Tab. 13: Procurement 4.0 objectives for Adopters

Procurement 4.0 aims to reduce purchasing time	91%
Procurement 4.0 aims to increase efficiency in internal processes and along the SC	91%
Procurement 4.0 aims to simplify internal processes and procedures	64%
Procurement 4.0 aims to increase market opportunities	64%
Procurement 4.0 is consistent with the company's propensity for innovation	55%
Procurement 4.0 aims to reduce costs	45%
Procurement 4.0 aims to increase the quality of work	36%
Procurement 4.0 aims to meet the demand of other SC companies	18%

Source: Authors' elaboration

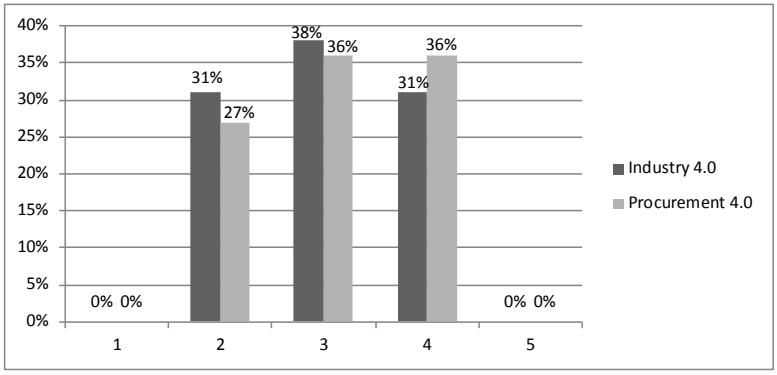
Tab. 14: The first 6 difficulties encountered

Incompatibility with other SC companies (suppliers and customers)	64%
Timing of the implementation process	64%
Resistance to change of the other companies of the SC	55%
Internal business processes unsuitable to support/benefit from enabling technologies	45%
Incompatibility with corporate culture	36%
Doubts about the security and secrecy of information and transactions	36%

Source: Authors' elaboration

The survey also attempted to investigate the degree of satisfaction expressed by Adopters, which seems quite high with regard to both Industry 4.0 technologies (69% ≥ 3 on a Lickert scale from 0 to 5) and Procurement 4.0 (72% ≥ 3 on a Lickert scale from 0 to 5) (Fig. 2).

Fig. 2: The degree of satisfaction of the Adopters



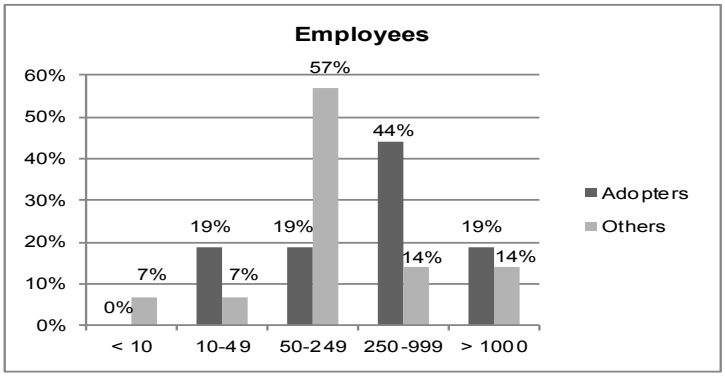
Source: the authors' elaboration

4.5 The Adopters: Specificities

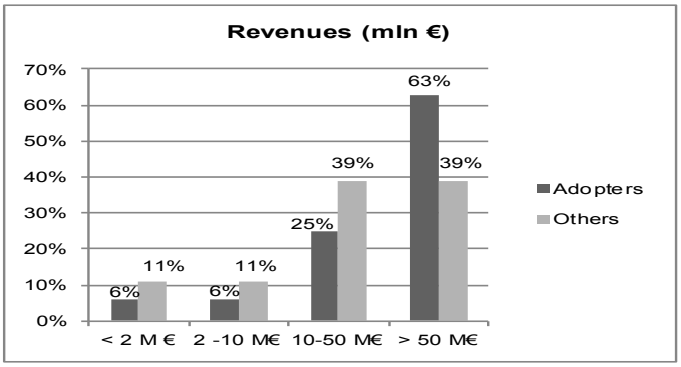
In order to see whether the Adopters have specific characteristics that would be useful for indicating a type category of innovative enterprise, the descriptive analysis of the results focused on Adopters.

The comparison between Adopters and the other enterprises shows that Adopters are on average larger, both in terms of employees and in terms of their turnover. Moreover, they have a broader range of suppliers characterized by a greater degree of internationalisation; and they have more formalized and computerized/automated procurement processes. They are more advanced in terms of supplier qualification systems, even if not in terms of supplier monitoring.

Figs. 3: Adopters' dimensions



Figs. 4: Adopters' dimensions



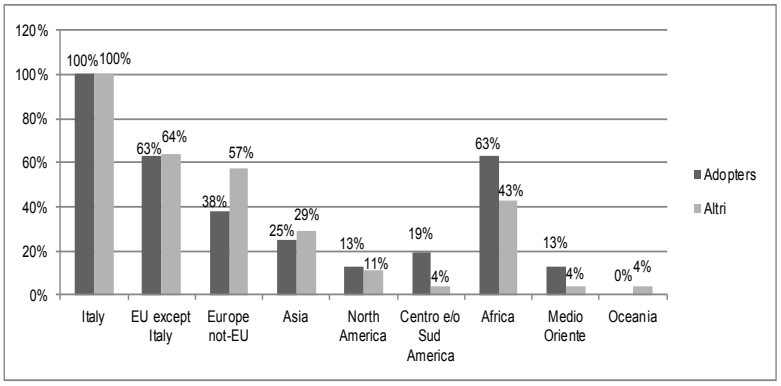
Source: Authors' elaboration

Tab. 15: The number of Adopters' active suppliers

	Adopters	Others
up to 50	6%	11%
from 51 to 300	31%	57%
more than 300	63%	32%

Source: Authors' elaboration

Fig. 5: Location of Adopters' suppliers



Source: Authors' elaboration

Tab. 16: Degree of formalization of procurement processes in Adopters

	Adopters	Others
Not at all formalised (=1)	0%	0%
2	0%	11%
3	25%	32%
4	44%	39%
Highly formalised (=5)	31%	18%

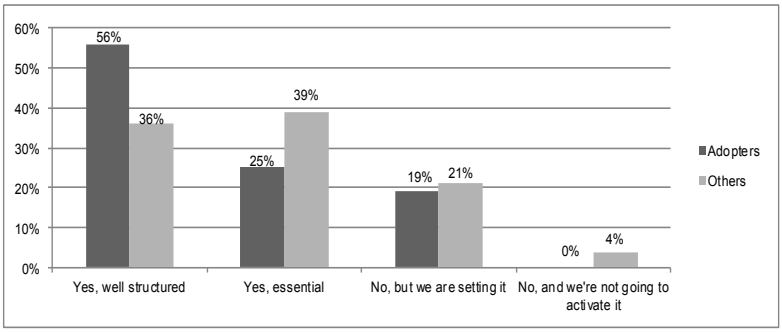
Source: Authors' elaboration

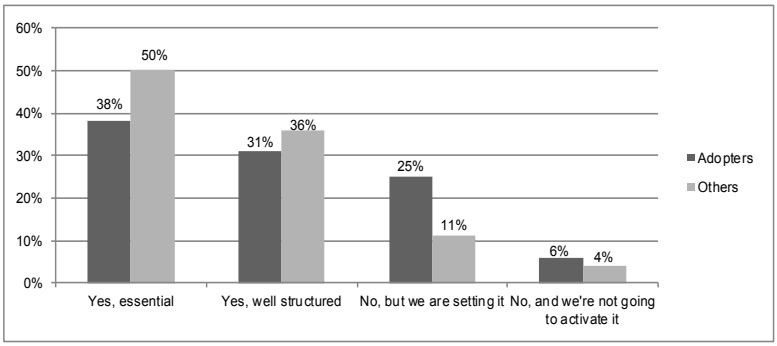
Tab. 17: Degree of computerization/automation of procurement processes in Adopters

	Adopters	Others
Little or no computerised, mainly manual (<25%)	0%	7%
Quite computerized (25 - 49%)	38%	54%
Very computerised (50 - 74%)	38%	18%
Highly computerised (50 - 74%)	25%	21%

Source: Authors' elaboration

Figs. 6-7: Supplier qualification and monitoring systems - Adopters vs Others





Source: Authors' elaboration

With reference to the impact of enabling technologies as stated by the interviewed managers, three aspects, already emerged considering the sample as a whole, stand out. On one hand, the viewpoint emerges that automation will make it possible to dedicate more time for strategic planning and scouting for new suppliers. On the other hand, the need to enhance skills in legal matters is evident in order to be able to manage the growing complexity of contracts, and also in the management and mitigation of risks. For Adopters, data management will play a more important role in procurement activities, to a greater extent than the other respondents (44% versus 36%). Furthermore, according to the Adopters, Procurement will become strategic for product innovation (63% versus 46%).

Tab. 18: How do you think Procurement will change in the near future with the adoption of enabling technologies? (Multiple response)

	Adopters	Others
Data management will become the focus of our business	44%	36%
The Procurement Department will become strategic for process innovation	38%	54%
Expertise in risk management and mitigation will need to be strengthened	69%	46%
Supplier management will play a much more important role	50%	54%
The Procurement Department will become strategic for product innovation	63%	46%
Automation will allow more time to be spent on strategic planning and scouting for new suppliers	81%	46%
It will be necessary to strengthen the skills for the management of contracts regulating the sharing of information and know-how	75%	57%
I don't think the enabling technologies will impact on the operations of the Procurement Department	6%	4%

Source: Authors' elaboration

5. Discussion of the results

The survey made it possible to identify a sample of enterprises that are very keen to actively participate in the digital transformation processes that are under way. Enterprises that have adopted or are adopting enabling technologies (Adopters) and enterprises that intend to do so in the near future (Interested) represent 95% of the respondents; this is an extremely high figure when compared to those presented by the MISE research (2018), in which only 8.4% of enterprises use at least one technology and 4.7% plan to make investments in enabling technologies in the next three years. However, since the rate of participation in our research is low, despite the fact that the survey was carried out by the Italian Association of Procurement and Supply Management (ADACI), it is likely that in our survey a non-response should be considered as an expression of disinterest and, therefore, of non-engagement in the activation of enabling technologies.

Therefore, if the sample of respondents cannot be considered to be representative of Italian enterprises and since the results of the research do not lend themselves to generalization, the results allow us to examine the features and choices of very interesting enterprises from the point of view of the ongoing digital transformation.

The study demonstrates a good knowledge of the enabling technologies, a full awareness of the challenges they offer and a good level of satisfaction in the results achieved through investments in technologies. The results show a high cultural maturity of the respondents, who express a widespread belief that technologies are a radical innovation intended to change the way of doing business and the way of managing procurement processes. In addition, enabling technologies are seen as an opportunity to enhance the strategic dimension of Procurement. Also the attitudes towards the information technology risk, which appears to be substantially under control thanks to the adoption of appropriate measures, highlights the enterprises' awareness of the risks associated with the digital revolution.

Moreover, respondents believe that enterprises' awareness of the impact of enabling technologies is moderate, just as the awareness within the enterprises of the role that Procurement can assume is scarce. This appears to be confirmed also by the fact that one of the main difficulties expressed by respondents concerns the internal resistance to change. This attitude appears to be in line with the results of a German study, which still showed a certain resistance and a certain skepticism on the part of managers regarding the opportunities that Industry 4.0 can offer to enterprises and to Procurement in particular (Glas and Kleeman, 2016).

The same role assumed by the Adopters' Procurement function in investment in enabling technologies tends to remain anchored to traditional tasks: the evaluation of suppliers' offers in 38% of the cases and the choice of suppliers in 31%, while only 13% of the responses indicate that Procurement is already involved in the investment planning phase.

In view of this, respondents hope for greater involvement of Procurement in the conviction that it can contribute to creating value in various areas, including some that in the current global competitive framework play a decisive role, such as the management of complex contracts and risk mitigation.

Respondents show a marked propensity for innovation, not only from a technological point of view, but also from a managerial point of view. The introduction of technologies takes on a pervasive nature, involving transversally different business functions and different actors in the supply chain, increasing communication flows and sharing. From this initial evidence, respondents appear to be active in the construction of integrated hybrid networks, in which, as anticipated by the literature, traditional physical elements are integrated with digital ones. The most highly adopted technology is, in fact, Clouds, which allows enterprises to share data and information, therefore, offering a fundamental infrastructure for process sharing and integration.

The role of innovators is confirmed by the fact that, regarding the adoption of specific technologies for Procurement, respondents state that the enabling technologies are consistent with the propensity of the enterprise to innovation (55% of the cases), while there is only a low percentage (18%) of enterprises adopting enabling technologies to satisfy the demands of other enterprises in the supply chain. This is a complex process, which will require much time, considering that the problems of incompatibility with other actors in the supply chain and their resistance to change are among the main difficulties highlighted by respondents.

These considerations suggest that the panel of enterprises identified in the research can be considered an interesting reference point for understanding and advancing this ongoing process. Indeed, this study has demonstrated that these enterprises have specific characteristics: they are larger and have a larger and more internationalised active supplier base than the other participants; their procurement processes appear to be more advanced in terms of formalization, computerization/automation and qualification of suppliers.

These characteristics suggest, within the limitations of the analyzed data, that Adopters can be considered as innovators capable of leading

innovation: driving the spread of enabling technologies within other enterprises in supply chains as well, they can contribute to the construction of more advanced, hybrid and integrated supply networks.

6. Conclusions

This research constitutes the first step in a wider body of research that aims to support enterprises in the complex adoption of enabling technologies during this crucial transformation phase for the Italian competitiveness within a global framework. Since Procurement plays a central role in the introduction and implementation of technologies, as well as in creating and managing innovative relationships with suppliers, a particular focus on Procurement in the field of research on Industry 4.0 would appear to be fundamental.

The research aims to provide useful information for decision-makers, primarily for managers and policy-makers. The article highlights the strong cultural dimension of the fourth industrial revolution, which requires a strong involvement of all the actors.

This first phase, based on a quantitative research methodology and on a statistical analysis of descriptive data, has made it possible to involve the enterprises that are most attentive to a phenomenon in its infancy and, for this reason, it suffers from a lack of participation.

On the other hand, the fact of having identified a panel of innovative enterprises that can play a role in driving innovation will allow to deepen the experiences already documented and to produce an awareness-raising effect towards other enterprises.

In order to nourish the know-how created up to this point, the research will continue in two directions: on one hand the results obtained will be studied in depth with qualitative research, through case studies, in order to better understand the phenomenon. The objective is to verify whether Adopters are actually playing a role in driving innovation within their supply chains and how this role is developing. It will be interesting to see whether hybrid and integrated supply networks are actually developing in Italy, in which sectors and in which geographical areas. On the other hand, we will try to broaden the sample of enterprises with new quantitative research that will make it possible to statistically strengthen the results gathered in this phase, also through an inferential analysis. The hope is that these activities, conducted through a solid university-business partnership, will nourish an action of cultural fertilization within the Italian production system.

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Manufacturing back-shoring and sustainability: a literature review

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Abstract

Purpose of the paper: *In recent years, companies are often rethinking their production localization decisions; among different alternatives, they are also considering the relocation of manufacturing activities at the home country (i.e. back-shoring). The purpose of this work is to verify the relationships between the decision to repatriate production (independently of the adopted governance mode) and two of the pillars of sustainability, namely the environmental and the social one.*

Methodology*: Authors implemented an explorative approach based on an extensive literature review of 105 articles and book chapters indexed on Elsevier Scopus and published up to August 2018. The selected documents have been analyzed conceptualizing environmental and social sustainability under three different perspectives, namely motivation/driver, result/outcome and barrier/enabling factor for back-shoring strategies.*

Results*: Results show a growing interest of back-shoring scholars on sustainability issues, with respect to both, the social and the environmental pillar. While these elements have been mainly conceptualized as back-shoring motivations, more recently sustainability has been also considered as a barrier/enabling factor for back-shoring strategies.*

Research limitations*: Due to the explorative nature of the study, generalizability of the results is limited.*

Practical implications*: The paper provides insights to policy makers who may implement policies to support back-shoring which also enhance environmental and social sustainability of manufacturing. The paper also offers some useful insights for managers, and suggest them to take into count of environmental and social sustainability when implementing backshoring decisions. Lastly, the paper contributes to the academic debate showing some avenues for future research.*

Key words: back-shoring; reshoring; environmental sustainability; social sustainability; off-shoring

1. Introduction

Sustainability has been defined as the possibility to cope with the needs of the current generations without compromising those of future ones. The sustainability concept has been conceptualized as organized in three different pillars: environmental, social and economic. They represent the "triple bottom line" mentioned in the "Brundtland Report" which also identifies them as "planet", "people" and "prosperity" (Brundtland *et al.*, 1987). Environmental sustainability is the ability to avoid the depletion of

non-renewable resources and to reduce the pollution created by human activities. Social sustainability concerns the ability to spread at the world-wide level the social well-being. Finally, the economic pillar refers to the equitable and efficient distribution of resources at a global level.

It has been widely recognized that productive activities have an impact on all three dimensions of sustainability (Sutherland *et al.*, 2016). Therefore, decisions regarding the place where production activities take place have a significant impact on the firms' sustainability. Based on this evidence, various scholars investigating the off-shoring and global sourcing *issues* have focused their attention on the sustainability issues interconnected with the delocalization of manufacturing activities (Jia and Jiang, 2018). However, these authors have mainly focused their attention on the economic sustainability issue and have investigated almost exclusively headquartered in economically developed countries.

Authors *under discussion* agree that off-shoring and global sourcing are radically changing the geographical distribution of production activities having heavy environmental impacts (Akyelken and Keller, 2014). More specifically, numerous polluting industries are shifting their production activities into geographical contexts where environmental legislation is less severe (Sawhney and Rastogi, 2015). In other words, as increasingly stringent European regulations are reducing contaminating emissions in Europe, global emissions are growing due to off-shoring and the creation of longer supply chains. Scholars have, therefore, invited managers to pay more attention to the implications of their carbon footprint and to the social impact of their procurement decisions (Christopher *et al.*, 2011). In other words, it is pointed out that a positive result from an economic point of view is not necessarily combined with a positive impact in terms of social and environmental sustainability. In this sense, it must be taken into account that decisions for off-shoring and global sourcing can also lead to an increase in income disparities in the world (Milberg, 2008). At the same time, it has been verified that companies select their suppliers also according their profile in terms of social responsibility, usually obtain better financial performance (Thornton *et al.*, 2013).

Less attention has been given to the study of the possible impact the different dimensions of sustainability may have on the choice of a company to relocate production in the country of origin (back-shoring). However, since the beginning back-shoring scholars highlighted that "heightened emphasis on sustainability [...] drove firms to re-consider the appropriate 'shoring' decision" (Tate, 2014, 66). More recently, Heikkilä *et al.*, (2018b, 382) have shown that sustainability and ethics in the supply chain are increasingly important reasons for the relocation of production. More specifically, the authors believe that the negative environmental impacts and the violation of human rights - increasingly widespread in the countries of delocalization - induce manufacturers to reconsider the location of their productive activities. Finally, Orzes and Sarkis (2019) highlighted that "the relationship between reshoring, or global supply chain reconfiguration, and environmental sustainability is relatively unexplored", adding that this issue is relevant not only for scholars but also for practitioners and policy makers.

The purpose of this article is to shed new light on the link (if any) between sustainability and back-shoring. In this respect, authors present and discuss results of an in-depth literature review, based on Elsevier Scopus indexed articles and book chapters published up to December 2018. Starting with 96 documents found through the use of specific keywords, authors identified 33 (around one-third of the total sampled literature) that address - in a more or less thorough manner - the issue of sustainability in back-shoring strategies.

Having in mind the previously-mentioned "triple bottom line", it has been recognized that the economic pillar represents a prerequisite for the other two, the social and the environmental ones (Gualandris *et al.*, 2014). Therefore, the authors decided to focus their attention on only these last two elements: social and environmental sustainability. This is also consistent with the request by Sirilertsuwan *et al.* (2018), which - in their literature review on "proximity production" (i.e. near the place of consumption) - indicates in these two pillars the most neglected issue in previous studies.

The rest of the article is structured in five sections, of which the first summarizes the state of the art of knowledge on the back-shoring phenomenon and proposes the three research questions to which the authors intend to respond. The following section is focused on methodological aspects and illustrates the criteria used for the selection of the analyzed literature. Findings arising the structured literature review, are discussed in Section four, while hypotheses for future research are presented (Section 5). The concluding section contains final reflections in terms of implications for practitioners and policy makers, as well as the limitations of the present study.

2. Manufacturing back-shoring: tate of the art and research questions

Location-decisions regarding production activities have been extensively analyzed in international business and supply chain management studies. Many theoretical approaches have been used, including: Internationalization Process Model (Johanson and Vahlne, 1977; Johanson and Wiedersheim-Paul, 1975; Johanson and Vahlne, 1977, 1990); Resource Based View (RBV) (Barney, 1991; Wernerfelt, 1984); Dynamic Capabilities (Teece *et al.*, 1997; Teece, 2007); Transaction Cost Economics (TCE) (Williamson, 1975); Dunning's "eclectic paradigm" (1980, 1988); Resource Dependence Theory (RDT) (Pfeffer and Salancik, 1978); and Contingency theory (Lawrence and Lorsch, 1967; Pennings, 1992). These approaches, and in particular the Internationalization Process Model proposed one, conceptualize the *firm's* internationalization process as a linear process. In other words, the presence of a company abroad can only grow over the time. However, some scholars have suggested that firms can use different combinations of entry and exit strategies in international markets (Axinn and Matthyssens, 2002) and/or may have periods of rapid internationalization followed by periods of consolidation and even downsizing (Bell *et al.*, 2001, p. 177). In this respect, Vissak

(2010) introduced the concept of nonlinear internationalization according to which phases of increase in the international presence of a company are followed by phases of reduction (see also: Vissak and Francioni, 2013; Vissak *et al.*, 2012). Based on this framework, Fratocchi *et al.* (2014a, b; 2015) proposed a two-steps internationalization process of firm's production activities: the first concerns the off-shoring decision - that is, the decision to locate production abroad, regardless of the governance model adopted (in- vs. out-sourcing); the second concerns the possible revision of the initial offshoring decisions. In this sense, companies may choose one of the following alternatives:

a) "back-shoring": a company headquartered in the country A (home country) relocates at the country of origin manufacturing activities earlier offshored in the country B (host country);
b) "near-shoring": a company headquartered in a country A (home country) decides to relocate offshored production previously offshored in the host country B in a second host country C located in its home region;
c) "further off-shoring": a company headquartered in a country A (home country) decides to relocate offshored production previously offshored in the host country B in a second host country D located further away.

Among the three alternatives, back-shoring is the one that has been most extensively investigated by scholars (Stentoft *et al.*, 2018; Wiesmann *et al.*, 2017; Barbieri *et al.*, 2018) but also more discussed by policy makers (De Backer *et al.*, 2016; Guenther, 2012, Livesey, 2012). More precisely, the interest of the scientific community in back-shoring manufacturing has been growing since 2007, the year of publication of the article by Kinkel *et al.* focused on the phenomenon of back-sourcing in Germany (for a more detailed analysis, see the following paragraph). In the following years, attention to the subject has steadily increased; in 2018, over 20 publications have addressed it. Analyzing the contents of the publications issued so far on the back-shoring manufacturing, it emerges that the academic community have been used different terms to identify the phenomenon of relocation at the home country, including: *reshoring, re-shoring, back-shoring, backshoring,* etc. (Wiesmann *et al.*, 2016). Such relocation decisions have been implemented by both, large enterprises and small and medium enterprises (SMEs), operating in a differentiated set of manufacturing industries (Stentoft *et al.*, 2016a). Scholars pointed out the back-shoring decision is complex and can be influenced simultaneously by numerous elements (Wiesmann *et al.*, 2016); while the drivers of the phenomenon have been extensively analyzed over the years, the analysis of the barriers has received less attention (Engström *et al.,* 2018 a, b). As far as drivers are concerned, Stentoft *et al.* (2016a) identify seven different categories: (i) costs, (ii) quality, (iii) time and flexibility, (iv) access to skills and knowledge, (v) risks, (vi) market and (vii) other factors. Fratocchi *et al.* (2016) suggest back-shoring motivations may be classified according the environment they belong to (internal vs external) and the company strategic aims (value creations vs cost reduction). Finally, Barbieri *et al.,* (2018) point out back-shoring decision making is one of the less investigated issues and suggest future research should specifically address

such an issue. At the same time, the growth of interest in the back-shoring issue has led to the publication so far of three literature reviews between 2016 and 2018 (namely, Wiesmann *et al.* (2016), Stentoft *et al.* (2016a) and Barbieri *et al.* (2018)). However such documents have a "generalist" nature and are not specifically focused on the sustainability issue. Furthermore, the most recent of these literature reviews (Barbieri *et al.,* 2018) analyses articles published up to September 2017, thus excluding a relevant number of more "recent" publications. Consequently, in this paper authors develop a structured literature review of the back-shoring literature focusing attention on the possible roles of environmental and social sustainability pillars. More specifically, such pillars may influence all the three elements of the decision-making process:

a) motivation/driver: by this term we refer to the possibility that environmental and social sustainability may generate the back-shoring decision;
b) result/outcome: under this perspective we want verify whether the choice to repatriate productive activities - regardless of the reasons that generated it - has a (plausibly positive) effect on the firm's environmental and social sustainability;
c) barrier/enabling factor: in this sense, the research aim aims to understand whether environmental and social sustainability can represent an obstacle or, on the contrary, may support the decision to relocate production activities at the home country.

Based on this conceptualization, the article aims to answer the following research questions (RQ):

RQ1) Has the back-shoring literature analyzed whether and how environmental and social sustainability can be a motivation/driver for strategies of relocation of productive activities in the home countries?

RQ2) Has the back-shoring literature analyzed whether and how environmental and social sustainability can represent an outcome of the strategies of relocation of productive activities in the home countries?

RQ3) Has the back-shoring literature analyzed whether and how environmental and social sustainability can represent a barrier/enabling factor for the relocation strategies of productive activities in the home countries?

3. Research methodology

In order to answer the three research questions earlier described, an exploratory approach was adopted based on a structured literature review. As known, such a research methodology represents "a systematic, explicit, and reproducible design for identifying, evaluating, and interpreting the existing body of recorded documents" (Fink, 2005, p. 6). The review was carried out considering scientific articles indexed on Elsevier Scopus and published up to December 2018. To select, analyze and classify the extant literature, the analytical framework proposed by Seuring and Gold (2012) has been implemented. It has already been adopted in other literature reviews on the back-shoring phenomenon (Stentoft *et al.*, 2016a; Barbieri *et al.*, 2018)

The first phase of the structured literature review conducted according to the Seuring and Gold (2012) scheme is defined as "material collection". Authors implemented it by focusing on scientific articles indexed on Elsevier Scopus, since it has been recognized as one of the most important databases for scientific literature in the managerial field (Greenwood, 2011). More specifically, the analysis was focused on the documents, published up to December 31st 2018, which met the following research criteria:

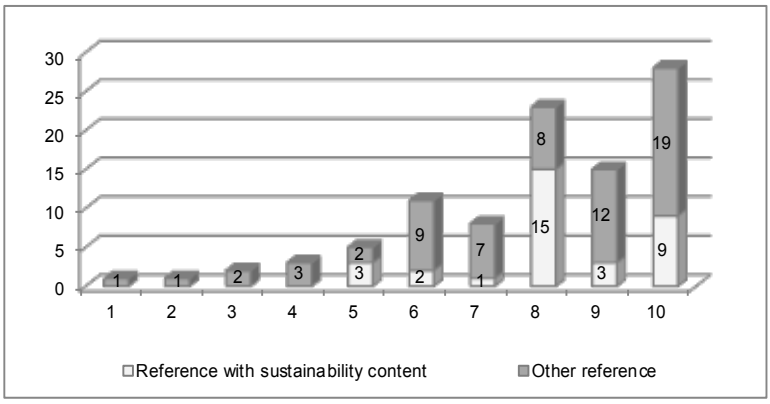
a) peer-reviewed articles, because this makes it possible to increase the quality of the literature review (Wiesmann *et al.*, 2017);
b) written in English language;
c) published in academic journals;
d) belonging to the following Scopus categories: 1) Business Management and Accounting; 2) Decision Science; 3) Economics, Econometrics and Finance; 4) Engineering (only Industrial and Manufacturing); 5) Social Science; and 6) Arts and Humanities.

Articles have been selected through the following keywords in the title, in the abstract or in the keywords (in brackets the number of documents extracted): "reshor*" (83 articles), "reshoring" (89), "re-shor*" (15), "re-shoring" (14), "backshor*" (137), "backshoring" (29), back-shor*" (18), "back-shoring" (6), "backsour*" (21), "backsourcing" (17), "back-sour*" (5) e "back-sourcing" (1).

A total number of 96 documents were found After carefully reading the entire text of the selected documents, authors selected the ones specifically addressing the social and environmental sustainability issue. A total number of 33 documents were then selected (see Appendix I).

The second phase of the analytical framework proposed by Seuring and Gold (2012) concerns the descriptive analysis, that is, the evaluation of the formal characteristics of the sampled documents. Collected data clearly show that the interest of back-shoring scholars in sustainability issues is quite recent and not homogeneously distributed over the years (Figure 1).

Fig. 1: Bibliography on back-shoring: subdivision by year of document publication



Source: own elaboration on Elsevier Scopus data

While the first article on relocation of manufacturing activities at the home country was published in 2007, the theme of sustainability appeared in the in back-shoring literature only in 2013. In 2016 the sustainability issue acquired the greater relevance in the academic debate, since 15 of the 23 23 articles published in that year addressed the topic. More in general, the trend of publications regarding back-shoring and sustainability is certainly growing.

The 33 sampled documents primarily belongs to the Operation Management and Supply Chain Management area, while the International Business and Business Strategy ones are much less represented (Table 1). This finding confirms previous research conducted on the back-shoring phenomenon as a whole (Barbieri *et al.*, 2018).

Tab. 1: Back-shoring publications: breakdown by scientific journal (for articles only)

Scientific journal	Area of interest	Number of documents
Operations Management Research	OM/SCM	6
Journal of Global Operations and Strategic Sourcing	OM/SCM	2
Journal of Manufacturing Technology Management	OM	**2**
Journal of Physical Distribution and Logistics Management	SCM	**2**
Journal of Purchasing and Supply Management	SCM	**2**
Journal of Supply Chain Management	SCM	**2**
World Review of Intermodal Transportation Research	SCM	**2**
Supply Chain Forum: An International Journal	SCM	**2**
The International Journal of Logistics Management	SCM	**2**
Business Horizons	Management/IB	**1**
CIRP Annals - Manufacturing Technology	Operations	**1**
European Business Review	Management/IB	**1**
International Journal of Production Research	Operations	**1**
Journal of Engineering Manufacturing	Operations	**1**
Journal of Operations Management	Operations	**1**
Journal of Textile and Apparel Technology and Management	Management/OM	**1**
Journal of the Academy of Marketing Science	Marketing	**1**
Journal of the Textile Institute	Management	**1**
Strategic Direction	Management	**1**
Strategy and Leadership	Management	**1**
Total		33

Source: own elaboration

When considering theoretical framework adopted in the sampled literature, it emerges-many articles (20 out of 33) lack a specific theoretical anchorage. This is consistent with previous findings by Barbieri *et al.*, (2018) for back-shoring literature and Mugurusi and de Boer (2013) for the offshoring one. However, it is worth nothing some of the selected documents are based on a plurality of doctrinal references, which are largely attributable to the most well-known organizational and managerial theories, as well as to those of international business (Table 2).

Tab. 2: Publications on back-shoring: subdivision by theoretical reference model (if applicable)

	Author(s)	Year	Model(s)/theory(ies) of reference
1	Abbasi	2016	Vernon's life cycle model
2	Ashby	2016	Social Network Theory
3	Barbieri *et al.*	2018	n/a
4	Bals *et al.*	2016	Transaction cost economics Research Based Theory Dynamic capabilities Organizational learning Organizational buying behavior Contingency theory Critical Incident technics Resource dependence theory Relational view Absortive capacity
5	Denning	2013	n/a
6	Di Mauro *et al.*	2018	n/a
7	Ellram *et al.*	2013	Dunning's Oils Paradigm
8	Engström *et al.*	2018a	n/a
9	Engström *et al.*	2018b	n/a
10	Fel and Griette	2017	n/a
11	Foerstl *et al.*	2016	Transaction cost economics Organizational buying behavior
12	Fratocchi *et al.*	2016	Dunning's Oils Paradigm Transaction Cost Economics Resource Based Theory Internalization Theory
13	Fratocchi	2018	n/a
14	Grappi *et al.*	2015	Consumer behavior
15	Gray *et al.*	2013	Dunning's Oils Paradigm Internalization Theory Hymer's approach
16	Gray *et al.*	2017	Dunning's Oils Paradigm Resource Based Theory Uppsala model
17	Heikkilä *et al.*	2018	n/a
18	Moore *et al.*	2018	n/a
19	Moradlou and Backhouse	2016	n/a
20	Pal *et al.*	2018	n/a
21	Presley *et al.*	2016	n/a
22	Robinson and Hsieh	2016	Other supply chain theories
23	Sirilertsuwan *et al.*	2018	n/a
24	Srai and Ané	2016	Dunning's Oils Paradigm Transaction Cost Economics Internalization Theory Strategic management theories
25	Stentoft *et al.*	2015	Other supply chain theories
26	Stentoft *et al.*	2016a	n/a
27	Stentoft *et al.*	2016b	n/a
28	Sutherland *et al.*	2016	n/a
29	Tate	2014	n/a
30	Tate *et al.*	2014	n/a
31	Uluskan *et al.*	2017	n/a
32	Wiesmann *et al.*	2017	Dunning's Oils Paradigm Transaction Cost Economics Internalization Theory Dynamic capabilities
33	Zhai *et al.*	2016	n/a

Source: own elaboration

The third phase of the process is the category selection one, that is, the identification of analytical categories to classify the contents of the documents taken into consideration. Given the research objectives of this contribution, the two sustainability pillars (environmental and social) and the three research questions (sustainability as motivation, outcome and/or enabling/barrier factor) were chosen as reference categories. Consequently, each document has been classified in relation to these two sets of variables. Collected data (Table 3) clearly show that while the documents refer in a homogeneous way to the two pillars of sustainability, less attention is devoted to sustainability as an enabler/barrier factor.

Tab. 3: Publications on back-shoring: subdivision by category selection criteria

Research question	Environmental sustainability	Social sustainability
1 Motivation / Driver	26	20
2 Outcome	8	6
3 Barrier / Enabling factor	8	8

Source: own elaboration

The final phase of the model proposed by Seuring and Gold (2012) is the material evaluation step which consists in reading, analyzing and coding all the documents according to the two selection criteria (type of sustainability and impact on the back-shoring decision-making process). In implementing this methodological step, authors compared their evaluation (researcher triangulation) in order to increase the process correctness. Results will be presented and discussed in Section 4.

4. Results of the literature review

As already mentioned, the analysis of the selected references was carried out according to two criteria: the specific type of sustainability (environmental or social) and the research questions to which the document responds (drivers, outcome, barriers/enabling factors of the back-shoring decision making process). As far as the first criterion (type of sustainability) concerns, sampled articles gave equal attention to the two pillars. More specifically, 28 out of 33 collected documents refer to environmental sustainability, 25 to social sustainability and while 22 consider both). On the contrary, when considering how the documents support the three research questions, the results are quite differentiated. More specifically, the documents that consider sustainability as a motivation are 26 out of 33, while only 10 consider the barrier/enabling factor perspective and nine the outcome one. These findings confirm the idea that back-shoring literature mainly addressed the analysis of the motivations *behind this phenomenon* (Barbieri *et al.*, 2018; Stentoft *et al.*, 2016a; Wiesman *et al.*, 2017).

Focusing attention on the first research question (sustainability as motivation/driver) (Tables 4 & 5), it emerges that 15 of the 33 documents refer to both environmental and social sustainability. At the same time, while seven articles specifically consider environmental sustainability,

only four are focused on social sustainability. On the basis of these findings, it can be concluded that scholars have usually conceptualized sustainability as a motivation, considering it in a general way, while less attention has been paid to more specific elements such as the adoption of carbon footprint certifications or the role of consumers and suppliers in production sustainability.

Even if the documents relating to these detailed aspects are inferior, interesting results emerge from sampled documents. In order to develop a more detailed analysis, it is possible to divide them into groups based on the following criteria:

a) documents that refer to sustainability as a business strategy;
b) documents that assess the role of actors outside the company (e.g., suppliers, consumers, trade unions);
c) documents that refer to the legislation in the country of origin.

As far as the first group concerns (sustainability as a strategy), six out of the 33 sampled documents specifically refers to the implementation of environmental standards (such as the carbon footprint) and to the strategic aim of not taking advantage of the mildest environmental legislation in off-shoring countries. While considering the social pillar, similar issues (e.g. the decision to pay more attention to workers' rights and occupational safety) are investigated in only four documents.

When considering the actors who are outside the company, it merges four documents refer to the role of suppliers and consumers for environmental sustainability. With reference to the role of suppliers, it is interesting to mention Ashby (2016) who highlights the critical issue - for the positive implementation of a back-shoring strategy - of "socially complex, long range term relationships" with these actors. More specifically, the author analyzes the case of a British company that has implemented a ten-year project to create a "100% UK" supply chain, including in the project the reintroduction of a native sheep species to produce a specific type of merino wool. During the decade in question, the company implemented several relocations according to a "progressive reshoring" approach, both in terms of procurement of materials (e.g. polyester and Merino wool) and in relation to production activities. Other two documents specifically highlight the role played by consumers in terms of both environmental and social sustainability. Finally, a single document specifically refers to the role of the legislation in the off-shoring country regarding the reduction of pollution and the working conditions of employees, clearly showing the limited influence of this driver, which seems to have less importance for companies, in contrast to the adoption of specific environmental (e.g. the analysis of the carbon footprint).

Four articles belonging to the social pillar, analyze the relationship between the firms and external; among them, a special note deserve the issue of unemployment reduction in the home country. On the contrary, no document makes explicit reference to social certifications, such as OHSAS (Occupational Health and Safety Assessment Series).To sum up, the attention of back-shoring scholars to social and environmental sustainability as a motivation/driver in its infancy, since half of the analyzed documents generically refer to the two pillars of sustainability.

Tab. 4: Publications on environmental sustainability as a back-shoring motivation

Publication (number in Appendix)	Motivation/Driver											
	Sustainability (without further specifications)	Business objectives in terms of environmental and social sustainability	Environmental and social sustainability	Eco-sustainability	Environmental problems	Implementation of environmental and ethical standards	Carbon labeling	Carbon footprint	Need to stop taking advantage of the permissive foreign environmental regulations	Adoption of CSR strategies that lead to selecting suppliers that are more environmentally friendly and socially responsible	Cleaner production processes performed by the suppliers of the host countries	Increase customers' awareness of environmental problems
1												
2												
3		X										
4												
5												
6			X									
7					X							
8	X										X	
9	X											
10										X		
11			X									
12												
13				X								
14									X			
15			X				X					
16												
17	X											
18	X											
19					X			X				
20	X											X
21	X											
22						X						
23												
24								X				X
25	X											
26			X									
27					X			X				
28	X											
29	X											
30	X											
31	X				X							
32	X				X							
33					X							
Tot.	12	1	4	1	6	1	1	3	1	1	1	2

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Tab. 5: Publications on social sustainability as a back-shoring motivation

Publication (number in Appendix)	Motivation/Driver									
	Sustainability (without further specifications)	Business objectives in terms of environmental and social sustainability	Environmental and social sustainability	Need to stop labor exploitation in underdeveloped countries	Labor rights	Implementation of environmental and ethical standards	Occupational safety (e.g. Accidents at work, work-related illnesses)	High unemployment rates in the country of origin	Pressure from trade unions in the country of origin	Increased awareness of social problems by customers
1										
2										
3		x								
4										
5										
6			x							
7										
8	x									
9	x									
10										
11			x							
12								x	x	
13										
14				x						
15			x							
16										
17	x									
18	x				x					
19										
20	x									x
21										
22						x				
23										
24										x
25	x									
26			x							
27							x			
28										
29	x									
30	x									
31	x									
32	x									
33										
Tot.	10	1	4	1	1	1	1	1	1	2

Source: own elaboration

The few articles investigating more specific issues (for example, the adoption of standard environments and certifications and the role of external actors), clearly show that corporate sustainability strategies need to be developed according to a systematic approach that also includes stakeholders (in particular suppliers and consumers).

As far as the back-shoring literature, it is necessary to highlight that the few scientific articles adopting the outcome perspective (Heikkilä *et al.*, 2018b, Johanson *et al.*, 2018; Stentoft *et al.*, 2018), sustainability is never recognized as a stand-alone result of the relocation. The outcomes highlighted in the literature are mainly represented by performance in terms of cost (e.g. unit costs, production costs and logistics costs) and relating to the operating cycle (e.g. product quality, certainty and delivery time, product quality and process). This can be partially explained, considering that the authors evaluate the benefits derived from the implementation of back-shoring from the companies' point of view and do not take into consideration the point of view of the other external environmental actors (e.g. the communities where the companies are located). In any case, a careful analysis of the documents shows that only nine of the sampled documents take the outcome issue into consideration (Table 6).

In this respect, the two of the most analyzed outcomes concern the possibility for a company to leverage the interdependencies between "made in" effect and sustainability. In this regard, Engström *et al.* (2018a) have pointed out that after having brought production back, Swedish companies also benefited from the "made in Sweden" effect, since this label is intrinsically related to the idea of eco-friendly products. Similarly, two of the documents analyzed showed that consumers view products made at the home country as having a lower environmental impact than those manufactured abroad. For instance, Moore *et al.* (2018) reported a study by Cotton Incorporated, an American non-profit company that provides resources and develops research to help companies develop and market innovative, high quality and profitable cotton products (https://www.cottoninc.com/). According to this study, American consumers believe that trendy products made overseas have a greater negative environmental impact than those produced in America. At the same time, Abassi (2016) suggests that American companies relocating their production activities in US have the opportunity to implement a strategy based on garment recycling, due to the availability of an efficient infrastructure for waste collection. This suggestion becomes quite relevant when considering the growing diffusion of "throwaway approaches" in the fashion sector (Ashby, 2016).

Finally, other environmental benefits found in the sampled refer to the reduction of carbon emissions due to the lower amount of transports and the use of clean energy sources (Sirilertsuwan *et al.*, 2018).

When considering the social sustainability pillar, the most cited outcome regards the impact of back-shoring strategies on employment levels. In this regard, it is necessary to investigate such an issue for both the countries, the home and the host ones (Heikkilä *et al.*, 2018a). This issue assumes a specific relevance for both practitioners and policy makers. More specifically, scholars observed that back-shoring decisions do not

always create new jobs at the home country; however they may avoid further redundancies originated by previous processes of delocalization and de-industrialization (Engström *et al.*, 2018a, b).

Tab. 6: Publications on sustainability as a back-shoring benefit/result

Pillar	Outcome/Benefit	Publication (Numbering in the appendix)										Tot.
		1	2	5	8	9	17	18	19	23	24	
Environmental	Interdependencies between sustainability and the "made in" effect (for example "made in Sweden" is synonymous with sustainable product				X			X	X			3
	Perception of a lower environmental impact by consumers for products made in the country of origin						X				X	2
	Lower CO2 emissions									X		4
	Less environmental impact due to shorter transports		X									
	Lower gas emissions, in particular due to shorter distances and more efficient production									X		
	Lower gas emissions thanks to the use of filtering technologies and the use of ecological fuels, sources of clean energy									X		
	Opportunity to implement a strategy based on recycling garments given the availability of waste collection infrastructures and low energy costs in the USA	X										1
	Greater control of environmental impact of production process		X									1
Social	Increase / maintenance of employment levels in the country of origin				X	X						3
	Creation of new jobs and maintenance of employment levels									X		
	Opportunity to contribute to the local economy		X									2
	Economic growth and greater prosperity in the region									X		
	Greater work ethic		X									1
	Perception by consumers of greater corporate social responsibility for production carried out in the country of origin										X	1
	Use of skills present in the country of origin			X								1

Source: own elaboration

In particular, such authors found the impact on employment levels is minimal when back-shoring is associated with the adoption of automated production systems (see also: Ancarani and Di Mauro, 2018; Arlbjørn and Mikkelsen, 2014). On the opposite, back-shoring strategies increase the visibility of working practices and ethical behavior of companies (Ashby, 2016). In this sense, it is worth nothing European countries are economic contexts that are characterized by better working conditions and higher workers' rights. In disagreement with these statements, Hammer and Plugor argue that by analyzing the clothing sector in the United Kingdom, and more specifically, the fast-fashion supply chain, there are numerous cases of undeclared work and informal employment (2016) due to the need to respond effectively to competition from Eastern Europe, parts of the

Middle East and North Africa. Therefore, the authors suggest evaluating the sustainability of back-shoring decisions implemented by English fast-fashion companies within a regulatory and institutional context that is operating at regional and national levels (2016).

Finally, two documents highlight the positive impact of back-shoring decisions on the growth and well-being of the home country (Ashby, 2016; Sirilertsuwan *et al.*, 2018). Based on earlier discussed findings, it may be recognized the relocation of manufacturing activities in the country of origin can produce various advantages for the company and for the local context of reference. Among these, a particular relevance is seen in the reduction of polluting emissions and the maintenance or growth of employment levels. However, none of the analyzed offer quantitative evidence. As far as the third research question concerns (barrier vs enabling factor), the most cited element for both, the social and environmental pillars, is the legislation in both the home and the host country (Table7).

Tab. 7: Publications sustainability as a back-shoring barrier/enabling factor

Pillar	Outcome/Benefit	Publication (Numbering in the appendix)										Tot.
		4	6	8	9	11	15	20	23	24	27	
Environmental	Legislation of the country of origin on environmental and social issues		X									5
	Environmental laws and regulations in the country of origin included government support for good practices and environmental standards								X			
	Environmental regulations in the country of origin	X				X	X					
	Increased consumer awareness of environmental issues							X		X		2
	Host country's legislation of the on environmental issues relating to the closure of plants			X							1	
Social	Labor market and relative regulation in the country of origin	X										5
	Environmental and social legislation in the country of origin		X									
	Flexicurity (combination of flexibility, social security and labor market programs) in the country of origin				X						X	
	Government support in the country of origin in terms of working conditions								X			
	Social capital available in the country of origin	X										1
	Entrepreneur's desire to avoid redundancies in the off-shoring country				X							1
	Increased consumer awareness of social issues							X		X		2
	Legislation of the host country (fees to be paid to close a plant)			X								1
	Effects of the back-shoring decision on off-shoring workers (possibility of sabotage)			X								1

Source: own elaboration

For instance, Engström *et al.* (2018a) found that the environmental and fiscal legislation of an off-shoring country represented a huge back-shoring barrier for a Swedish company, since such rules impeded the

closure of the foreign country plant. The authors also point out companies wishing to back-shore must carefully evaluate the effects on foreign workers, since they could also decide to carry out sabotage actions. At the same time, attention should be given to flexicurity, a combination of flexibility, social security and labor market support programs that are widespread in some Nordic countries (Engström *et al.*, 2018b; Stentoft *et al.*, 2016b). Finally, Engström *et al.*, (2018b) noted that a Swedish furniture manufacturer postponed several times the back-shoring decisions due to the entrepreneur's sense of social responsibility, which did not allowed him to dismiss German employees. The sample literature also focused on the role played by consumers highlighting their increasing attention to the environmental and social issues. For instance, Gray *et al.* (2013) and Ellram *et al.* (2013) state this element represents a continuously growing factor, which - *according to* Pal *et al.* (2018) - will encourage manufacturing companies to consider back-shoring.

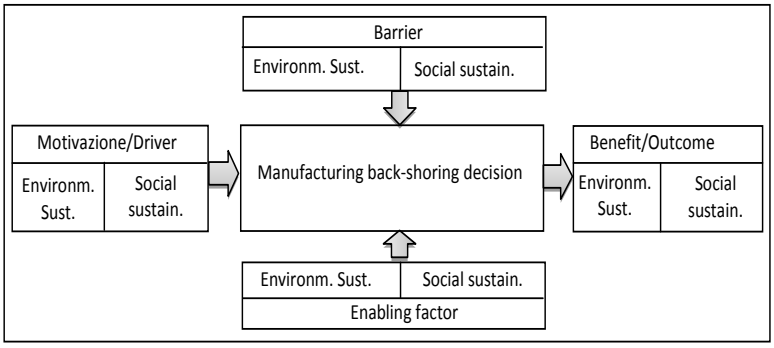
Based on the results discussed, it can be stated that back-shoring decisions are more easier to be kept and implemented when the entrepreneur is attentive to sustainability issues (Ashby, 2016; Engström *et al.*, 2018b). At the same time, a relevant role is played by legislations at both, the home and the host country.

5. Hypothesis for future research

This article aimed to summarize the extant literature on the back-shoring phenomenon by focusing attention on the role of environmental and social sustainability pillars within the back-shoring decision-making process. More specifically, the such a processes has been conceptualized according three levels: a) motivation/driver, b) benefit/outcome, c) barrier/enabling factor.

The analysis earlier conducted clearly showed scholars mainly focused their attention on the driver issue , even though more recent studies consider also the role of environmental and social sustainability as a barrier and/or an enabling factor. Therefore, we suggest future research should be conducted having as a reference the framework summarized in Figure 2.

Fig. 2: Theoretical framework of reference for future research



Source: own elaboration

Based on the proposed framework, it is possible to develop specific future research avenues. In this respect, we suggest to separately investigate the two sustainability pillars (environmental and social ones) (given the different - and sometimes contrasting - impact back-shoring decisions may have on them. For instance, a relocation strategy may have a positive environmental impact at the home country level- due to the reduction of transport and the consequent reduction in CO2 emissions, but also a negative environmental effect at the host country level, due to the reduction of employment levels.

As far as social sustainability, a further distinction should be implemented - in the case of captive offshoring - between relocations including the closure of the firm's offshore manufacturing facility and the ones when such a plant is still active (usually for the local market demand).

A first research avenue concerns the impact (if any) of the adoption of international standards (e.g. carbon footprint and/or OHSAS certifications) on the back-shoring strategies. As already pointed out, this issue has not been investigated in the sampled literature.

A second interesting research topic regards the (re)construction of local supply chains at the home country (see, in this regard, the case investigated by Ashby (2016)). At the same time, the role of consumers and their increased interest in sustainability issues deserves further attention.

Moreover the possible role of home and host country regulations deserves further in-depth study. In effect, regulations relating to environmental and social issues may become both a barrier and an enabling factor for back-shoring decisions. In this respect, findings from Stentoft *et al.*, (2016b) and Engström *et al.*, (2018a, b), suggest a specific attention deserve the labor market legislation. At the same time, further attention should be reserved to the entrepreneur's perception of sustainability issues, and how it affects their choices (Ashby, 2016; Engström *et al.*, 2018a, b).

While implementing the earlier proposed future research avenues, scholars should differentiate the analysis taking into account the company size and industry, as suggested by Bals *et al.*, (2016).

6. Additional implications and limitations

In addition to the contribution provided to the academic community through the identification of possible future research themes, this paper offers implications for practitioners and policy makers as well.

Managers should evaluate sustainability strategies as a useful element to improve the financial performance of the company, even if the underlying view of these decisions is usually oriented to the medium and long term (Ashby, 2016). In this sense, the conceptualization of back-shoring as a "progressive" (Ashby, 2016) or "selective" strategy (Baraldi *et al.*, 2018) is extremely important since it makes it possible to "spread" the investments related to production repatriation over several years with a less significant impact on short-term economic and financial performance.

As earlier noted policy makers may play a fundamental role in defining legislation aimed at greater sustainability which, in turn, may influence - and support - firms' back-shoring decisions. Political initiatives aimed

at raising awareness of sustainability issues may be useful especially for SMEs, which generally apply economic and social sustainability strategies only in a limited way (Hörisch *et al.*, 2015). Furthermore, policy makers should pay more attention to the definition of labor market legislation and carefully verify back-shoring decisions are not implemented by resorting to illegal employment and illegal work practices (Hammer and Plugor, 2016, p. 402).

Limitations

The main limitation of the article is related to its exploratory nature which limits its generalizability. This characteristic, however, is consistent with the intention of defining "the state of the art" in order to identify future research avenues. In this respect, it is worth nothing sustainability issues have been suggested as an absolute priority within the scholar debate on manufacturing back-shoring. (Orzes and Sarkis, 2019).

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Appendix 1 Back-shoring and sustainability: list reference (section A)

#	Author(s)	Year	Journal/ Book chapter	Environ, sustainability	Social sustainability
1	Abbasi	2016	Journal of Textile and Apparel Technology and Management	X	
2	Ashby	2016	Operations Management Research	X	X
3	Barbieri *et al.*	2018	Journal of Global Operation and Strategic Sourcing	X	X
4	Bals *et al.*	2016	Operations Management Research	X	X
5	Denning	2013	Strategy and Leadership	X	X
6	Di Mauro *et al.*	2018	Journal of Purchasing and Supply Management	X	X
7	Ellram *et al.*	2013	Journal of Supply chain Management	X	X
8	Engström *et al.*	2018a	Journal of Global Operation and Strategic Sourcing	X	X
9	Engström *et al.*	2018b	World Review of Intermodal Transportation Research	X	X
10	Fel and Griette	2017	Strategic direction	X	X
11	Foerstl *et al.*	2016	Journal of Physical Distribution and Logistics Management	X	X
12	Fratocchi *et al.*	2014b	Book chapter	X	X
13	Fratocchi *et al.*	2015	Book chapter	X	X
14	Fratocchi *et al.*	2016	Journal of Physical Distribution and Logistics Management		X
15	Fratocchi	2018	World Review of Intermodal Transportation Research	X	
16	Grappi *et al.*	2015	Journal of the Academy of Marketing Science	X	X
17	Gray *et al.*	2013	Journal of Supply chain Management	X	X
18	Gray *et al.*	2017	Journal of Operation Management	X	X
19	Heikkilä *et al.*	2018	Journal of Manufacturing Technology Management	X	X
20	Moore *et al.*	2018	Journal of Manufacturing Technology Management	X	X
21	Moradlou and Backhouse	2016	Journal of Engineering Manufacturing	X	
22	Pal *et al.*	2018	The International Journal of Logistic Management	X	X
23	Robinson and Hsieh	2016	Operations Management Research	X	X
24	Sirilertsuwan *et al.*	2018	The International Journal of Logistic Management		
25	Srai and Ané	2016	International Journal of Production Research	X	X
26	Stentoft *et al.*	2015	Supply chain Forum: An International Journal	X	X
27	Stentoft *et al.*	2016a	Operations Management Research	X	X
28	Stentoft *et al*	2016b	Operations Management Research	X	X
29	Tate	2014	Journal of Purchasing and Supply Management	X	X
30	Tate *et al.*	2014	Business Horizons	X	X
31	Uluskan *et al.*	2017	Journal of the Textile Institute	X	X
32	Wiesmann *et al.*	2017	European Business review	X	X
33	Zhai *et al.*	2016	Operations Management Research	X	
Total				28	25

Appendix 1 Back-shoring and sustainability: list reference (section B)

#	Author(s)	Year	Journal/ Book chapter	RQ 1 (Driver)	RQ 2 (Result/ Outcome)	RQ 3 (Barrier/ Enabling factor)
1	Abbasi	2016	Journal of Textile and Apparel Technology and Management		X	
2	Ashby	2016	Operations Management Research		X	
3	Barbieri *et al.*	2018	Journal of Global Operation and Strategic Sourcing	X		
4	Bals *et al.*	2016	Operations Management Research			X
5	Denning	2013	Strategy and Leadership		X	
6	Di Mauro *et al.*	2018	Journal of Purchasing and Supply Management	X		X
7	Ellram *et al.*	2013	Journal of Supply chain Management	X		
8	Engström *et al.*	2018a	Journal of Global Operation and Strategic Sourcing	X	X	X
9	Engström *et al.*	2018b	World Review of Intermodal Transportation Research	X	X	X
10	Fel and Griette	2017	Strategic direction			
11	Foerstl *et al.*	2016	Journal of Physical Distribution and Logistics Management	X		X
12	Fratocchi *et al.*	2014b	Book chapter	X		
13	Fratocchi *et al.*	2015	Book chapter	X		
14	Fratocchi *et al.*	2016	Journal of Physical Distribution and Logistics Management	X		
15	Fratocchi	2018	World Review of Intermodal Transportation Research	X		
16	Grappi *et al.*	2015	Journal of the Academy of Marketing Science	X		
17	Gray *et al.*	2013	Journal of Supply chain Management	X		X
18	Gray *et al.*	2017	Journal of Operation Management	X		
19	Heikkilä *et al.*	2018	Journal of Manufacturing Technology Management	X		
20	Moore *et al.*	2018	Journal of Manufacturing Technology Management	X	X	
21	Moradlou and Backhouse	2016	Journal of Engineering Manufacturing	X	X	
22	Pal *et al.*	2018	The International Journal of Logistic Management	X		X
23	Robinson and Hsieh	2016	Operations Management Research	X		
24	Sirilertsuwan *et al.*	2018	The International Journal of Logistic Management		X	X
25	Srai and Ané	2016	International Journal of Production Research	X	X	X
26	Stentoft *et al.*	2015	Supply chain Forum: An International Journal	X		
27	Stentoft *et al.*	2016a	Operations Management Research	X		
28	Stentoft *et al*	2016b	Operations Management Research	X		X
29	Tate	2014	Journal of Purchasing and Supply Management	X		
30	Tate *et al.*	2014	Business Horizons	X		
31	Uluskan *et al.*	2017	Journal of the Textile Institute	X		
32	Wiesmann *et al.*	2017	European Business review	X		
33	Zhai *et al.*	2016	Operations Management Research	X		
	Total			26	9	10

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The social clause in public tenders: strategic interdependence among companies and economic distortions

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Abstract

Purpose of the paper: *The aim of the paper is to identify the economic effects of the generalized application of the social clause, i.e., the mechanism established by the legislation and by the collective agreement that foresees the continuity of employment in public tenders.*

Methodology*: The methodological approach is qualitative and based on a multiple case study method. Through the use of a semi-structured questionnaire, interviews were conducted with the ownership and management of certain companies identified on the basis of dimensional criteria and their governance.*

Results*: The results of the research show how the social clause can generate distortive effects both on the decisions and behaviour of existing or incoming companies that could plan exit strategies from the service or manage different means for the allocation of new employees, respectively, and on the market dynamics in terms of barriers to the introduction of technological and organizational innovations, motivation of employees and expected levels of service quality.*

Research limitations: *This research is exploratory in nature and only considers the business perspective. Possible future research could help to overcome this limitation considering the other actors involved in these dynamics, such as employees, trade unions and public administrations.*

Practical implications: *The article provides several policy proposals and indications that could result in a reduction in procurement costs and an increase in the capability to monitor the quality of the service provided.*

Originality of the paper*: The work focuses on the public procurement field and addresses a specific theme, such as the social clause, via a business strategy perspective.*

Key words: social clauses; public procurement; public services; outsourcing; business strategies

1. Introduction

The public administration procures goods and services within a rather rigid regulatory framework in which European, national and regional legal standards contribute in defining the overall regulatory framework.

In public procurement, several so-called "social" clauses have existed for many years that aim to protect and regulate certain aspects of the supply of goods and services with particular reference to the employees involved in this activity. Among these clauses, the so-called "social safeguard

clause" has assumed intrinsic importance and is intended, in its binding application, to safeguard the employees of the company that performed the contracted service, guaranteeing continuity of employment regardless of any change in the contracting company. In other words, thanks to this social safeguard clause, the employees involved in the provision of a service are protected and will not lose their jobs even if the employer changes as a result of tendering procedures.

The economic rationale of this clause is attributable to some characteristics of the services performed. More specifically, these characteristics include the following:

- They are fundamentally labour intensive services with limited levels of qualification of the workforce employed;
- Employees usually belong to relatively marginal segments of labour with low wage and specialization levels; and
- The service to be provided (cleaning, porterage, garden maintenance, etc.) is continuous regardless of the contract's period of validity.

Therefore, it appears that the failure to apply the social protection clause would have harmful economic effects in various levels of analysis:

- Regarding employees, given the emergence of phenomena of expulsion from work as an effect of a change in employer, unemployment with re-employment difficulties would occur given the lack of professional qualifications; and
- Regarding public institutions, employee turnover would generate a dispersion of the tacit know-how accumulated during the provision of the service, resulting in its lower quality.

In economic and management studies, the theme of the social clause is part of the broader strand dedicated to the process of outsourcing services by public institutions that has shown strong growth over time, especially in industrialized countries (Warner and Hefetz, 2008; Jensen and Stonecash, 2005). The reasons for this high diffusion of outsourcing practices are varied, but it is essentially due to the cost advantages that can be achieved given greater competition between supplier companies (Girth *et al.*, 2012), a reduction in labour costs and a progressive downsizing of the sphere of intervention of the public institution (Alonso *et al.*, 2015). The results of the studies conducted to date however are contrasting (Bel *et al.*, 2010) and do not highlight the existence of a univocal correlation between these two phenomena, configuring a debate that still appears to be open (Alonso *et al.*, 2015; Jensen and Stonecash, 2005).

Considerable research has therefore shifted its focus to aspects of management, highlighting how the adoption of particular strategic and organizational solutions can lead to an improvement in economic performance, an increase in the quality of the services offered and an increase in the satisfaction level of the users. In this regard, the presence of a public supervisor who is present and who collaborates operationally with the contracting company improves the quality of the service (Cabral *et al.*, 2013). Similarly, the quality of public employees is important in processes of outsourcing. A manager who is perceived as exhibiting a certain level of preparation and skills but also as having a capacity for listening and motivation at work can generate a higher level of citizens

satisfaction (Dahlström *et al.*, 2018). Finally, factors that could contribute to overcoming the traditional public-private dichotomy have been identified by the increase in competition, the adoption of adequate contract management practices and the progressive involvement of the users (Warner and Hefetz, 2008).

The aim of this article is to contribute to this debate by identifying the economic and management consequences that are derived from the general application of the social clause to tenders called by the public administration. For this purpose, the article is organized as follows. In the next paragraph (Section 2), the framework of the social clause is presented, as it emerges from the current regulatory and jurisprudential context. Subsequently, after describing the methodological approach used (Section 3) and on the basis of the results deriving from the empirical research performed, an interpretative framework of the economic effects deriving from the application of the social clause on the decisions and behaviours assumed by the companies is proposed (Section 4). Finally, the article concludes with the identification of the principal management and policy implications (Section 5).

2. The framework of the social clause

Social issues have assumed a growing importance in public procurement (Erridge and McIlroy, 2002), determining the introduction of specific clauses in the procurement of goods and services as well as in light of the role that public spending plays in the economies of industrialized countries (European Commission, 2016). From a review of the scientific work conducted on this topic, it is possible to note a tendential expansion of margins of social protection, considering a progressively broader set of aspects relating to the improvement of working conditions to be recognized and protected (Cravero, 2018; Grimshaw *et al.*, 2015; McCrudden, 2004). In fact, public procurement has been used to promote and affirm social goals in terms of reduction of working hours, determination of fair wages, increase in security conditions, recognition of human rights (Graafland, 2002; Mamic, 2005), removal of racial, religious and gender discrimination (Carter, 2000), employment inclusion of disadvantaged people, protection of minorities (Carter *et al.*, 1999; Krause *et al.*, 1999) and reduction in the conditions of unemployment (Erridge, 2007).

On several occasions, these social clauses have been promoted by the European Commission since the end of the 1990s (COM /1998/148; COM /2001/566) and considered to be one of the fundamental tools for directing entrepreneurs towards behaviours that are socially and environmentally responsible. The Directives 2004/17/CE and 2004/18/CE on the subject of public procurement have confirmed this EU orientation and provide a new organization for reserved procurement.

In the Italian legal system, the social clauses were originally designed to be interpreted primarily in relation to the guarantee of economic treatment in favour of the worker. Indeed, "through the promotion of the application of the minimum standards of treatment, the legislation did not really

propose the objective of the so-called extension of collective agreements (…) as it did the objective of ensuring better employment conditions for employees of companies who were recipients of the so-called social clauses" (Ghera, 2001). Based on this logic, an equal level of competition was guaranteed among the competing companies at least in terms of hourly labour costs. However, the following three economic factors led to a change of perspective, shifting from the protection of minimum salary conditions to that of guaranteeing employment continuity:

1. The process of restructuration and liberalization of public services and the need to contain public spending;
2. The recognition that firms legitimately have different average total cost structures since they abide by different regulations in terms of labour costs or have different competitive abilities; and
3. The need to not restrict access to the public services market for organizations that have registered offices – and thus employment contracts – in countries outside the European Union.

In relation to the first point, the public administration, in its role as contracting authority, has a need to benefit from public services based on management, organizational and technological innovations, such as in recognizing the freedom to determine hourly labour costs for a company that intends to participate in the tender for the assignment of the service. These features also relate to the objective of limiting the total public expenditure (Olgiati and Danovi, 2015).

The second point highlights that the structure of the cost of labour in firms is objectively different, even in the context of the same economic activity, due to the effects of a different combination of workers and technology. In this regard, the company participating in the tender can justify abnormally low economic offers with reference to the minimum salary conditions of its workers. Other justifications include fiscal tax relief, the application of supplementary agreements that allow a reduction in the cost of labour, and the assignment of temporary project contracts and not salaried employment contracts to a large part of the workforce (Costantini, 2014). Consequently, the hourly labour cost can no longer be considered a rigid and equal lever for all companies that intend to participate in a public contract. Finally, the social clauses that safeguard workers' minimum salary conditions can become barriers to the free movement of companies in the European Union (Costantini, 2014).

These three factors, therefore, have led to a shift in perspective from the safeguarding of hourly labour costs to the guarantee of employment continuity. In a certain way, the incoming company is faced with a loosening of the constraint of the hourly labour cost with some aspects left to collective bargaining between employers and employees and with the insertion of a constraint for continuity of the employment relationship for the employees of the outgoing company (Impicciatore, 2015). This innovation is important regarding strategic consequences for the various players involved, from the workers to the public administration up to the outgoing and incoming companies.

In the current Italian legal system, the main legislative reference source for the social safeguard clause is found in Legislative Decree

50/2016, the so-called Procurement Code (Ferrara, 2018; Russo, 2017). However, current regulatory provisions run the risk of "a sort of social constraint on the exercise of certain economic activities of public utility and, ultimately, a condition of legal origin when new entrepreneurs enter the market" (Ghera, 2001). Moreover, the European Court of Justice (ruling CGCE C-460/2002) has argued for some years that "the rehiring obligations are (…) incompatible with European Union law, because they could compromise the openness of the markets, discouraging potential newcomers because of the emergence of (high) labour costs, which are not determined by their entrepreneurial choices, with a consequent limitation of the freedom to run a business and to provide services" (Costantini, 2014).

In this respect, the social clause has been the subject of a vast and above all recent legal interpretation, which has profoundly modified its content and application methods. In particular, the Council of State (Section III, Sentence no. 2078 of 5 May 2017) established that "the so-called social clause must be interpreted in accordance with national and community principles regarding freedom of entrepreneurial initiative and competition, otherwise it would become detrimental to competition (…), as well as adversely affecting free enterprise, recognized and guaranteed by Art. 41 of The Constitution (…); consequently, the obligation to reabsorb the workers employed by the outgoing contractor, in the same job and in the context of the same contract, must be coherent and made compatible with the business organization chosen by the incoming entrepreneur".

We are therefore faced with a legal strand, which has given degrees of freedom and decision-making discretion to employers especially in recent years while acknowledging the social and economic value of this social safeguard clause to limit as much as possible some of the distorting effects that could result from its strict application in the context of public administration contracts (Ferrara, 2018; Pallini, 2016; Tomo *et al.*, 2016; Boitani and Cambini, 2014). Compared to these studies and based on the assumption of a tendentially "rigid" application of the social safeguard clause, this article is part of a fruitful strand of studies that identifies important contaminations between labour lawyers and economists (Romagnoli, 2003; Salvati, 2002; Antonelli and Paganetto, 1999) and intends to answer the following questions: What are the effects of the social clause for contractors? What are the effects on the market, with particular reference to the public administration as contractor of the service?

3. Research methodology

The empirical research performed is exploratory in nature in that it is aimed at investigating the decisions made and the behaviours assumed by enterprises with respect to the provisions of the social clause and the various tender conditions that could occur. Consistent with these conditions, the nature of the investigation could only be qualitative as a preferable and usable approach at the moment when the knowledge of a given phenomenon and the possibility of providing adequate explanations

appear reduced (Eisenhardt, 1989). The methodology of the case study makes it possible to study the behaviour of firms in a real environment, capturing all the possible dimensions (Yin, 2017), and simultaneously identify the motivations and the methods in which decisions were made and specific problems were addressed (Gibbert and Ruigrok, 2010).

Four companies were interviewed, all of which were very involved in public procurement. Their identification occurred through the use of two distinct criteria:

a) Significant size in terms of employees and turnover (i.e., greater than 100 employees and 2.5 million euros, respectively); and
b) Different legal forms to grasp differentiated behaviours due to different purposes and different governance arrangements.

The main characteristics of the companies involved and the related interviews performed are reported below.

Tab. 1: The companies involved in the research activity

Company	Legal form	Employees	Turnover (in millions)	Interviewed	Interview duration
ALFA	Joint stock company	704	83, 6	CEO and Human resources manager	1 hour 26 minutes
BETA	Worker cooperative	890	69, 4	Human resources manager	45 minutes
GAMMA	Worker cooperative	816	23, 6	President	50 minutes
DELTA	Social cooperative	158	3, 7	President	1 hour 10 minutes

Source: authors' elaboration

In relation to the specific activities performed, the research was conducted by following various methodological steps.

First, information was acquired directly from the companies. On the basis of a semi-structured questionnaire, interviews were conducted with the owners and the company management during September and October 2018. The choice of this method of investigation may be considered the most appropriate given the objectives being pursued, the number of the interlocutors involved and the quantity and depth of the information that could be collected. Every business owner or manager was free to explain his experience and to state his opinion in relation to the topic addressed.

Second, the information obtained was first recorded and subsequently transcribed to perform the processing of the texts. This last activity was performed through a comparison between the authors (Stake, 1995) who, from the reading of the individual transcripts, identified the most recurrent themes in the testimonies of business owners and managers, the resulting decisions that were made and the perceptions that they had of the market conditions with reference to the behaviour of the competitors and the contracting authorities.

Third, to perform a triangulation of the data (Yin, 2017), the results derived from the analysis that was performed were compared and supplemented with information from secondary sources, including both

internal (presentations and company reports, accounting documents and, when provided, documentation relating to participation in tenders) and external sources, which consisted mainly of national and regional newspaper and magazine articles.

Finally, at the end of this process, the most appropriate method of interpretation and presentation of the results was decided, i.e., the definition of the themes to articulate the empirical part of the present research. Thus, it was possible to investigate the economic effects induced by the application of the social safeguard clause and the relative decisions made by the businesses when they were forced to leave a contract or manage a new contract.

4. The results of the research

4.1 The strategies of the outgoing companies

The social safeguard clause can contribute to following a strategy on the part of the outgoing company, that is to say the company that is currently performing the service activity but which will soon be submitted to a new tendering procedure with the consequent risks of departure from the same due to the replacement by a competitor. This appears to be of particular relevance in the following cases:

- A company is in a particular critical economic and financial condition, which requires the implementation of restructuring and corporate reorganization strategies;
- One of the options of the turnaround company is to intervene on the total workforce employed by the company;
- The company is multi-service or in any case operates on behalf of a plurality of clients (both public and private); and
- The service that is currently being offered to a public institution is not particularly profitable and generates management, organizational and economic problems to the point of making an exit strategy rational.

In similar circumstances, the new tendering procedure for the assignment of the service constitutes an opportunity for this company because it is able to generate the exit conditions from the contract and simultaneously raise its overall competitiveness. The current regulation is the framework within which to pursue this intentional exit strategy. Workers who benefit from the application of the social safeguard clause must work, for example, within a specific service (the one that is the object of the contract) for a minimum period of time (six months, for example, for the national labour contract in the environmental hygiene sector and four months for multiservices). Thus, the outgoing company must prepare its exit strategy well in advance in compliance with the time constraints that are defined by current legislation. It is also clear that this exit strategy must be unexplained so as not to generate anxiety and tensions within the business organization (relationships with the employees who are concerned, trade union relations, etc.).

At this point, it is necessary to assume that the outgoing company is characterized by having a total workforce that is employed in a plurality

of service offers (both to public and private subjects). This characteristic makes it possible to operate effectively on the mobility of the employees and even simultaneously given the multiplicity of the services offered.

Company GAMMA: *"If the company has a single contract in a territory, it is obvious that the list of employees is automatically prepared. They are the only resources available. However, if the same company loses a contract in a territory where it carries out many activities of the same nature, within this contract it is likely that other people have also worked over time. For this reason, making a list of the people who permanently occupied that workplace is not so automatic. It is probable that even someone who is not employed in that service may end up on the list of this lost contract".*

In this context, the outgoing company could intentionally pursue three strategic options during the period prior to the contract expiration.

First, it could aim to increase the total number of staffs employed in this contract, reallocating the workforce at its disposal. In the short term (for example, six months), the company would find itself managing this contract under more critical economic conditions due to a higher overall labour cost.

Second, the outgoing company could proceed to modify the qualitative composition of the staff required without altering the overall number. In other words, in the context of the total number employed, those who have subjective characteristics of lower efficiency and productivity could be allocated to this service, whereas those originally present would be moved to other services.

Finally, the outgoing company could allocate staff, replacing some who, due to seniority or other reasons, have an average labour cost that is higher than other employees. Thus, the employees who are characterized by higher wage levels could find themselves involved in the expiring contract. Some empirical evidence seems to suggest these theories.

Company ALFA: *"There are companies that assign a large number of employees to contracts that are lost. Furthermore, these companies don't only act on quantity by increasing the number of employees but also on quality by assigning those with lower productivity".*

Company GAMMA: "*When changing contracts, each company tends to adopt behaviour that may not be clear. In particular, when projects are organized within the territory, in the list of a changing tender, people with low productivity may have been inserted, and also those who are working under other contracts".*

Therefore, these are exit strategies through which the outgoing company tries to pursue a double objective: a) optimize its internal organization and improve its efficiency and b) penalize its competitors by transferring personnel characterized by lower productivity or higher costs to them.

The consequences of this strategy of the outgoing company can be twofold. On one hand, if the competing companies participating in the tender have previous experience as well as accurate and precise knowledge and information regarding the efficient working conditions in offering this service, the exit strategy of the outgoing company is "unmasked" and consequently two options are possible. a) The competing companies do not take part in the tender to avoid taking the risk of winning it and then having

to face higher labour costs, which make this service not economically sustainable. In this case, the exit strategy of the outgoing company has, in fact, become a strategy to deter the entry of potential competitors. b) Some competing companies decide to participate in the tender in an economically credible manner because they believe they can internally relocate excess staff or those with lower productivity, thus recovering cost-effective margins. The empirical evidence gathered suggests some of these considerations:

Company ALFA: *"There are anti-competitive mechanisms that are applied by existing suppliers in order to defend their positions. Through the social clause, these companies try to make a contract seem as though it is not advantageous from an economic point of view. For example, if my service contract is running out and I know that in a few months a new tender will be announced, I can, in the meantime, load all the personnel I have into that site in order to transmit a totally inefficient view. Then, through the ability of the companies that participate in the tendering procedure and that make the inspections, they can understand from their own experience whether that type of service can be organized in a different way"*.

On the other hand, if the competing companies do not have a degree of knowledge and information that is particularly thorough regarding the conditions of efficiency and productivity of this service, they can participate in the tender and perhaps win it, while proceeding to the full application of the social safeguard clause. This may depend on the inexperience of the company participating in the tender (perhaps because it does not specialize in this business) or occur because the information provided transparently by the public institution awarding the contract does not analytically and precisely specify the characteristics of the personnel currently employed by the outgoing company. Thus, the exit strategy of the outgoing company can achieve its aims and objectives, which include reorganization and corporate restructuring starting from the transfer of part of its workforce.

The credibility of the information offered in the tender by the outgoing company in terms of jobs currently employed is however subject to verification by the incoming company to the point of generating possible conflict and ex post negotiation.

Company GAMMA: *"These are all things emerging immediately. When you begin to hold interviews with the workers in the trade union, you immediately understand whether or not they are employed in that service and for how long"*.

Company DELTA: *"Then it is logical that in trade union mediation, questions are asked, and if they do not know how to answer, it is clear that they were not working in that service. There is always an attempt to transfer personnel who are not part of that service, or who are more problematic than others, to the new company"*.

4.2 The strategies of incoming companies

The second subjective element involved in this procedure for the assignment of services is the incoming company, which, in contrast to the outgoing company, must manage the effects resulting from the application of the social clause.

In abstract terms, it is necessary to hypothesize two different conditions of tender for the service by the public institution: a) a service that does not undergo substantial changes from an organizational point of view and that is contracted out with the same previous conditions. This is the case in which the social clause produces its maximum effects in terms of full transfer of previously employed staff; b) a service that was substantially changed in relation to the award criteria and thus can be considered different from the previous management. The interviews performed reveal that this second typology is largely dominant.

Company GAMMA: *"The current problem is that contracts are increasingly assigned deteriorating economic conditions. A contract that previously provided for certain conditions suddenly becomes a poor contract. This is now systematic"*.

Therefore, almost no contract is stipulated under the same conditions in which it was originally issued, and there are various reasons for this approach on the part of the public administration: a reduction in the starting bid amount due to the reduced financial capacity of public institutions and the on-going process of spending review; the consolidation in a logical bundling of a plurality of services that are required from companies; the foresight, with a view to innovation, to introduce new methods of organization and delivery of the service to improve the quality offered.

Faced with a situation of this type and with a need to reabsorb the employees from the previous contractor, the incoming company has the possibility to operate on some variables. In other words, the adjustment mechanisms with which the company tries to reduce the effects resulting from the social safeguard clause take over.

There are three variables that the incoming company can use to mitigate the effects of the social safeguard clause – and therefore contain the overall labour cost attributable to this specific service:

a) The hourly wage to employees. The entering company can try to redefine, where legally possible, the economic conditions of the hourly wage in favour of the employees that have been obtained to reduce the cost of labour and recuperate profit margins;
b) The total time allocated to the service. In these terms it becomes central to act on the basis of the total working hours to contain the overall labour cost; and
c) The absolute number of employees that are absorbed. This leverage can be used in the context of the positions legally permitted by the concrete application of the social safeguard clause as well as by negotiation with the unions and with the outgoing company of aspects of "alteration" of the total workforce employed in the pre-exit phase.

The current legislation concerning the social safeguard clause intervenes on the absolute number of employees. Factors related to employment contracts is reflected in the variable of the hourly wage, while the specific provisions provided for in the tender could have an influence on the total contract hours. It is evident that excessive "restriction" to free enterprise (due to the absolute binding interpretation of the three variables in a contextual way) would be unsustainable even legally.

Empirical research reveals that the incoming company assumes a different behaviour for each of these variables.

In relation to the contractual conditions of the employees to be absorbed, the margins for action of the entering company are extremely reduced, if not even absent. The hourly costs of the paid wages are determined exogenously by the public authorities and the trade unions and anchoring to these values becomes an indispensable requisite to be respected to participate and compete in tenders and avoid any disputes.

Company ALFA: *"The hourly wage is made up of the unit cost of the labour established by the ministerial tables and by the national collective contracts. Currently, it has become mandatory to refer to these data at the moment when presenting justifications for manpower. Therefore, it is necessary to specify the part of your offer that is dedicated to the cost of labour. The company may also provide different costs from these; however, it is so difficult and dangerous to justify this choice that it is not advisable to practice such an alternative".*

The second variable, namely, the total contract hours allocated to the service, is what normally constitutes the leverage with which it is most possible to intervene to mitigate the effects of the social safeguard clause. Among other things, organizational or technical innovations, which are occasionally requested or solicited by the contracting authority itself, can generate the conditions of the service with fewer total contract hours while safeguarding the quality standards of the offer.

Company BETA: *"The last ten years have been those of the Spending Review. The amount of work has been reduced and, as a result, the use of personnel has also decreased. Faced with these situations, not only the service is reorganized but a reduction in the timetable is offered to employees. These paths must be studied, built and consolidated at the union tables".*

Company GAMMA: *"If the services to be rendered in the new contract are smaller or different than those in the previous contract, it is obvious that a different agreement must be found. Therefore, in the face of a diverse articulation of the service, the parties must come to an agreement on the reduction of hours".*

However, the remodulation of the service through a reduction in the total number of hours does not occur automatically and linearly. Occasionally, the same public contracting authority can precisely define the total contract hours, specifying the time frames during which the service must be performed, or it can simply provide a reward in the selection and award clauses of the tender according to the estimated time by individual bidders. In both cases, a strict correspondence is assumed between the quality of the service provided and the total hours spent. In reality, this assumption is questionable from different points of view. However, in a context in which it is assumed that the contracting public administration does not have the skills and human resources to effectively monitor the intrinsic quality of the service performed, there is a tendency to base it on an indirect indicator that is easily monitored, such as the total contract hours. In the event that the public administration accurately defines the total contract hours as a constraint on the service being offered, this leverage can no longer be used by the incoming company for containing

the economic effects derived from the application of the social safeguard clause. On the other hand, in the case in which the public administration foresees incentives in the tender specifications in relation to the total contract hours, then the incoming company can evaluate and weigh this incentive with respect to the overall conditions in the offer. In the latter case, therefore, there is a margin of discretion on the part of the incoming company in "manipulating" the variable of the total contract hours to contain the economic effects derived from the application of the social safeguard clause.

Company ALFA: *"Very often the total hours are an incentive. However, if the points that are given to this indicator are many, the company is obliged to organize itself in an "analogical" way. It will have to use all the people that the social clause provides for carrying out the contract activities, not being free to organize itself otherwise. In this way the company achieves very low margins"*.

Finally, the last variable that influences the behaviour of incoming companies is the number of employees absorbed as a result of the social safeguard clause. Generally, the possibility of intervention by the company on this aspect in terms of failure to hire new workers from the previous contract is extremely limited, and this poor decision capacity is derived from various aspects. First, this strategy would be diametrically opposed and therefore not admissible with respect to the ratio and the legislative provision for the social safeguard of workers. Second, it represents the most highly opposed element by the trade unions in negotiations conducted for the transfer of contracts. Finally, as noted above, its effects can be mitigated by a reduction in the total contract hours allocated to the service.

Company GAMMA: *"The failure to hire new personnel does not occur. This is a decision that will never be accepted by the trade union. There may be cuts that are more or less in proportion with the different professional profiles, but a situation in which some people are not hired almost never happens. There is specific legislation for this situation and who behaves differently would receive any kind of legal appeal"*.

In any case, while acting on the leverage of the hourly work schedule and to a lesser extent on the hourly labour cost and the number of employees, the incoming company can also intervene on other variables to recover margins of efficiency and economy. In particular, the incoming company can decide to cut other costs (perhaps referring to the overall organization of the company and not to a single contract), to contain its overall profit levels, to limit purchase costs with suppliers of the materials used in the contract or to reduce the quality of the service offered, attempting to preserve and, if possible, increase its competitiveness.

Company GAMMA: *"In the cleaning sector, the tendency to impoverish contracts has been going on for years. More than profits, the contribution to the general costs of the cooperative is penalized"*.

4.3 Effects on the market

The social safeguard clause also determines overall effects at other levels of analysis. In particular, together with other factors, it is able to contribute to the activation of specific dynamics related to the following:

1. Structure of the sector, with particular reference to the size of competing companies;
2. Barriers to the introduction of management, organizational or technological innovations in the performance of the service;
3. Level of work motivation of the employees who are "guaranteed" by the social safeguard clause; and
4. Expected and provided quality levels of the service offered to the contracting public institution.

In relation to the structure of the sector, the social safeguard clause has a different effect on companies depending on their average size. In fact, larger incoming companies (due to their "portfolio" of services to public and private customers) can proceed with the relocation of surplus staff who are present in a contract. Thus, they are able to acquire contracts with occupational "redundancy" and then proceed by restoring the conditions of efficiency and productivity. Conversely, small businesses entering a new contract may find themselves compromising their overall productivity, efficiency and cost-effectiveness. Thus, the capacity to absorb inefficient conditions - derived from the full application of the social safeguard clause - has very different impacts on large and small enterprises. In dynamic terms, therefore, this sector is subjected to the stress of a trend that favours growth to an average company size.

Company BETA: *"The social clause certainly has a greater impact on a small company. We are large and if we were to acquire people who have profiles that are out of line, we find a way to place these skills in some replacements or for additional activities in other services".*

Company GAMMA: *"Workers are also relocated to other services. We have developed appropriate tools, such as the negative hour bank, to manage and compensate for these activities so that there is no excessive reduction in working hours".*

From the companies' testimonies, the condition of asymmetry between large and small enterprises that is derived from the social safeguard clause is also amplified by a further aspect that is attributable to the negotiation capacity that larger companies show towards union representatives when they are required to identify employment solutions capable of preserving the workers' positions.

Company BETA: *"We have never had any problems and the percentage of disputes is really low. A large company succeeds in better amortizing the social clause because it has a different organization and contractual capacity, also from the union's point of view".*

Company GAMMA: *"Normally these agreements are closed at the union's negotiating table, assigning people to other types of services. However, the situations are different. There is the company structured over a fairly large territory and the small company that may work with three contracts, located in a single territory".*

In relation to the second factor, namely, the introduction of labour-saving innovations of a managerial, organizational or technological type in the performance of the service, the social safeguard clause can act as an inertial and frictional mechanism, hindering the propensity of companies to introduce new solutions for delivery of the service. In these circumstances,

i.e., when a trade-off is generated between the protection of previous employment levels and the introduction of labour-saving innovations, if the application constraint of the social safeguard clause is very strict, then the sector will tend to not introduce these types of innovations. Among other things, the problem is particularly relevant when the labour-saving innovation is able to generate an increase in the quality level of the service. In this case, the public institution finds itself operating in the dilemma between a request for full application of the social safeguard clause (with a consequent barrier to the introduction of innovation) and the possibility of achieving higher quality service levels (subject to the introduction of innovation).

Company ALFA: *"When there is a different organization of the service than in the past, it is necessary to be able to explain the innovation adopted, how the workforce will be reduced and for what reason this can be considered an improved solution for the institution because otherwise, only the labour reduction emerges. This is a common topic of discussion with the widespread contracting authority".*

When the introduction of technological innovation is hampered, the public administration continues to have a very high cost structure in the acquisition of certain services. In fact, firms do not have an incentive to innovate unless they work for both the public and private sectors. In the private sector, since clients send "signals" and show instances of cost restraint, contractors may be induced to introduce technological innovations to provide a response to the requests of their private customers. This could lead to the presence of companies in the same sector that are "dual", namely, those that, on one hand, introduce technological innovation to meet the needs of the private sector and, on the other hand, that do not innovate, working with public clients at higher costs. Therefore, the public cost to acquire a service could be dynamic over time and greater than the private cost to purchase the same type of service. When companies that have a presence in the private market that have internalized technological innovations and have lower cost structures decide to enter the public market, they could have a significant competitive advantage while discounting the effects of the social safeguard clause.

Ultimately, the adoption of managerial, organizational and technological innovations can be problematic in small businesses, whereas this adoption may generate specific competitive advantages in other types of enterprises. This last circumstance is attributable to three types of enterprises: the company that operates in the private market compared to one that completely acts in the public market; the multi-business firm considering that it operates in a sector that is capable of absorbing employment; and the large company that, despite being specialized, manages multiple lots and is therefore able to optimize the dynamics of personnel absorption that is envisioned by the social safeguard clause.

The third level of analysis involves the effects of the social safeguard clause on the level of the motivation of the personnel employed in the contract. For some aspects, with the rigid application of the social safeguard clause, the worker appears to be guaranteed in her/his duties and activities, but s/he cannot capitalize on her/his knowledge and skills in the career

paths of a firm due to the temporary nature of the contract and possible replacement of the current employer over time. These factors can generate working conditions that are characterized by lower motivation levels and less loyalty to the contracting company with obvious consequences in terms of individual and collective productivity.

Company ALFA: *"In these contracts, there are pathological situations of personnel who think that the position granted is a permanent position. The contractor who must inevitably absorb these people may see negative effects on productivity and efficiency"*.

Company DELTA: *"The bond of employee to the work but not to the company is harmful, especially in services performed for the public. The worker is loyal to the public administration and often feels like a public employee because, once the job is done, he remains and the company changes. This creates situations that are difficult to manage"*.

Therefore, a situation arises in which the company does not have any leverage for motivating its employees by ensuring them a job for long periods of time, given the average duration of the contracts, or guaranteeing them adequate career paths given the probability of losing the contract in the future. The employee is aware of all this and therefore does not develop a sense of belonging within the company. Consequently, it is a world in which it is extremely difficult to introduce merit-based rules aimed at rewarding deserving workers since the duration of similar incentive mechanisms would be, by definition limited i.e., linked to the duration of the contract.

The situation may seem even more problematic for cooperative enterprises in which the role of the employee is often associated with that of a worker member. In these circumstances, the interruption of the employment relationship can also limit the status of member due to the social safeguard clause, indicating a clear prejudice to the identity of the cooperative.

Company BETA: *"We are a cooperative and people are all members except for those who are hired as employees through new contracts. These staff can choose. We can make a proposal to them, but they are not obliged to become members. Many times, however, they have asked to become members over the years. This gives us great satisfaction"*.

Company DELTA: *"We had people who didn't leave after the tender was lost. At the beginning they preferred a reduction in hours, but they stayed with us until we were able to get them back to the number of hours they had done previously, but they did not think of leaving us at all"*.

Finally, the fourth factor influenced by the safeguard clause is the quality of the service provided as well as the stickiness of pricing with respect to the contracting public administration. In fact, this clause entails, to a large extent, rigidity in the price offered in the face of a condition of continuity of the employment relationship, but it does not particularly determine even a change in the quality of the service offered. As a rule, it is assumed that with the safeguarding of employment levels, the tacit knowledge and skills accumulated by these employees and consequently the quality levels of the service are preserved. However, two previously illustrated factors, namely, the barriers to the introduction of innovations and the motivational levels

of employees, significantly influence the qualitative characteristics of the service offered. Therefore, the social safeguard clause is ambivalent with respect to the quality of the service provided. On one hand, it can tend to increase quality. On the other hand, it can reduce it. However, the importance of the contracting public institution is evident. When defining the clauses of the contract, the contracting public institution must have ex-ante ability to provide for specific objective standards for the quality of the service to be provided. While in progress, the institution must have the ability to monitor and evaluate this performance effectively through its own internal organizational capacity.

Company ALFA: *"In the face of potential appeals, the members of the evaluation commissions tend to not expose themselves, to not express great differences between the project proposals and to not make too courageous assessments that could be questionable. As a result, the differences are smoothed out. Furthermore, if there is no formula for the price score that allows to check particular reductions or market excesses, the entire procedure turns into a unique bid auction. If there are no rewards and if monitoring is absent, the company tries to give as little as possible and stay within the thin line of penalties. This is how a service is created with fewer people, with poor products and with an organization that will penalize users. In other words, a low-quality service is created".*

5. Conclusions and implications on management and policy

The analysis shows that currently the public administration is faced with objectives that may diverge. On one hand, there are interests in obtaining qualitative levels of service that are consistent with user expectations and in containing public spending. On the other hand, there is also interest in protecting the employees of the contracting company who are working in these services to avoid social phenomena of marginalization and underemployment.

Given awareness of the possible distortions derived from the rigid and binding application of the social safeguard clause, the legal orientation in our country in recent years has in fact attributed a certain discretionary decision-making power to the contracting company. By absolutizing the principle of social safeguarding, this approach makes it possible to overcome the conceptions of the past that generated the distortive effects illustrated in this article in a consequential and unintentional manner. However, this new jurisprudential direction assigns to the voice and the negotiation skills of the various organizations the final results of this dynamic. The actors involved are undoubtedly the union representatives of the workers concerned and the new employer (i.e., the winner of the contract). However, there is no doubt that even the contracting public institution, for various reasons, can have some amount of influence in determining the final decisional equilibrium.

In the case of the social safeguard clause, there may be outcomes that seem to be close to a rigid application of this mechanism. To the contrary, there may be employment conditions that are only limitedly confirmed in

the new contract. This will depend on several factors that are highlighted in this article, including:

- Distorting behaviours pursued by the outgoing company in terms of redundancy or lower production capacity of the workers employed;
- Occupational resources of the incoming company, lacking (or not lacking) certain job skills, or having its own pre-existing employment redundancy (or lacking this);
- Competitive pressure exerted by managerial, organizational and technological innovations that can push towards a reduction in the price offered in the contract or an increase in the quality of the service;
- Procuring public institutions that have (or do not have) a specific sensitivity to workers employed in a service; and
- Contracting public institutions with (or without) a technical organizational capacity for the formulation of tender specifications and, above all, in monitoring (and sanctioning) the quality of the service provided.

In a framework with these characteristics, the results of the decision-making process deriving from the application of the social safeguard clause are not discounted and determined. Consequently, we identified highly differentiated market situations among them (Decarolis and Giorgiantonio, 2014). In terms of economic rationality, these factors could generate conditions of strategic operability that are very different for each of the enterprises involved. For example, the "scarce" attention of public institutions to the social safeguard clause could lead to a greater influx of potential competitors to a specific tender; an increased capacity to demand and monitor the quality of the service offered by a public institution (Gabryelczyk *et al.*, 2017) could lead to a more limited application of the social safeguard clause by the incoming company and so on.

In this context, it may be important to outline some possible implications for both management regarding firms involved in these decision-making processes and in relation with public institutions as well as for industrial policy regarding the administrations that intend to improve the management of the social clause.

In relation to the first aspect, companies could strengthen their level of reputation and credibility through the adoption of policies that tend to maintain high employment levels and/or improve the processes of conversion and requalification of human resources. Thus, companies could not only increase the level of professional preparation and satisfaction of staff and consequently their productivity, but they could also obtain recognition from external stakeholders, including the employee representatives of these public administrations. Furthermore, the strategic dynamics that emerge from similar competitive contexts show that it is actually essential for any company, regardless of its size, to implement adequate information systems that can systematically monitor the behaviour of competitors and generate information on which to make appropriate decisions.

In relation to the second aspect, the following policy interventions are suggested:

1. Adopting tools as well as regulatory tools for deterring and avoiding

the distortionary behaviour pursued by the outgoing company. Thus, it is reasonable to assume that many potential incoming enterprises may be interested in participating in the tendering procedure;

2. Strengthening of the ex-ante ability to define the clauses and rules of the contract. This can be accomplished by establishing centralized contracting authorities in contrast to, for example, scattering these in each individual municipality, which are often much smaller. The aggregation of the contracting authorities could lead to reductions in the overall costs of tenders and greater capacity to monitor the quality provided (Guccio *et al.*, 2014); and
3. Safeguarding of employment levels in these tenders could be based on reward scales. The company that participates in the contract by drawing up its project specifies the percentage (or other indicators) of absorption of the personnel currently employed (Varva, 2016). Thus, the contracting authority ponders the different offers of potential incoming companies based also on this indicator by giving a specific awarding of points in the ranking. Thus, the public institution "declares" with its own voice the willingness to reward, more or less consistently and indirectly, the personnel currently employed in the contract. Therefore, the latter will feel a competitive "pressure" to work in a motivated and productive manner so the public institution will attribute a relatively high importance to this possible reward in a future tender.

Ultimately, if public institutions are moving towards a less rigid and binding application of the social safeguard clause, this does not mean that the two objectives (price/quality of service and employment safeguarding) cannot be pursued through other policies that are equally relevant. Instead, it is important to note that a clause, namely, that of social safeguarding that was established for highly ethical reasons, may risk activating a distortive dynamic that does not protect the overall interests of workers and the community.

The investigation conducted in this article contributes to the definition of strategic behaviours assumed by enterprises in competitive procedures organized by public institutions; however, it also has some limits. As previously highlighted, this study is an exploratory study that can be broadened by observing a larger number of companies, further developing the topics under investigation, and through the preparation and use of appropriate indicators that could help to outline some aspects that companies still consider as being sensitive. The major limitation involves the nature of the subjects who were involved. In fact, the research only considers the companies' perspectives. To understand the role and the effects of the social clause, it may also be appropriate to define and evaluate the conditions, the points of view and the problems expressed by employees, workers' representatives and public institutions in the future. Each of these perspectives could also be broadened, through the use of a quantitative approach and could lead to original results, thereby presenting new and original pathways for continued research.

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Social enterprise and market orientation: roles and relationships for the management of sustainable supply chains[1]

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Abstract

Purpose of the paper: *This article explores the management of sustainable supply chains by social enterprises that sell ethical products in the mass market. This phenomenon is considered part of a growing openness to markets in some nonprofit organizations.*

Methodology*: The analysis considers case studies of two social enterprises, Altromercato and Libera Terra.*

Results*: Results indicate the main mechanisms in the management of supply chains by a social enterprise, highlighting the need for a hub in the management of profit-nonprofit relationships. This role is characterized by four main tasks: quality assurance, training and education, experimentation/coordination, harmonization of material and information flows.*

Research limitations: *This study addresses two cases, and future research in this area should extend the analysis to a higher number of nonprofit organizations.*

Practical implications: *This article describes the main dynamics of change for nonprofit organizations in the process of opening towards the mass market, concentrating on the ways in which it is possible to manage supply chains and downstream markets in line with their social mission.*

Originality of the paper: *This article shows the existence of a gap in the literature regarding the presence of nonprofit focal actors in the management of ethical product supply chain.*

Key words: sustainability; supply chain; distribution channels; social enterprise; nonprofit

1. Introduction

The concept of sustainability has entered into daily conversation and the conduct of business, influencing how they unfold and encouraging the introduction of new approaches to the use of resources and the control of markets (Keijzers, 2002). Growing attention to environmental, social,

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and economic issues has taken on new dimensions and is progressively manifesting itself in several areas of application within the organization of sustainable supply chains (Closs *et al.*, 2011). This will be obvious considering, for example, the lower consumption of natural resources in favor of the use of recycled materials by manufacturing companies that operate in the traditional sectors of clothing (Caniato *et al.*, 2012), agri-food (Beske *et al.*, 2014), or construction (Sev, 2009). Further, the progressive use of alternative over traditional energy sources (Panwar *et al.*, 2011); reductions in polluting agents and emissions (Vachon and Klassen, 2008); improvements in working conditions, such as in guaranteed minimum wage, fair working hours, and protection of human rights (McCrudden, 2004); the implementation of marketing policies aimed at promoting responsible purchasing behavior (Becker-Olsen *et al.*, 2006); and the adoption of new and adequate certification systems and the preparation of appropriate management and communication tools, such as ethical codes and social budgets (Spence, 2007) also reflect this same overall pattern. The general trend is expressed and realized in the assumption of behaviors or the creation of products that have ethical aspects, that is, which incorporate one or more social or environmental principle that can influence consumer purchase decisions (Crane, 2001; Bezençon and Blili, 2010).

In the academic literature, this dynamic has been investigated and developed, above all, in for-profit enterprises. In the face of growing public scrutiny and greater consumer awareness of social and environmental issues, many companies have increased their commitment to ethical initiatives, allocating a growing share of their financial and organizational resources to these activities, increasing their reputation and acceptance by consumers and by external interlocutors in general. On the other hand, little attention has been paid to the role played by nonprofit organizations, which are often considered to occupy a subordinate position (Kim *et al.*, 2012).

This article explores these recent changes in the organizational practice dimension and brings original findings to the specific discussion of sustainable supply chains. In particular, its main purpose is to understand the configuration and management of the supply chain of ethical products proposed by nonprofit organizations, which can take on an entrepreneurial structure. Some social enterprises carry out productive activities and operate in the market, generating benefits for the disadvantaged and entire local communities, and, in some cases, create and commercialize products that have ethical connotations that are capable of competing on the market with goods offered by for-profit enterprises that are not characterized in the market in the ethical dimension.

Pursuing this objective, the study is organized in the following manner: in the next section, a review of the literature is presented, focusing on the concept of sustainable supply chain and the role of social enterprises in the dynamics of openness to the market. Following a description of the methodology (Section 3), the results of empirical research are described (Section 4). The article concludes with a discussion of the results (Section 5) and a characterization of the main implications (Section 6).

2. Sustainable supply chains and the role of nonprofit organizations: a review of the literature

2.1 Supply chains and sustainability

Supply chain management has been impacted by the growing importance of sustainability issues within companies and organizations. This is reflected in the literature on management (Linton, 2007). To begin with a definition of sustainability, we refer to one of the earliest statements of this concept, proposed by the World Commission on Environment and Development (1987): sustainable development is "the development that meets the needs of the present without compromising the ability of future generations to meet their needs".

The idea of a sustainable supply chain is a relatively more recent topic. The literature review conducted by Massaroni *et al.* (2015) indicates that it is only in the last decade that scientific studies of management have concentrated on this topic, at least in a way that indicates a more thoroughly developed perspective.

Brandenburg *et al.* (2014) highlight the existence of only a few contributions that take into account all three pillars of sustainability in accordance with the triple-bottom-line approach (Elkington, 1998): environmental, social, and economic. Most studies focus on environmental sustainability, emphasizing the green management of supply chain relationships (Massaroni *et al.*, 2015).

Over the last decade, a more holistic view of sustainable supply chains has been developed, defined by Seuring and Müller (2008, p. 1700) as "the management of material, information and capital as well as the development of supply chains while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social".

A great deal of the work on sustainable supply chains focuses on strategies implemented by companies that are typically profit-oriented, though these strategies are often conceptually included within the broader theme of corporate social responsibility (CSR) (Carter and Easton, 2011). Carter and Jennings (2002), for example, study how companies implement CSR policies in the logistics function, identifying the most relevant aspects here: purchase management, transport management, and warehouse management. The main relevant practices for the management of logistics, purchases, and the entire supply chain in general bear on health and safety, animal protection, environmental protection, supporting local communities, work, and human rights (Maloni and Brown, 2006).

A portion of the literature focuses on the conduct and management of sustainable supply chains. Pagell and Wu (2009) summarize the empirical work in these areas: existing best practices as a foundation for sustainability; need for integration (sustainability objectives, practices, and awareness must be integrated within each organization in the supply chain and between them); and reconceptualization of the supply chain. For this last, Pagell and Wu (2009) demonstrate how the literature highlights the inclusion of non-governmental organizations (NGOs), nonprofit organizations, and members of the community as an emerging theme

(Seuring, 2004). This confirms that the dominant literature on sustainable supply chains focuses primarily on the key figure of a profit-oriented company that develops issues of social responsibility and sustainability within its organization and in its management of supply chain relationships (Tencati and Pogutz, 2015).

This line of literature appears to ignore situations where a nonprofit organization or a social enterprise is the central actor in the supply chain; instead, they are viewed as partners only included in supply chain relationships as part of CSR strategies (Seitanidi and Crane, 2009; Seuring, 2004). As Zhu *et al.* (2018, p. 5708) find in a review of the literature on sustainable supply chains in the food sector: "nonprofit organisations seem to be relatively seldom of interest in existing published literature".

Usually, nonprofit organizations operate in sectors that are entirely oriented to nonprofits. They have dedicated supply chains in which all operators share the same values and the same social goals, guaranteeing strategic and managerial similarities. The management literature that analyzes nonprofit organizations and their supply chains falls into two main areas of study.

The first investigates supply chains in relation to social welfare, which Adivar *et al.* (2010, p. 292) define as "the processes of designing, planning and implementing a wide range of social development and improvement programs involving all the logistics activities in meeting the needs, managing social problems and maximizing the opportunities for the purpose of improved social welfare".

In general, in discussions of social welfare and the welfare state, we are referring to a whole series of welfare services provided by the state or local governments that are often outsourced to increase efficiency (Hood, 1991). As indicated by the literature, it is precisely NGOs and nonprofit organizations that play the dominant role in the provision of these services, which are intended, for example, to develop and improve the social well-being of the poorest populations (Van Slyke, 2006; Austin, 2003).

In the supply chains of organizations concerned with social welfare, procurement, transport, and storage come into focus whenever a nonprofit organization receives financial flows from donors or public institutions that would allow it to provide goods or services for groups of beneficiaries. The literature shows how these activities, as carried out by nonprofit organizations, often require them to cope with obstacles such as the failure to recognize the importance of logistics, the lack of professionals, the limited level of collaboration and coordination, and the inadequate use of information technology (Adivar *et al.*, 2010).

The supply chains of nonprofit organizations are also subject to humanitarian conceptions of logistics or humanitarian relief chains, defined by Beamon and Balcik (2008, p. 4) as supply chains that provide "humanitarian assistance in the form of food, water, medicine, shelter, and supplies to people affected by large-scale emergencies". This context is, therefore, closely linked to the sudden onset problems, such as disasters and calamities, and consequently, to the management of emergencies (Kovács and Spens, 2009). These supply chains, precisely because they are activated by emergency situations, have particular characteristics, such as

agility (Cozzolino, 2014), uncertainty and risk (Van Wassenhove, 2006), and speed (Beamon and Kotleba, 2006). Furthermore, characteristics such as the high number of subjects with different natures involved (McLachlin and Larson, 2011) require, on the one hand high levels of coordination (Balcik *et al.*, 2010) while on the other hand, they allow a high degree of interchange and mutual learning among the various actors (Cozzolino, 2014).

In summary, the literature on sustainable supply chains shows two main strands: supply chains in which the key player is a for-profit enterprise and those in which it is a nonprofit organization. The introduction of sustainability practices into the supply chain relationships of for-profit companies leads to the introduction into the market of products with ethical characteristics (Carter and Jennings, 2002; Seuring and Müller, 2008), including one or more social and/or environmental attributes capable of differentiating the positioning (Crane, 2001; Bezençon and Blili, 2010). In place of cases where a sustainable supply chain is addressed by a nonprofit, the literature instead proposes cases of welfare services or humanitarian interventions (Adivar *et al.*, 2010; Beamon and Balcik, 2008), in the areas that are typical of the third sector. More recently, however, the management literature has focused on the opening of nonprofit organizations to the market (Borzaga and Fazzi, 2014), with particular reference to social enterprises. Social enterprises are increasingly able to offer products (with intrinsic and obvious ethical characteristics) on the market that are a manifestation of their dual social and commercial identity.

This consideration indicates the potential interest of analyzing the case of the management of sustainable supply chains led by nonprofits that have as their final outputs the marketing of a product that competes in the market. To locate this issue in the management literature, a bibliographic search was conducted using the Scopus database. The following key words were used: "sustainable supply chain" AND "social enterprise" for "title, abstract, keywords, " limited to the categories "business, management, and accounting" and "articles". The inquiry resulted in only two papers, one of which is not focused on the studied topics (Miemczyk *et al.*, 2016) and the other which is a didactic text reporting a business case without reflection or discussion of implications (Walske and Tyson, 2015). Since in the international literature social enterprises are considered one of the most emblematic examples of hybrid organizations (Battilana and Lee, 2014), a similar study was carried out in the Scopus database, using the key words: "sustainable supply chain" AND "hybrid organization, " but this did not return any result.

This article intends, therefore, to bridge the gap in the literature, analyzing the specific case of sustainable supply chains directed by social enterprises that bring a product to the market. To fully understand this specific actor and its logic and dynamics, in the following section theoretical reflections regarding the opening of social enterprises to the market will be presented.

2.2 Openness to the market among social enterprises

The issue of openness to the market of nonprofit organizations is investigated in the management literature in various ways (Maier *et al.*, 2016). However, as previously noted, the prevailing view defines and frames it in relation to the function of advocacy (Padanyi and Gainer, 2004; Gonzalez *et al.*, 2002). In this perspective, nonprofit organizations assume an essentially associative nature and aim at finding new financial resources through the acquisition of adequate marketing skills (Sargeant *et al.*, 2002) and the collaboration with for-profit companies that are implementing CSR policies (Jamali and Keshishian, 2009; Seitanidi and Crane, 2009). Such nonprofit organizations continue to carry out awareness-raising activities and involvement in certain social or environmental issues while at the same time exposing themselves to the risk of transforming their identity profile (Dolnicar *et al.*, 2008; Eikenberry and Kluver, 2004).

At the same time, other nonprofit organizations try to face new and different challenges. Due to the complexity of their activities and the nature of the goods and services offered, they have an entrepreneurial orientation. These organizations are generally called social enterprises. They conduct productive activities following entrepreneurial criteria but pursue an explicit and exclusive social purpose that results in the generation of direct benefits in favor of disadvantaged people or entire territorial communities (Galera and Borzaga, 2009; Defourny and Nyssens, 2006). In the international and academic literature, this specific organizational typology is also termed, although not univocally or in a shared way, hybrid organization, to highlight how, unlike other types of organization in this category, it combines an exclusively social aim with economic and financial sustainability (Doherty *et al.*, 2014).

In the national context, this phenomenon is represented by social cooperation, in the forms of production and provision of welfare services (Type A social cooperatives) and employment integration for disadvantaged people (Type B social cooperatives). Social cooperation has constituted, beginning at the end of the 1970s, an innovation in the nonprofit sector and a pioneering model, on the basis of which social enterprise was developed in Europe (Defourny and Nyssens, 2010).

Traditionally, social enterprises are engaged in the production and provision of welfare services, in a logic of close collaboration with public administrations (Kerlin, 2013; Defourny and Nyssens, 2010), which, in several cases, has shown an intensity that determines what has been defined as a process of institutionalization (Borzaga and Fazzi, 2011), namely, a situation of strategic subordination and financial dependence on public players.

Over the last few years, however, there has been a significant increase in the conditions of hardship and social marginality among a growing part of the population, and by contrast, a tendency of reduction in traditional sources of public financing for welfare services. These are leading to a redefinition of the activities of social enterprises and to a greater openness to the market. This new orientation has led social enterprises to progressively work in new areas of intervention, often far from their

traditional ones. They are developing new specialized technical skills, networks, and relationships with a plurality of subjects and organizations that have varying institutional natures (for-profit, nonprofit, public, and private). They are diversifying their sources of financing, no longer primarily made up of public resources or philanthropic donations, but instead of revenue from market operations. They are activating, with a view to environmental, social, and economic sustainability, the processes of the involvement and participation of entire local communities (Picciotti, 2017; Borzaga and Fazzi, 2014).

This openness to the market is being realized in different ways. Some companies are exploiting the specialized skills they have acquired and are beginning to offer social services to private clients (Maier *et al.*, 2016). This is occurring in the direct management of residences for the elderly without public assignment and in the management of nursery schools following the logic of corporate welfare (Maino and Ferrera, 2015). It is also appearing in family care services and nursing services that are offered directly to families. Other companies, while they continue to manage certain welfare activities, are developing new services that are additional and complementary to those traditionally provided. As observed by Evers (2005), this is the case, for example, in new services that are introduced into the management of a theater, a museum or a swimming pool that bring in additional financial resources, improve the overall supply system, and carry out experimentation in organizational models based on the logic of public-private collaboration. In other cases, market openness is not achieved through the provision of services but through the sale of products destined to a final consumer market that compete with other products offered by for-profit companies. These are social enterprises that provide employment for disadvantaged people, the so-called work integration social enterprises (Spear and Bidet, 2005; Davister *et al.*, 2004), which may produce products that are particularly appreciated by consumers, such as items of clothing, fashion accessories, or home furnishing , as they incorporate and combine quality and social values (Tasavori *et al.*, 2018). Finally, in different circumstances, social enterprises are going beyond exhibiting openness to the market, instead creating it by aggregating those people who are present in a territorial community and providing them, through their own participation, goods and services that have been offered neither by the public nor by the market. These operations have led to the reopening of cinemas, shops, and other businesses in the historic city centers or in other disadvantaged areas, as well as constructing residential housing projects for people without access to the traditional market and disseminating or providing community management for renewable energy sources (Bernardoni and Picciotti, 2017).

Thus, we are witnessing a shift from supply chains characterized exclusively by the presence of nonprofit actors. This kind of supply chain was based on the affinity between organizations with established business relationships, guaranteeing greater strategic and managerial homogeneity but not allowing effective achievements or wide market coverage. The literature indicates a new and emerging type of supply chain, in which nonprofit organizations with an entrepreneurial matrix, i.e. social

enterprises, take on a focal role in planning and managing activities. This is a supply chain that involves the simultaneous presence of for-profit and nonprofit subjects, typically characterized by different organizational structures, aims, competences, and speeds and that, for these reasons, can generate critical issues and require new management logics.

In the context in which social enterprises can offer ethical products on the market, how are supply chains strategically and operationally managed? What solutions are being adopted to reduce divergences between for-profit and nonprofit actors to optimize supply chains? Who are the key players that are implementing these solutions, and what functions do they perform? This study seeks answers to these questions, describing the experience of the entrepreneurial realities of two companies that are emblematic examples of these new types of supply chain.

3. Methodology

This article exhibits a multiple case study (Yin, 1994). The case study is particularly suitable in situations where the topic to be investigated has an exploratory nature, such as the one considered in this paper, that focuses on the main functions performed by a social enterprise as leading actor in a supply chain. The management literature (Eisenhardt 1989; Eisenhardt and Graebner, 2007) indicates the appropriateness of the use of the case study to understand complex phenomena for which the theoretical development is not consolidated. The case study, in this sense, is a suitable method of empirical research because it allows to understand a recent phenomenon in depth within its own context (Miles and Huberman, 1994).

A multiple case study makes it possible to compare more than one reality to identify commonalities or differences in a theme (Yin, 2003; Stake, 2013). In particular, in the literature, the investigation of more than one case increases the external validity of the results (Gibbert *et al.*, 2008). Although case studies are not generalizable, the comparison of case studies can highlight paths and dynamics that derive from comparative analysis of different organizational contexts. Here, the cases analyzed are those of Altromercato Impresa Sociale (Altromercato) and the Libera Terra project. These were chosen using a theoretical sampling (Eisenhardt and Graebner, 2007) that included selection criteria. The two organizations investigated in this article are both social enterprises and national leaders in the creation and marketing of ethical products: fair trade products in the one case and products derived from the use of land confiscated from the mafia in the other. These cases were identified due to the ease of access to information and data on them (Yin, 2003) because the authors collaborated in research with the two companies on the topics covered in this paper.

Altromercato is the largest Italian importer of fair trade products. It has commercial relationships with about 120 disadvantaged farmers and artisans in the Global South and sells the products through its own distribution network and through some of the principal players in the Italian large-scale retail channel. Libera Terra is the primary initiative that produces and markets the products of social cooperatives working land

confiscated from the mafia and that produces both agri-food products and agricultural raw materials, which, once transformed, are sold at supermarkets and modern retail outlets.

The origin of the information for the case studies is presented in the following paragraphs.

The main source of information was semi-structured interviews conducted with company representatives from 2013 to 2019. The interview protocols were prepared ad hoc, as suggested in the literature (Gibbert *et al.*, 2008), including the following topics treated in depth: the main dynamics and evolution of company strategies, supplier relationships and changes in supply approaches, relationships in the distribution channel and main players in distribution, and changes in end markets and business relationships with the market. In these interviews, open questions were generally used to allow the subjects to express their opinions without being unduly influenced by the researcher, following suggestions in the literature for improving rigor in the research results (Gioia *et al.*, 2013). The interviews were recorded and subsequently transcribed. Seven interviews were conducted with Altromercato and five interviews were done with Libera Terra. The manager of Altromercato procurement and cooperation office and the managers of the large-scale retail unit were interviewed. The interviewees for Libera Terra were with various managers, who have changed over time, in the agency Cooperare con Libera Terra (Cooperate with Libera Terra). The interviews were supplemented with secondary data found in both internal and external sources. To triangulate data and for greater reliability of the results (Eisenhardt and Graebner, 2007; Stake, 2013) for the entire period 2013-2019, information was collected from corporate websites, annual reports, company presentations, and articles published in newspapers and magazines.

The case studies were carried out using the information collected in the interviews and from a continuous comparison of proposals in the secondary sources. The analysis of the data, for the purpose of the study, included discussion among the authors of this paper (Stake, 1995), intended to identify the main dynamics of supply chain management. As indicated in the literature (Gioia *et al.*, 2013), each author read the interview transcripts individually to identify the main emerging themes. Then, authors discussed their separate interpretations and the themes they identified. Finally, they reached a full agreement and shared a common vision on the main dynamics of the supply chains and distribution channels management. In this way, the secondary data collected were used to support and supplement what emerged from the interviews. In the course of the investigation, the cases were first presented individually, proposing the presentation of the aspects that characterize the profile, and the main characteristics of the company's undertakings in the supply markets and the distribution channels. Due to the absence of a consolidated theoretical framework in the literature, this analysis was performed by presenting the main elements related to the change in the management of the supply and distribution markets. This approach exhibits an evolutionary focus. Subsequently, in the discussion, a comparative view of the cases is proposed to address the research questions.

4. The results of the empirical research

4.1 Altromercato case study

Altromercato was established as a cooperative in Bolzano at the end of the 1980s. Since that time, it has been importing food and handcrafted products that are in compliance with international norms of fair trade that are intended to create commercial opportunities for economically disadvantaged producers. Its strategies have led to a constant growth, and Altromercato has been, since the start, the principal Italian fair trade organization and one of the most important in Europe.

At the end of the 1990s, the cooperative changed its legal form, becoming a consortium of cooperatives and associations that manages approximately 300 "world shops" (*botteghe del mondo*) in Italy. These world shops, sales points specialized in the marketing of fair trade products, have practically represented the only access to Altromercato market. However, a recent turn toward openness for distribution channels has appeared, which is discussed below.

4.1.1 Altromercato supply chain

The activity upstream of the supply chain focuses on supporting artisans and farmers in the most disadvantaged areas of the planet, marketing products that have been made in the Northern Hemisphere. These producers are, therefore, Altromercato's only suppliers, whose purchases respect the rules of fair trade. The company is a certified World Fair Trade Organization (WFTO), which guarantees that it is completely dedicated to conducting fair trade activities and respecting the principles contained in the International Fair Trade Charter. First among these is the fair price principle (which guarantees correct remuneration for productive factors and a surplus to invest in community projects), respect for the dignity of workers and the absence of child labor, environmental sustainability (most fair trade crops are organic), and the pre-financing opportunity (thus compensating for lack of access to credit). The WFTO has a complex guarantee system, verified in various and ongoing auditing activities in its organizations. In turn, Altromercato carries out specific and formalized evaluations and monitoring of the producers with whom it has a commercial relationship. Altromercato cooperation and purchasing unit first performs a preliminary assessment of the ethical, commercial, and qualitative characteristics of the producers. This is followed by bi-annual site visits by the Altromercato Project Committee, which is independent from the purchasing department and has an ethical supervisory function with the producers and their products to guarantee the application of the fair trade criteria, following the WFTO.

Altromercato imports from around 120 producers in 45 countries around the world, with particular concentrations in South America and Southeast Asia, from which it imports food products such as coffee, tea, sugar, chocolate, and honey, as well as textiles, clothing, handicraft products, cosmetics, and home accessories.

Altromercato manages all logistical aspects of the importation, and the supply relationships are managed by two internal bodies: the cooperation and purchasing unit and the procurement and logistics office.

The cooperation and purchasing unit maintains the direct relationships with the suppliers; as in other companies, this office manages information flows and dialogue for the development of new products and management of orders. In addition, however, due to the particular mission of Altromercato, this unit also manages all aspects related to supplier support, including technical training and implementation of development projects.

The procurement and logistics office deals with material flows once the products reach Europe. It deals with the aspects most closely linked to transportation and bureaucratic practices (for example, customs duties) but also with subcontractor relationships. Some products are not supplied directly by producers but are developed through the use of their materials by companies located in Italy.

4.1.2 Altromercato distribution channels

Altromercato also incorporates all the downstream activities necessary for bringing the products to the final consumer. Until the 1990s, as previously mentioned, sales took place exclusively through world shops, guaranteeing an exclusively nonprofit chain, capable of maintaining identity and value consistency. At the end of the 1990s, a radical strategic decision was made that led to the opening of large-scale retailers. Currently, Altromercato supplies approximately 20 supermarket/hypermarket chains, organic retailers, and other distributors throughout Italy.

This openness towards profit has allowed Altromercato to extend its outlet market, expanding accessibility to its products and guaranteeing them access to larger markets. Working with large-scale for-profit retailers has also led to a rethinking of its internal organization and of the skill set that is necessary to establish such relationships.

At the beginning of the twenty-first century, Altromercato created its own quality control office and a department that manages relationships with large-scale retail trade. The quality control office makes it possible for the company to apply a quality management system based on production locations. As the purchasing manager noted, from an operational point of view, "we always ask for pre-boarding samples to understand if the lot that will be shipped conforms to standards. At the arrival of the lot, the sampling is repeated and quality and compliance are checked again with respect to the pre-shipment. In many cases, our quality control office also carries out audits on the suppliers at the beginning of the business relationship". The goal of this organizational unit is to improve methods of quality control and production technologies, increasingly oriented towards quality and safety. Thus, Altromercato is a guarantor of the quality standards required by its distributors and the market in general, taking responsibility for the training needed by its producers.

The large-scale retail unit was created to guarantee a specific and specialized dialogue with this sector, which is profoundly different from the world shops.

The relationships with the for-profit businesses that have been established over the last twenty years have led to the need to internalize competences related to communication, branding, packaging, merchandising, and product innovation. For innovation in particular, the company has introduced new products, in assortments, in line with the request of its retail customers, and these products have also been marketed with co-branding strategies. A supervisor of this unit reported that "up to now the products produced were all for the shops. Now, in the development phase, we are trying to be more involved by identifying what the predominant market may be for the single product being created. There is a greater awareness of Altromercato's multi-channel distribution, and ad hoc strategies for large-scale retail channel are being applied".

The need to acquire new skills and competences has led, in recent years, to a change in the recruitment policies of the human resources working at Altromercato. Some internalization of new skills has taken place in recent years, thanks to the recruitment of highly trained staff with bachelor's and master's degrees earned in different parts of Italy, along with professionals with experience in important for-profit organizations.

Finally, the changes made by Altromercato in its distribution policies have also led to changes in procurement strategies. The purchasing manager said, "even when we are looking for new producers we always start with the need for marketing, market analysis, and what we lack in scope. We always consider our original mission, which is to work with suppliers that would otherwise be excluded, but now we keep in mind a combination of assistance for the most disadvantaged suppliers and a search for those who guarantee quality and commercial safety". Previously, only ethical considerations were prioritized, but now, even if these remain a fundamental principle for the identity of the company, market needs must also be taken into consideration. Altromercato is the spokesperson for these needs and stimulates its suppliers to propose new products that are in compliance with quality standards, deadlines, and commercial commitments.

4.2 Libera Terra case study

Libera Terra project was launched in 2001, and its work has led to the establishment of nine social cooperatives, each of which is engaged in the cultivation or transformation of agricultural products from land confiscated from the mafia.

The dynamics of development that have emerged over the years have led to a particular configuration of supply chains, due to the relationships that social cooperatives have been able to establish on several levels: reciprocally, involving the creation of specific organizational structures, with a plurality of actors operating in the distribution sector and in relation to other profit-making organizations that carry out manufacturing transformations.

The most significant innovation in this context is the aggregation of social cooperatives and the related establishment of the Libera Terra Mediterraneo Consortium, through which supply chains and the relationships with commercial distribution are managed.

4.2.1 Libera Terra supply chain

The social enterprises into the Libera Terra circuit are all located in Southern Italy (five in Sicily, two in Calabria, one in Campania, and one in Puglia) and they show a significant level of specialization. Each of them produces specific products that are subject to successive transformations (the wheat grown, for instance, is used in the subsequent manufacture of pasta or other baked goods) or products that are directly commercialized (wine, fruit and vegetables, and dairy products, among others).

These organizations are located at the initial stages of the food processing chain. In the production of finished products, the social enterprises are highly integrated, but in other cases, they supply raw materials to processing companies that produce Libera Terra brand products. The entry of new companies into the Libera Terra project requires compliance with production regulations (including professional standards for the granting and use of the Libera Terra brand), conformity with standards that allow cooperatives and their aggregations to request the use of the Libera Terra brand if they manage assets confiscated from organized crime; without managing confiscated assets, adhering to Libera Terra and providing services to support cooperatives that do; or being involved in the liberation of territories and their return to sustainable and participatory use. These enterprises must not only comply with certain value requirements for legality and morality and ensure adequate working conditions for their employees and suppliers, but also guarantee quality prerogatives of the entire production and management processes. They are thus subject, both in the initial phase of entry and in subsequent phases of extension of product lines or brand maintenance, to controls by a third-party certification body, the consortium Il Biologico, which follows the UNI CEI EN 45011 requirements and performs analysis (chemical-physical and qualitative-organoleptic analysis, compliance with hygiene and health standards, and biological certification) of samples. Furthermore, this consortium periodically conducts field checks to verify compliance with the requirements of the regulations.

These controls and checks extend in two directions: on the one hand, to the for-profit manufacturing companies that deal with the transformation of agri-food products and are required to comply with quality and ethical standards in product specifications; on the other hand, to independent agricultural producers in the same territories as the social cooperatives. Indeed, due to increases in demand in the market, these enterprises could become suppliers for social cooperatives, providing shipments of raw materials.

4.2.2 Libera Terra distribution channels

The development of agricultural activities began with the supply relationship that the first social cooperatives established with Coop, one of the main large-scale retailing chains operating in Italy and organized as consumers cooperative. As noted by the current manager of Cooperate with Libera Terra: "this first experiment determined the need to establish

a dialogue with consumers, who requested to take the products that came from the cooperative. From this experience we began to structure a path of entrepreneurial qualification that has been strengthened over time, calling into question other cooperatives that have accompanied the development of new businesses". This relationship is, therefore, configured as an investment in the values and potential of the Libera Terra project by the cooperatives. The relationship stems from a decision that the distributor makes to support social cooperatives as they begin their activity. This opening, however, does not occur unconditionally. Therefore, the manufactured products can remain on the shelf without becoming a simple request for charity toward the final consumer. The ethical value of the products, namely, their legality and the fight against the mafia that they represent, must be accompanied by qualitative requirements: the ability to compete with competitors, generally represented by for-profit companies. To this end, a new organizational structure was established in 2006, and Cooperare with Libera Terra was founded, which, including over 70 members among territorial associations and cooperative enterprises, is expected to support individual social cooperatives through training interventions and consultations with the aim of facilitating the transfer and reinforcement of agronomic, commercial, and managerial skills. In this way, Libera Terra's individual social cooperatives can improve the level of quality of their products and forecast demand flows coming from the market to plan production activities, manage customer relations from a logistics and marketing point of view, and monitor internal economic and financial aspects. As stated by the current manager of Cooperate with Libera Terra, "the association deals with the transmission of know-how. In the first instance, it accompanies the cooperatives in mapping their needs, in drafting the business plan and in defining development paths. Then, it acts with a view to the further structuring of the entrepreneurial project and continuous monitoring".

This organizational innovation has led to an expansion of distribution channels, bringing a greater variety of distribution methods (as in the case of food industry channels or specialized retailers for the marketing of certain products, such as wine) and in terms of acquisition of new customers within the same distribution channel (as in the supply of products to other large-scale retail chains, also organized in a non-cooperative form).

As a result of these dynamics, the Consortium Libera Terra Mediterraneo was set up in 2009, aggregating eight of the nine social cooperatives and thus representing the true hub of the Libera Terra system. This associative entity carries out, on behalf of the individual companies, demand forecasting, development of manufacturing agreements, and planning and control, as well as design and implementation of all marketing policies, from the definition of new products to the enhancement of the brand and the realization of communication campaigns. The current manager of Cooperate with Libera Terra highlights that "the hard work that the consortium does is to balance demand with supply because the latter is limited. The consortium controls the entire supply chain, not only from a quantitative point of view but also by verifying the presence and persistence of ethical and value requirements. In addition to all this, it is the center

where marketing policies are defined, new products are designed, the brand is discussed, and communication is developed".

Currently, the Libera Terra supply chain is quite complex. Numerous actors take part in it, it takes on different natures (profit/nonprofit), and it conducts different activities (production/distribution/training, consultancy, and financial support). It also regulates intangible resources flows (market information or technical skills) and material resources (mix of agricultural production, external conferment, transformation, and supply of finished products), which require management with new organizational structures that can guarantee the necessary strategic and operational coordination.

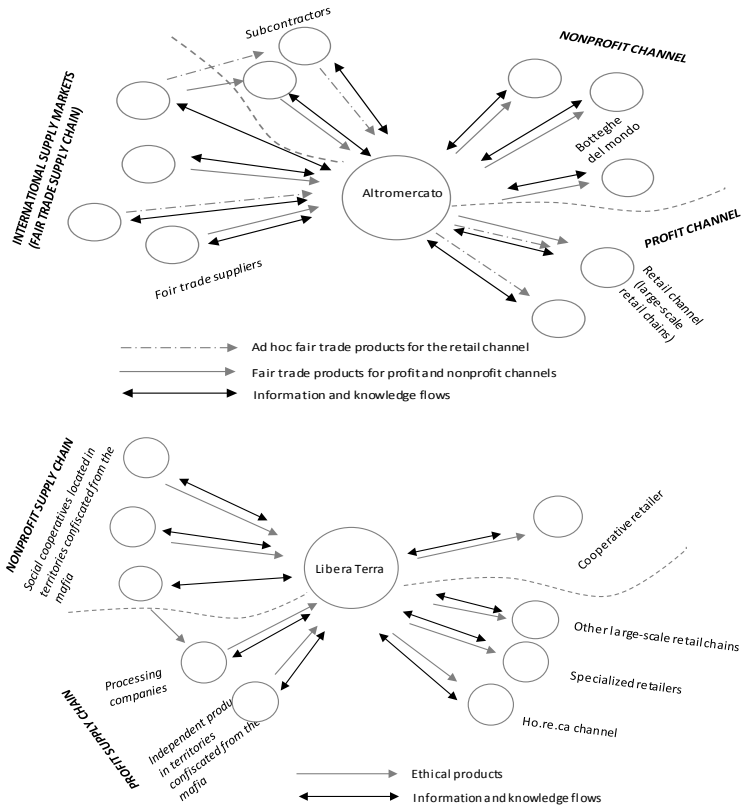
5. Discussion

The theoretical analysis and the empirical investigation allow us to highlight some relevant dimensions of supply chain management by nonprofit actors. The decision to operate in the mass market with a sustainable product requires a guiding actor in nonprofit chains with a meaning that differs from that highlighted in management theory. In this case, the element that changes, in comparison with the literature, is not the focal actor in the supply chain, which is already present in social welfare supply chains and in humanitarian relief chains (Adivar *et al.*, 2010; Balcik *et al.*, 2010), but, instead, the content of this role. The management of a supply chain is intended to develop products with the connotations of sustainability, and the products are then marketed in retail for-profit channels, ultimately destined to a clientele of consumers who are necessarily larger than and different from an earlier one. In the two cases analyzed here, product sustainability is mainly connected to the social dimension of the production. In the case of Altromercato, the product is the result of an entire production chain oriented to the principles of fair trade. For Libera Terra, its products respect the ethical values of legality and the fight against the mafia. In particular, taking into account the process of openness to the market (Maier *et al.*, 2016), in this section we propose the challenges that a nonprofit organization, such as those discussed in this investigation, must face in supply chain management to be able to effectively propose products that compete in for-profit environments.

The case studies show how there may be a necessity to reconcile needs coming from the nonprofit and for-profit worlds, given the articulation of both supply and distribution relationships. Figure 1 below displays a representation of the main for-profit and nonprofit actors with whom Altromercato and Libera Terra interact. As it is evident for the case of Altromercato, there are fundamentally two downstream markets, the "botteghe del mondo" (nonprofit channel) and large-scale retailers (for-profit channel). Upstream, the enterprise has relationships with companies in international fair trade chains while also making use of third-party companies in for-profit chains (such as suppliers for packaging). For Libera Terra, there are mainly social cooperatives located in territories confiscated from the mafia, although in recent years, as previously

highlighted, supply relationships have been established with independent agricultural producers and processing companies. Downstream, for Libera Terra, the main channel represented by cooperative distribution has been integrated by new channels.

Fig. 1: Summary representation of the main relationships in supply markets and distribution markets for Altromercato and Libera Terra



Source: authors' elaboration

With reference to the articulated set of profit-nonprofit relationships in social enterprises, supply chain management is a central activity. On closer inspection, as highlighted in the literature, the process of opening to the market places a particular emphasis on the identity of the social enterprise (Smith *et al.*, 2010), possibly undermining it. Then, wherever the actor is a leading player in a supply chain, the presence of relationships with both for-profit, largely in downstream retail (Crawford-Spencer and Cantatore, 2016), and nonprofit actors, in supply chains that support that openness, can generate difficulties for the company. In fact, in the two situations discussed, it can be clearly seen how social enterprises, both Altromercato and the social cooperatives of Libera Terra, have responded to the opportunities offered by the competitive context, activating relations downstream with large-scale retailers while at the same time trying to

strengthen the bond with nonprofit actors in their own network, to allow the offer of a product recognized by the nonprofit world as ethical (Crane, 2001) and in line with market standards, while being able to compete in profit contexts with other products.

Our analysis indicates the need for a social enterprise to perform a "shock absorber" function for the proper functioning of the supply chain of the nonprofit and for-profit worlds. This is to ensure that the two worlds can converge and allow the enterprise itself to grow, rather than representing two tendentially opposing forces that might push the company toward conflicting choices that could be an obstacle to its own survival.

Amortization can assume different configurations taking into consideration organizational dimension. In the examined cases, organizational dimension is maintained by a consortium (Altromercato and Cooperate with Libera Terra/Free Earth Mediterranean Consortium), to which the individual consortium members delegate the management of relationships with the for-profit world. These new subjects within them include organizational positions and functions that allow to dialogue with retail for-profit and nonprofit supply chain actors. However, beyond the precise form, the role of a "shock absorber" is characterized by the tasks that it must perform. Our empirical investigation allows us to specifically identify four tasks in supply chain management, that are also areas of challenge and if faced can allow the company to operate on the market with a sustainable product. Table 1 proposes a comparative view of the cases, with reference to the following four tasks: quality assurance, training and education, experimentation/coordination, and harmonization of material and information flows.

The first area of change connected to supply chain management concerns the role of the guarantor of quality, which the social enterprise must carry out. Compliance with quality standards is an element that is typically associated with the management of supply relationships by a company (Kannan and Tan, 2005), which for example can evaluate a supplier and its performance. In the cases we have analyzed, the concept of guarantor of quality in supply relations takes on a different strategic value. The guarantor of quality in this case is not merely an actor that can ensure standards compliance but instead one who responds to the need to reassure the for-profit actor regarding the quality standards required for the mass market. On the other hand, there is a need to develop this concept within nonprofit chains by contributing to make it legitimate as an integral part of the value of a sustainable product. In essence, in the case studies, compliance with ethical standards, whether the WFTO or Libera Terra's production regulations, was seen to relate to new ways of defining quality in the market, seeking to reconcile standards compliance with consumer needs and through which the retail customers of the social enterprises are carriers in the interaction with the two realities. In this case, the dialogue by the social enterprise occurs both with the downstream for-profit world, whose needs it must understand for the intrinsic quality of the product, and with the organizations in the supply chain (social enterprises and actors in the fair trade supply chain) to understand how this concept can connect and progress with existing productions.

Tab. 1: The four tasks in the social enterprise shock-absorber function: Comparison of cases

TASK	ALTROMERCATO	LIBERA TERRA
Guarantor of quality	- Ensuring compliance with World Fair Trade Organization standards - Ensuring quality standards in response to the needs of large-scale retailers, offering a product for which fair trade is reflected on a wider public in the retail market	- Ensuring compliance with ethical standards and the regulation of agricultural production in the territories confiscated from the Mafia managed by member cooperatives and by independent agricultural producers with whom it interacts - Ensuring market standards for product development, mainly intended for cooperative distribution, where the ethical value linked to the fight against the Mafia combines with the intrinsic quality of the product
Training and education	- Technical support and development projects with economically disadvantaged producers, mainly in South America and Southeast Asia - Raising awareness on fair trade issues among the for-profit distribution companies downstream - Raising awareness of the world shops about the opportunities of the fair trade product for wider targets	- Training interventions aimed at the transfer of agronomic, commercial and management skills to the single social cooperatives belonging to the consortium with support in the preparation of business plans - Communication activities in downstream markets to raise awareness of the ethical and value issues of legality and the fight against the mafia - Understanding the main operating elements of the downstream markets for the development of the production of the cooperatives belonging to Libera Terra
Experimentation and coordination	- Joint development with retail customers of new products and co-branding initiatives - Coordination of suppliers for compliance with the standards of the retail market - Management of multi-channels through downstream coordination between world shops and large-scale retail channels.	- Creation of new products for cooperative distribution - Coordination with the upstream social cooperatives for the creation of new products and membership of new social cooperatives - Opening to new independent agricultural producers to expand the Libera Terra offer - Open to new retail customers and new channels (ho.re.ca, specialized retail)
Harmonizing material and information flows	- Transfer of commercial know-how both in the supply markets and in world shops - Management of logistics flows from international supply markets to sales markets both in the fair trade channel and in the large-scale retail channel	- Transmission of market know-how to cooperatives belonging to Libera Terra - Management of the logistics flows of the products of the cooperatives belonging to Libera Terra, of the independent agricultural producers, and of the processing companies for the respect of the standards required by Libera Terra distribution customers

Source: authors' elaboration

This also leads to a second area of change that impacts supply chain management. In fact, the nonprofit actor must perform training and education in the link between supply chains and for-profit distribution channels. Training and education, which are part of general awareness-raising activities for social issues (Huybrechts, 2012), have a dual role in supply chain management. They are aimed at the for-profit actor, to raise awareness of the issues and of the specific mission, as can be seen, for example, in communication initiatives implemented by Libera Terra and in Altromercato's co-branding initiatives. This awareness-raising

activity features two peculiarities: it is carried out with typical methods of business dialogue and is intended to build stable relationships, avoiding spot interactions with for-profit actors focused on short-term goals. The objective is, therefore, to activate long-term cooperation mechanisms of a commercial nature with these actors (Ploetner and Ehret, 2006). However, training and education are also focused at suppliers in nonprofit sectors. This is done to raise awareness among suppliers regarding new needs and the ways these needs can be responded to, bringing the various actors in the supply chain to an understanding of the dimensions that create an overlap between the for-profit and nonprofit worlds, rather than those that generate conflicts, as can be seen in Table 1.

Another key role in harmonization is played by experimentation and coordination for the development of new products. Openness towards the market unavoidably pushes the nonprofit organization toward innovation in its management model (Huybrechts, 2012) and products, prompted by the downstream markets. A skill that the organization must have is leveraging supply chains to experiment with and create new products to offer to retail customers. In our cases, this has meant rethinking supply relationships, as in Altromercato's procurement and cooperation office or in the opening up to new cooperatives or external actors for Libera Terra. This is a clear implication, especially for a nonprofit organization. Experimentation can be fueled both by retail actors, who can push for the development of new products and by the internal capacity of the social enterprise to generate innovation. In the two cases analyzed here, the growing openness towards new channels generates opportunities and requests. As shown in Table 1, for Altromercato, this is the result of the expansion of relations with various players in the large-scale retail trade, while for Libera Terra it comes from the evolution of the relationship with the main clientele of the cooperative distribution and from the recent opening to new channels. It is evident that the dialogue between social enterprise and suppliers (fair trade actors for Altromercato and social cooperatives and independent agricultural producers for Libera Terra) must be continuous.

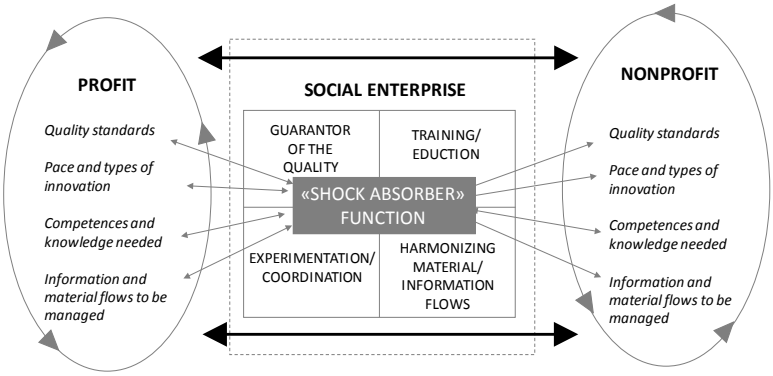
Finally, it is evident that supply chain management requires a social enterprise to be an actor capable of harmonizing material and information flows considering different functioning mechanism between for-profit and nonprofit supply chains. In fact, some features of the management of material and information flows may not be oriented, or only on a reduced scale, to dimensions that are central to the mass market, such as the need to reduce time to market or the problems of management of deliveries at points of sale. In the case of Altromercato, this activity is particularly complex, especially if we take into consideration the international dimension of the procurement processes and the related logistic flows. For Libera Terra, the complexity is evident, instead, in the opening to more subjects in downstream markets (beyond the traditional customer) and the expansion to new social cooperatives and new productive actors. It is clear that nonprofit actors must reconcile flows of materials and information that have potentially different operating logics in the search for efficient performance (Stank *et al.*, 2001), and in this sense the transfer of know-how is central (Table 1).

Ultimately, the performance of these tasks enables us to understand how social enterprises can respond to the needs of the market and for-profit actors while performing their typical tasks to protect social identity. We are witnessing a combination of new and traditional functions; this is a key challenge that, if not properly managed, can undermine the very nature of a company. In the cases we have analyzed, this is the key for being able to propose a product that is characterized by a social dimension in a mass market.

6. Conclusion

Our study outlines how the supply of sustainable products for the mass market is essentially linked to the skills necessary for the social enterprise in its supply chain management. Where this occurs, the potential for organizational growth in the nonprofit is evident. In particular, this indicates how to configure and manage supply chains of ethical products proposed by nonprofit organizations that take on an entrepreneurial nature and structure related to social enterprises. In our interpretation, a social enterprise must reconcile its actions as being in line with its identity and the social mission, as well as with demand in the consumer market. The supply chain and its management are a necessary condition for the company to be able to effectively operate in the for-profit world while maintaining its identity. This article makes the original contribution of highlighting the "shock absorber" function that a social enterprise must have. Figure 2 below exhibits our reasoning. A social enterprise is at the center of the for-profit and nonprofit worlds, which have different mechanisms, at least for the quality standards needed to operate, the pace and type of proposed innovation, the required knowledge and skills, and the dynamics of logistics and information flows. A social enterprise must manage these potential disparities to balance contrasting aspects and succeed in achieving the social objectives that it proposes while also grow economically. In the absence of this "shock absorber" function, the opening of a social enterprise to for-profit worlds can out at risk its survival.

Fig. 2: Management of for-profit and nonprofit aspects of a social enterprise supply chain



Source: authors' elaboration

The limits of this study deserve a final reflection, and these are also indications for future research. First, only two companies were investigated. Although, as already pointed out, these two are organizations of primary national importance, future research should extend empirical investigation to other cases of social enterprises. Second, our research has considered social enterprises exclusively. Future research should develop the dynamics of supply chain management in for-profit companies that enter into a relationship with a social enterprise. Study of the implications for the for-profit actor in managing its supply chain that emerges from the relationship with a social enterprise would be of interest.

In conclusion, our article highlights the need to study supply chain management with due consideration of the perspective of a nonprofit actor as a focal actor, offering sustainable products in the mass market. With this in mind, our article highlights a gap in the literature and provides the first elements of a response that would address this by rethinking the tasks, roles, and functions that must be fulfilled and that can have an impact on actors in production and distribution networks.

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Original research papers

Employees as advocates or adversaries during a corporate crisis. The role of perceived authenticity and employee empowerment[1]

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Abstract

Purpose of the paper: *this study investigates the impact of organization perceived authentic behaviors, employee empowerment and quality of organization-employee relationship on employees' positive megaphoning during crisis situations, i.e. the voluntary information forwarded regarding organizational accomplishments.*

Methodology: *a survey was administered on 306 current employees who are working full-time in a semiconductor company in Italy (LFoundry, Avezzano, AQ-Italy), where a corporate crisis was ongoing by the time the research was conducted.*

Results: *results suggest that both organizations' authentic behavior and employee empowerment increased the likelihood of positive megaphoning and reduced intentions of negative megaphoning regarding a corporate crisis. Furthermore, it was found a significant mediation impact of the organization-employee relationship on employee behaviors regarding an organizational crisis.*

Research limitations: *the study is a single organization one, therefore further research is required to confirm findings in different countries and companies.*

Practical implications: *companies should invest on the levers of interpersonal relationships, empowerment and the authenticity of the organization not only because they allow to improve the organizational climate in a moment of ordinary organizational life, but especially because they encourage the employees' active alliance in the event of crises. In a crisis situation, organizations' authentic actions are likely to be more powerful than their words, or even individuals' intrinsic motivation.*

Originality of the paper: *this paper contributes to theory development in the field of internal crisis communication, showing that during crisis situations, organizational effort and perceived organizational authenticity are a better predictor of positive megaphoning than employee empowerment and intrinsic motivation.*

Key words: internal communication; employee communication behavior; megaphoning; perceived authenticity; empowerment; internal crisis communication

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1. Introduction

Scholars have long emphasized the role of employees and their behaviors for organizational effectiveness. For example, in business and organizational behavior literatures, concepts such as employees voice and silence (Morrison, 2014; Van Dyne *et al.*, 2003) or organization-citizenship behaviors (OCB) (Organ, 1988) have been examined extensively. Recently, an increasing amount of attention has been paid to how to manage employees internally to foster their performance externally (Santos-Vijande *et al.*, 2013), recognizing a significant role of members' behaviors for corporate reputation. Helm (2011) noted that what employees say about their organization or the way they behave have the power to make external publics perceive an organization positively or negatively. To avoid the risk of not expressing its identity and not surviving, every company should express its culture and personality on the basis of its shared values and act ethically (Baccarani and Golinelli, 2015), evidently through people that belong to it: employees.

In this sense, the role of employees' communication behaviors (ECB) has been emphasized across the disciplines. In particular, applied communication researchers have recently introduced a concept, *megaphoning*, capturing employees' external behaviors about their organization (Kim and Rhee, 2011).

Employees' behaviors are especially important during the periods of corporate crises. Internal communication has been indicated as a significant factor for issue management (Frandsen and Johansen, 2011; Johansen *et al.*, 2012). It is also helpful for preventing a crisis, minimizing damage and producing positive outcomes (Mazzei *et al.*, 2012), and it is even regarded as a solution to corporate problems (Taylor, 2010). In particular, employees' intentions of disclosing positive or negative information about the company and a crisis situation in their personal network play a critical role in managing corporate reputation and resilience (Kim and Rhee, 2011) and for brand co-creation (Mazzei *et al.*, 2017).

Despite its strategic significance, little research has provided a comprehensive approach to understand what organizational efforts affect employees' communicative behaviors in a crisis situation. The purpose of this study, therefore, is to develop a model of employee behaviors during a crisis and test its utility. By building a link among organizational authenticity, employee empowerment, and organization-employee relationships, the study aims to understand how organizational factors affect employees' communicative actions-megaphoning-during the periods of an organizational issue.

The paper is organized as follow. The first section discusses the literature review on employee communication behavior, corporate crisis and employee megaphoning, organizational authenticity, employee empowerment, and organizational-employee relationship at the basis of the research model. The second section presents the research methodology, while the subsequent discusses findings. The paper concludes with a section devoted to the discussion regarding the theoretical developments and a concluding section on managerial and research implications.

2. Literature Review

2.1 Employee Communication Behaviors (ECB)

Management and organizational behavior scholars have investigated diverse types of employee communication behaviors (ECB) and the individual and organizational efforts sustaining them. Organ (1988) correlated employees' organizational pro-social or citizenship-type behaviors with individuals' job satisfaction, and Mayer and Gavin (2005) showed that trust in management originates with organizational citizenship behavior (OCB). Crant (2000) referred to employee proactive behavior, which consists of in- or extra-role anticipatory actions that employees willingly take. Employee voice behaviors that employees seek to make constructive changes via discretionary and risk-taking efforts, and its related constructs (e.g., issue selling, upward communication, pro-social organizational behaviours, and leadership) have been identified in numerous business and psychology studies (Budd *et al.*, 2010; Lavelle *et al.* 2010; Morrison, 2014). Grant and Ashford (2008) underlined the increasing importance of employee proactivity for organizations and elaborated an integrated framework of organizational and individual antecedents. Also, marketing literature focuses on employee communicative behavior aligned with the brand positioning of the company when interacting with customers (Sirianni *et al.*, 2013).

In the meantime, communication researchers have also begun to explore employee communication behaviors (ECB) that affect public relations outcomes. Kim and Rhee (2011) conceptualized megaphoning, defined as "the likelihood of employees' voluntary information forwarding or information sharing about organizational strengths (accomplishments) or weaknesses (problems)" (p. 246). By adopting information forwarding and sharing variables from the Situational Theory of Problem-Solving (Kim and Grunig, 2011), Kim and Rhee (2011) captured both employees' positive and negative external communication behaviors about their organization. While earlier concepts such as employee voice or pro-social behaviors describe consequences of employee behaviors for changing organizational governance, megaphoning is differentiated in that it conceptualizes their daily communicative behaviors towards people in individuals' personal network (e.g., family members, friends). Kim and Rhee (2011) additionally indicated that developing a good relationship with employees is a key factor that determines the direction of voluntary information behaviors. Subsequently, several scholars have identified the importance of megaphoning as an outcome of public relations. Men and Stacks (2013) argued that leadership style and employee empowerment behavior generate positive megaphoning. In a study in American and Italian companies (Mazzei, 2014), economic performance was considered as one of the most important outcomes of employees' communicative actions. Kang and Sung (2017) emphasized the importance of organizations' symmetrical communication efforts for increasing employees' positive communication behaviors.

2.2 Corporate Crisis, Internal Crisis Communication and Employee Megaphoning

Such behavior also creates opportunities to minimize organizational threats (Kim and Rhee, 2011). In particular, employees have played a critical role as advocates of their organization during the organizational crisis through their communicative actions (Coombs, 2000; Mazzei *et al.*, 2012; Rhee, 2008). To sustain employee advocacy during crises, are crucial internal communication, the quality of relationships (Mazzei *et al.*, 2012), and communication strategies that signal company's commitment (Mazzei and Ravazzani, 2015). In crises situations, adequate and timely information affect employee trust and commitment toward the crisis resolution (David, 2011). But it is mainly based on a rational approach, while a more complex approach should help the understanding of employees (Heide and Simonsson, 2015). The internal perspective in the study of crisis communication focuses mostly on organizational preparedness, crisis leadership, and organizational learning (Bundy *et al.*, 2017). A new stream emphasizes the employees' communication with each other for sense-making during a crisis (Strandberg and Vigsø, 2016).

Taking into consideration the strategic value of employees' communicative behaviors in terms of organizational reputation during a corporate crisis, the study intends to explore organizational strategies to foster employees' communicative actions.

2.3 Strategies for ECB: organizational authenticity

Organizational authenticy is at the core of management and marketing studies (Sirianni *et al.*, 2013; Pattuglia and Mingione, 2017) especially in social mediated markets, where brand relationships emerge at the intersection of brand conversation and texts (Mandelli, 2012).

Since the introduction of megaphoning in applied communication literature, several scholars have explored diverse antecedents to understand employees' motivation to communicate. Among various communication trends in the 21st century, researchers and practitioners have noted the role of authenticity as an essential factor for successful organization-employee relationships (Lee and Kim, 2017; Men and Stacks, 2014; Shen and Kim, 2012) in an organizational context. Scholars in management and communication disciplines have emphasized authenticity as an important trait of leadership (Luthans and Avolio, 2003; Men and Stacks, 2014; Wang and Hsieh, 2013; Yagil and Medler-Liraz, 2014). Authentic leadership is a process that stems from psychological capacities and organizational context and results in self-awareness and self-regulated positive behaviors on the part of leaders and associates (Luthans and Avolio, 2003).

Highlighting the behaviors necessary for an organization to be perceived as an authentic company, Shen and Kim (2012) identified three components of authenticity: truthfulness, transparency, and consistency. *Truthfulness* means that an organization should be true to itself, and it includes an organization's efforts to discover what the public wants, provides information continuously to publics, accepts feedback

and involves the public in organizational decision-making processes. *Transparency* indicates an organization's willingness to admit, accept, and learn from their mistakes objectively, and it is facilitated by symmetrical communication strategy in the organization. The last component of authentic organizational behavior is *consistency*. This indicates that the value, belief, and rhetoric of an organization should be in accordance with its behaviors.

In communication contexts, linking authenticity with organizational outcomes, Shen and Kim (2012) determined that perceived authenticity of organizational behavior affects employees' messaging behavior and is mediated by the perceived quality of their relationship with the organization. Similarly, Men and Hung-Baesecke (2015) also contended that employees in a positive relationship with an organization with perceived authenticity and transparency are likely to become corporate advocates. Focusing on types of relationships between an organization and its employees, Lee and Kim (2017) found that organizations' authentic behavior was related to employees' perceived communal relationship and positive megaphoning, while it was negatively correlated with exchange relationship and their negative behaviors.

Based on prior literature, this study focused on an organization's authentic behavior as an organizational factor that may lead employees' information behaviors during periods of corporate crises. That is, the study predicts that when employees perceived that their organization's actions are trustful, transparent, and consistent, it is likely that they will engage in their communicative behaviors in a beneficial way for their organization when a corporate crisis is ongoing. The following hypotheses are thus suggested:

- *H1a. Employees' perceived authenticity of organizational behavior will increase their positive megaphoning during the crisis.*
- *H1b. Employees' perceived authenticity of organizational behavior will decrease their positive megaphoning during the crisis.*

2.4 Strategies for ECB: employee empowerment

While communication researchers have attempted to understand employee communication from the perspective of an organization's behavior, several business and psychology researchers have closely examined psychological factors to identify the antecedents of employee behaviors (Menon, 2001; Spreitzer, 1995; Zhang and Bartol, 2010). Psychological empowerment, one of the significant predictors of employee behaviors in the workplace, is defined as a process of psychological state manifested in meaning, competence, self-determination, and impact (Spreitzer, 1995). *Meaning* refers to a sense of feeling that one's work is personally important. *Competence* indicates self-efficacy or belief in one's ability to successfully perform tasks. *Self-determination* refers to perceptions of freedom to choose how to initiate and carry out tasks. *Impact* represents the degree to which a person views his/her behaviors as making a difference in work outcomes (Spreitzer, 1995). These four indicators together are regarded as an enabling process that makes an employee initiate tasks and persist (Conger and Kanungo, 1988).

In organizational contexts, employees' psychological empowerment and its antecedents and consequences have been extensively examined in various contexts. For example, Avolio *et al.* (2004) showed that transformational leadership affects employee empowerment, which in turn increases employees' organizational commitment. Similarly, Men and Stacks (2013) also found a significant impact of transformational leadership on employee empowerment as well as corporate reputation. Job characteristics and employees' work satisfaction have also been linked with employee empowerment (Liden *et al.*, 2000). Safari, Haghighi, Rastegar, and Jamshidi (2011) determined that psychological empowerment may predict employees' organizational learning.

However, little empirical research has attempted to link employees' psychological empowerment with their actual communicative actions in the extant literature. Thus, the present researchers theorized that employee empowerment may have an important influence on employees' willingness to engage in communication behaviors both in and out of the workplace, especially during a crisis. That is, when employees perceive their jobs are personally important and meaningful, they may forward or share positive information to others about their organization when the company is going through a challenging time. In addition, employees who believe that their behaviors can make a difference are more likely to spend time and energy advocating for their company and their own work during a time of organizational crises. Therefore, it is reasonable to argue that individuals' psychological empowerment may directly affect their megaphoning behaviors. The following hypotheses thus are proposed:

- *H2a. Employee empowerment will increase their positive megaphoning behaviors during the crisis.*
- *H2b. Employee empowerment will decrease their negative megaphoning behaviors during the crisis.*

2.5 Mediator: organization-employee relationship

As a critical organizational outcome, perceived relationship quality between an organization and its employees is suggested as a mediator for increasing or decreasing employees' communication behaviors during a crisis.

To measure the organization-employee relationship, the study adopted the widely-used conceptualization of organization-public relationship (OPR) (Hon and Grunig, 1999) including four indicators of relational outcome-trust, control mutuality, commitment, and satisfaction. *Trust* indicates an employee's level of confidence in and willingness to open oneself to the company, and *control mutuality* refers to the degree to which employees agree on who, between the company and themselves, has the rightful power to influence the other. *Commitment* means the extent to which an employee believes and feels that the relationship is worth spending energy to maintain and promote. *Satisfaction* refers to the extent to which an employee feels favorably toward the company because positive expectations about the relationship are reinforced. Using this framework as a guideline, Men and Stacks (2014) defined the organization-employee

relationship as "the degree to which an organization and its employees trust one another, agree on who has the rightful power to influence, experience satisfaction with each other, and commit oneself to the other (p. 307)".

Linking it with the organizational strategies and the consequence suggested in this study, prior studies have examined its linkage with organization-employee relationships. It has been closely linked with employees' organization-related behaviors (Kang and Sung, 2017; Kim and Rhee, 2011; Lee and Kim, 2017; Mazzei *et al.*, 2012) and organizations' authentic behaviors (Lee and Kim, 2017; Shen and Kim, 2012) as well as employee empowerment (Men, 2011; Park *et al.*, 2014).

Extending previous studies, this study aims to discover how perceived authenticity of an organization and employee empowerment leads to employees' megaphoning behaviors mediated by the organization-employee relationship in a crisis situation. Direct effects of relationship quality on employees' behaviors regarding a crisis were also posited. The current study thus proposes the following hypotheses:

- *H3. Employees' perceived authenticity of organizational behavior will be positively related to the quality of the organization-employee relationship.*
- *H4. Employee empowerment will be positively related to the quality of the organization-employee relationship.*
- *H5. Perceived quality of organization-employee relationship will a) increase employees' positive megaphoning and b) decrease negative megaphoning during the crisis.*

3. Methodology

As the study aims to understand employees' communication behaviors during periods of a corporate issue, this study selected a company experiencing an organizational crisis by the time when the research was conducted. By using a web-based survey tool to collect the data, employees who are currently working full-time in LFoundry, a semiconductor company in Italy, were invited to participate to the survey. At the time the participants participated in the survey, the company had been going through the following issue: the company had been sold to a new industrial group and a surplus of workable hours was declared, and consequently, some negative media coverage generated. With permission from a senior executive, employees were invited to take a web-based survey and guided to complete questions.

A sample of 762 employees was extracted from a population of 1581 employees. The sample was stratified using the following variables: a) supervisors/managers (101/158), b) professionals (200/327) and blue-collars (461/1096). Employees were randomly chosen.

Among 762 invitations, 326 employees completed the survey, and after deleting unanswered and incomplete responses, we had a final sample of 306, with a response rate of 40.2%. The final sample (N = 306) consisted of 15.7% females (n=48) and 84.3% males (n=258). Among the respondents, 18% (n=54) were managers, and 82% (n=252) were non-managers. Regarding years of work, 78% (n=237) of the respondents have worked in

this company more than ten years and 22% (*n*=69) of them have worked 6-9 years. Age level of 40-59 comprised 41% (*n*=126) of the sample, followed by 30-39 (37%, *n*=113), 50-59 (19%, *n*=58), and 20-29 (2%, *n*=6).

The survey included 41 question items, adopted from previous studies. The questionnaire was originally developed in English, and a bilingual native Italian speaker translated it into Italian, and two other native Italian speakers carefully revised it to ensure translation accuracy. 5- point Likert scales were used for all items, ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability of each variable and correlations are summarized in Table 1.

Tab. 1: Descriptives of latent variables (Mean, Standard Deviations, and Correlations)

	α	M	SD	1	2	3	4	5
1. Positive Megaphoning in Crisis	.826	3.68	0.58	1.00				
2.Negative Megaphoning in Crisis	.714	1.88	0.60	-.520**	1.00			
3. Organizational Authenticity	.900	3.40	0.66	.511**	-.542**	1.00		
4. Employee Empowerment	.834	3.81	0.46	.375**	-.364**	.369**	1.00	
5.Organization-Employee Relationship	.925	3.41	0.64	.489**	-.546**	.753**	.334**	1.00

**Correlation is significant at $p<.01$ level (2-tailed).

Source: Authors' elaboration

As a behavioral outcome, employees' positive megaphoning was measured with five items (Cronbach's α= 0.826), and five items (Cronbach's α= 0.714) were used to measure negative megaphoning behavior during the crisis. The items were adopted from Kim and Rhee (2011) and revised. A brief description of context (i.e., current corporate crisis) was given to the participants to answer the questions in a limited context. 12 items from Spreitzer (1995) were used for measuring employees' psychological empowerment (Cronbach's α=0.834): 3 items were used for meaning (Cronbach's α = 0.763), competence (Cronbach's α = 0.833), self-determination (Cronbach's α = 0.775), and impact (Cronbach's α = 0.864), respectively. For measuring perceived authenticity of organizational behavior, this study adopted seven items (Cronbach's α= 0.90) from Shen and Kim (2012), including truthfulness (2 items, Cronbach's α= 0.807), transparency (3 items, Cronbach's α= 0.798), and consistency (4 items, Cronbach's α = 0.770). To measure organization-employee relationships, a total of 12 items (Cronbach's α= 0.925) from Hon and Grunig (1999) were used-commitment (2 items, Cronbach's α= 0.873), trust (4 items, Cronbach's α= 0.825), control-mutuality (3 items, Cronbach's α= 0.790), and satisfaction (3 items, Cronbach's α= 0.816). Items are summarized in Appendix.

The hypotheses were tested with structural equation modeling (SEM) (Byrne, 1994; Kline, 2005) using Mplus program. Multiple criteria were

used to evaluate the goodness-of-model fit, including the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) indexes, which are a minimal set of fit indexes that should be reported and interpreted when reporting the results of SEM analyses (Kline, 2011).

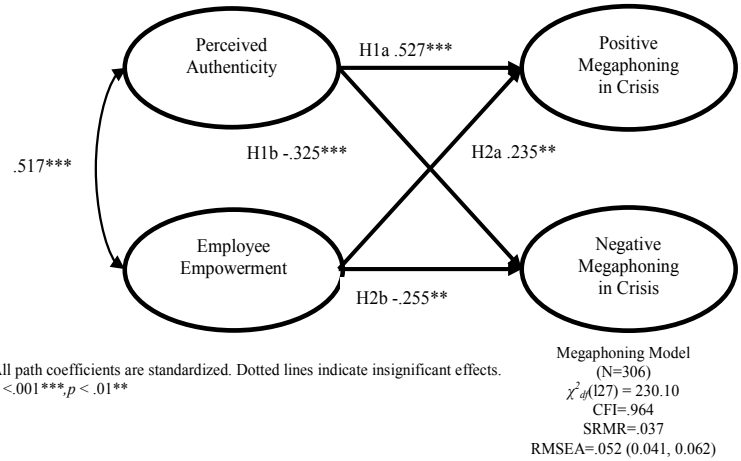
4. Findings

The results of the descriptive analysis showed that employees in this specific company reported a relatively high level of positive megaphoning behavior during a crisis (M = 3.68, SD = 0.58), and a low level of negative megaphoning (M = 1.88, SD = 0.60). In terms of organizational factors, employees tended to perceive a medium level of good relationship with their organization (M = 3.41, SD = 0.64), and a high level of empowerment (M = 3.81, SD = 0.46) in the workplace. Additionally, the participants perceived a medium level of authenticity of their company's behaviors (M = 3.40, SD = 0.66).

The hypothesized structural model displayed in Figure 1 demonstrated satisfactory fit to the data. The model showed a joint-fit criterion $\chi 2_{df}(127)$ = 230.10, CFI = .964, SRMR = .037, RMSEA = .052 (.041, .062), thus we proceeded to interpret the hypotheses.

The first model specified the direct paths from perceived authenticity and employee empowerment to their megaphoning behaviors. Hypotheses 1 posited that organizations' authentic behaviors influence employees' communicative behaviors in a corporate crisis. We found a significant positive path in H1a (β = .527, p< .001) and a negative path in H1b (β = -.325, p< .001). Thus, both hypotheses were supported. In H2, the study examined the impact of employee empowerment on megaphoning behaviors. It had a positive impact on positive megaphoning (H2a: β = .235, p< .01), and a negative effect on negative megaphoning (H2b: β = -.255, p< .01). H2a and H2b were thus both supported.

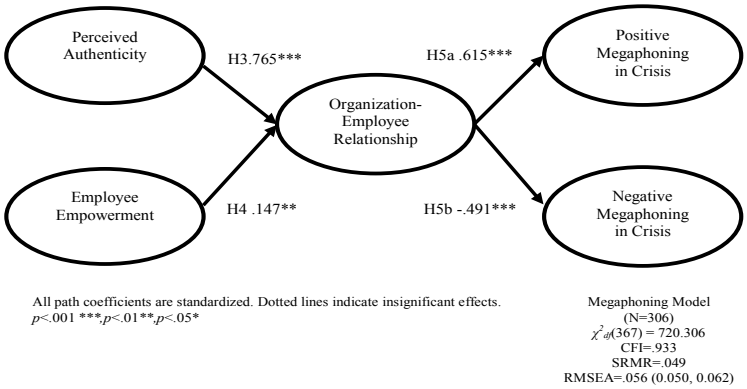
Fig. 1: Conceptual model and major results



Source: Authors' elaboration

The second model in Figure 2 proposed the mediating effect of organization-employee relationship on employees' megaphoning behaviors during crises, and it also showed a good model-fit, $\chi 2_{df}(367) = 720.306$, CFI = .933, SRMR = .049, RMSEA = .056 (.050, .062).

Fig. 2: Results of hypothesized model (mediation effect of organization-employee relationship)



Source: Authors' elaboration

The result revealed that all the hypotheses were supported. In H3, the study found that employees' perceptions of organizational authenticity had a positive effect on the quality of relationship between an organization and its employees (H3: β = .765, p< .001). The impact of employee empowerment on organization-employee relationship also turned out to be significant (H4: β = .147, p< .01). Lastly, the quality of relationship significantly increased employees' positive megaphoning (H5a: β = .615, p< .001) and decreased negative megaphoning during crises (H5b: β = -.491, p< .001). This study further examined indirect effects to understand the role of organization-employee relationship. The results showed that the mediation effect of organization-employee relationship between perceived authenticity and employees' positive megaphoning (β = .470, p < .001) as well as negative megaphoning (β = -.376, p < .001) were all statistically significant. Furthermore, organization-employee relationship significantly mediated the effect of employee empowerment on both positive megaphoning (.090, p = .004) and negative megaphoning (-.072, p = .004) during crisis.

5. Discussion

The purpose of the present study was to develop an integrated model of employees' communicative behaviors, megaphoning, focusing on an organization's crisis situation. Specifically, the study investigated whether organizations strategies to foster authenticity and employee empowerment are associated with the quality of organization-employee relationship as well as employees' behaviors regarding a corporate issue.

One important contribution of the study is to strengthen the concept of megaphoning in a crisis situation. While earlier concepts (e.g., employee voice) have explored how employees' behaviors play a role in improving organizational procedures or governance (Organ, 1988; Mayer and Gavin, 2005; Crant, 2000), the present study paid attention to employees' motivations to forward positive or negative information about the company beyond the boundary of an organization.

Enlarging the well-established concept, employee voice (Morrison, 2011) toward the more comprehensive concept of employee communication behavior, the study addressed both internal (e.g., managers, coworkers) and external (e.g., customers) interlocutors. That is, compared to the existing concepts such as employee voice, the concept of megaphoning captures the interactions with external interlocutors such as customers, other stakeholders, friends, relatives, and so forth. Recognizing its internal and external nature, this study attempted to explain how organizational factors facilitate the circulation of good or bad information about an organization during a crisis within an organization and beyond its boundaries. This finding is coherent with literature showing the linkage between employee engagement and their pro-social voice (Klaas *et al.*, 2012; Rich *et al.*, 2010; Kang, Sung, 2017; Ruck *et al.*, 2017)

Specifically, the study found that employees' perceived authenticity of their organizational behaviors and empowerment increased their positive megaphoning behaviors. That is, those who evaluate their company as authentic in their actions and who feel empowered in the workplace are more likely to forward and share positive information with other people (e.g., families, friends) when a company is undergoing a crisis. Employee authenticity is affected by organizational identification (Knoll and Dick, 2013) and leader authenticity predicts organizational climate (Henderson and Brookhart, 1996), as well as organizational authenticity affects employee performance at large (Cording *et al.*, 2013).

In addition, those strategies also had significant impacts on employees' negative megaphoning behaviors. When employees engage in tasks in the workplace and feel that their organization is behaving in authentic ways, the likelihood of sharing negative aspects about the company in a difficult time decreases. Adding to prior studies, the study empirically shows that organizations' authentic and empowering strategies for their employees play a crucial role in minimizing threats in organizational crises through employees' communication behaviors. With the results of the study, we further discovered that employees' evaluations of experience within the organization affect how they behave during the periods of corporate crisis.

Furthermore, this study explicates the role of relationship quality between an organization and its employees during crisis empirically, as it significantly mediates the association between organizational strategies-authenticity and empowerment-and employee behaviors. Such a finding indicates that, during organizational turbulence, an organization's authentic behavior can be effective at enhancing employees' commitment, satisfaction, and their perceptions of trust and control mutuality to their organization (i.e., relationship quality), which in turn activate their communicative behaviors (i.e., megaphoning). Similar to previous studies

(Kim and Rhee, 2011; Lee and Kim, 2017; Mazzei *et al.*, 2012), the study emphasizes that an organization's efforts to build a long-term relationship with their employees will enhance the likelihood of positive megaphoning and minimizing the negative one during crises.

When it comes to employee empowerment, it increased employees' perceived relationship with their organization, which eventually affects their communicative actions. It suggests that employees' affection for work itself is identified with their perceived relationship with the organization when it is going through a crisis, and this identification makes them feel motivated to forward or share positive information with others in their personal network voluntarily to advocate or protect their organization. In terms of negative megaphoning, it may also indicate that when workers are satisfied with their job, it is more likely that they have a favorable relationship with the company. This positive relationship quality motivates employees to reduce their negative actions, caring for their company's threats. In this sense, this study theoretically explicates how organizations' behaviors may prevent issues and help them to build powerful resilience after the crisis through employees' daily communicative behaviors, by utilizing significant outcomes (e.g., authenticity, empowerment, relationship quality) across the disciplines.

6. Conclusions: managerial and research implications

The integrated model of organizational factors triggering ECB discussed in this paper has several managerial and research implications for management studies. From the managerial point of view, this study gives a possible answer to a major question in management studies: how leadership behavior and organizational efforts not only sustain employee voice but also encourage employees to be active in protecting their company. With the result that authentic organizational behavior can be the main triggering factor during a crisis situation, managers can develop ethical and effective strategies for an organizational crisis to enhance employees' positive information sharing behaviors and minimize their intentions to share negative information about the company. In addition, managers and organizations need to establish effective communication strategies to prevent the crisis in order to make employees feel empowered and perceive a good relationship with their company, so that positive information about the company could circulate through employees and thus through their personal networks.

Today a crisis is a physiological event, and not an exception. The business contexts are often volatile, uncertain and they change continuously: companies cannot be taken by surprise. For this reason, companies need to invest in the improvement of employees' quality relationships, during ordinary organizational life. This factor is the leverage that will lead to competitive advantage, in the event of crises. Organizations can use different strategies and tools to improve the quality of relationships: the enhancement and recognition of the individual employee work, training, career and development, diversity management and above all integrated

and incisive HRM practices, like an active use of internal communication as a managerial and strategic leverage. Internal communication can create a climate of identification with the organization and, through horizontal, cross-over, top-down and bottom-up communication mechanisms can generate and nurture relationships based on long-term trust and can generate commitment. Moreover, through a realistic EVP (Employee Value Proposition), internal communication can encourage a reciprocal relationship and can have a positive effect on job satisfaction. (Botha *et al.*, 2011; Heger, 2007).

The findings of the study are promising for research and practice because of the characteristics of the data collected. Rather than recruiting current employees from various organizations, participants in the present study were invited from a single organization that had recently experienced corporate transition. Thus, the study could identify whether employees who share the same corporate culture or organizational environment have different motivations to forward or share positive information about their organization during periods of a crisis. Adding on a prior study that generalized employees' behavioral patterns, the study further indicated that perceived good relationship with the organization has significant influences on positive and negative external behaviors of employees within the same company.

The study also has a limitation that needs to be addressed. The fact that the study was based on a single organization can be both a strength and a limitation. As the collected data is from a male-oriented organization where most workers have been at the company for a long time, it may reduce the possibility to generalize the findings in other contexts. Further studies, therefore, may test the integrated model of megaphoning in different contexts and across the industry sectors, by considering the employees' demographics, psychographics, and other characteristics that affect their communicative intentions during a crisis. Additionally, although having data with employees' behaviors measured right after the crisis occurred gives the study benefits in many ways, the study could not measure how authentic the company's behavior (e.g., leadership) was after the corporate crisis. Future study may examine how an organization was trustful, transparent, or consistent in their ways of dealing with corporate issues and its impacts on employees' behaviors.

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Appendix. Measurement Items

Measurement Items	α	Standardized coefficients	
		Model 1	Model 2
Positive Megaphoning (Kim and Rhee, 2011)	*.826*		
I spent much time to explain to publics or others about what happened and how our organization was working to improve the situation.		.669***	.675***
I was advocating for my organization's position actively.		.776***	.784***
I tried everything I could to improve my organization's situation.		.626***	.629***
I was proactive and aggressive in defending my organization during the issue (or crisis).		.879***	.871***
I was upset when I met people who spoke of my organization negatively.		.758***	.757***
Variance Explained (R^2)		42.3%	37.8%
Negative Megaphoning (Kim and Rhee, 2011)	*.714*		
Honestly, I felt happy that the organization was in crisis.		.595***	.594***
I talked to my family about how poorly the management handled the situation.		.545***	.538***
I felt like leaving the organization during the crisis.		.642***	.646***
I enjoyed seeing the crisis that the top management experienced.		.756***	.752***
I felt that the organization and top management deserved such crisis because of its malpractice.		.748***	.747***
Variance Explained (R^2)		32.5%	36.4%
Perceived Authentic Organizational Behavior (Shen and Kim, 2012)	*.900*		
Trustfulness	*.807*		
My organization always tells the truth.		.820***	.824***
I believe that my organization's actions are genuine.		.772***	.773***
Transparency	*.798*		
I feel that my organization is willing to admit to mistakes when they are made.		.747***	.759***
I feel that my organization accepts and learns from mistakes.		.758***	.762***
Consistency	*.770*		
I believe that my organization's behavior matches its core values.		.833***	.824***
My organization's beliefs and actions are consistent.		.851***	.846***
I think my organization matches the rhetoric with its action.		.655***	.648***
Employee Empowerment (Spreitze, 1995)	*.834*		
The work I do is very important to me.		.744***	.771***
My work activities are personally meaningful to me.		.764***	.792***

The work I do is meaningful to me.		.732***	.748***
I am confident about my ability to do my jobs.		.604***	.622***
I am self-assured about my capabilities to perform my work activities.		.655***	.683***
I have mastered the skills necessary for my job.		.641***	.660***
I have significant autonomy in determining how I do my job.		.569***	.583***
I can decide on my own how to go about doing my work.		.678***	.695***
I have considerable opportunity for independence and freedom in how I do my job.		.661***	.677***
My impact on what happens in my department is large.		.689***	.711***
I have a great deal of control over what happens in my department.		.715***	.735***
I have significant influence over what happens in my department.		.664***	.681***
Organization-Employee Relationship (Hon and Grunig, 1999)	*.925*		
Trust	*.825*		
Whenever this company makes an important decision, I know it will be concerned about me.		-	.774***
This company can be relied on keep its promises.		-	.745***
I believe that this company takes my opinions into account when making decisions.		-	.757***
I feel very confident about this company's skills.		-	.687***
Control mutuality	*.790*		
This company and I are attentive to what the other says.		-	.746***
This company believes my opinions are legitimate.		-	.710***
This company really listens to what I have to say.		-	.765***
Commitment	*.873*		
I feel that this company is trying to maintain a long-term commitment to me.		-	.627***
I can see that this company wants to maintain a relationship with me.		-	.687***
Satisfaction	*.816*		
I am happy with this company.		-	.750***
Both this company and I benefit from the relationship.		-	.757***
Generally speaking, I am pleased with the relationship this company has established with me.		-	.745***
Variance Explained (R^2)		-	68.8%

***p< .001

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Sustainable business model innovation. "Progetto Quid" as an exploratory case study[1]

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Abstract

Purpose of the paper: *The research aims to better comprehend the mechanisms that allow the generation and dissemination of sustainable value. In particular, assuming the business model as conceptual framework and as unit of analysis, the purpose of the study is to understand factors and processes able to orient the strategic conduct of a company towards sustainable innovation.*

Methodology: *The study adopts a research approach oriented to the discovery and it privileges the analysis of a business case with a high explanatory power.*

Findings: *In highlighting the drivers for the creation of sustainable value and sustainable innovation at the base of the analysed company business model, the research proposes a framework for the Sustainable Business Model Innovation (SBMI).*

Research limits: *The analysis of a single case study, although explanatory, does not allow to reach a generalization of the results.*

Practical implications: *The study offers a contribution to the development of managerial theories on innovation with reference to business models oriented to sustainability. The case analyzed is also a best practice that could guide managers and entrepreneurs to plan innovation and sustainability-driven business models already in the start-up phase.*

Originality of the paper: *In response to a gap in the literature, the study proposal is focused on how companies should incorporate the logic of sustainable development and innovation into their business models at a strategic and holistic level.*

Key words: value strategies; sustainable value creation; value dissemination; sustainable innovation development; fashion business

1. Introduction

Today's dynamic, hypercompetitive markets mandate new ways to create integrated value (Elkington and Hartigan, 2008) in which the economic, social and environmental dimensions are closely interlinked.

The past decade has seen growing consensus in the management literature that increasing market success depends on being able to generate sustainability-oriented innovation, linked with new and improved goods and services, organizational processes and business practices that will prevent or reduce negative environmental and societal impacts (Schaltegger and Wagner, 2011). Accordingly, to integrate the social and environmental

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dimensions of sustainability into their business logic, companies must turn to innovative business models (Pencarelli *et al.*, 2019).

Although, from a theoretical viewpoint, possible archetypes of sustainability-oriented business models have been proposed, an analysis of the literature reveals a lack of holistic vision, with the focus more on the social dimension and corporate social responsibility (CSR), and a reductionist vision, in which the relationships between sustainability objectives and corporate performance are empirically analyzed (Wood, 2010; Glavas and Mish, 2015) from a quantitative perspective.

Based on the literature gap, this research aims to improve understanding of the mechanisms to generate sustainable value, using a qualitative approach and the business model as a conceptual framework and unit of analysis (Zott *et al.*, 2011). These theoretical concepts are examined in depth with reference to fashion, a critical sector in terms of sustainability on both the demand and the supply sides (Fletcher and Grose, 2012; Ciasullo *et al.*, 2017; Polese *et al.*, 2018), where the need for companies to adopt innovative business models is all the more urgent (Beh *et al.*, 2016; Lueg *et al.*, 2015). Therefore, the questions we propose to answer are:

RQ1: What are the main drivers for creating innovation in sustainable business models?

RQ2: How can the value creation, dissemination and capture process be managed?

Overall, this study contributes to a framework to guide managers and entrepreneurs in designing innovation-oriented sustainable business models (SBMs) in the start-up stage. Structurally, the paper first presents a review of the literature on business models focused on integrated value creation. A description of the research methodology used in the qualitative exploratory investigation follows. The results are then analyzed and discussed, and the theoretical and managerial implications highlighted. The final section offers some concluding reflections, along with the research limitations.

2. Literature analysis

Increasing attention to the concept of sustainability in management studies (Carroll, 1999; Elkington, 1997) poses the challenge of formulating integrated business models that can combine economic objectives with the multiple interests of an increasingly demanding society aware of social and environmental needs that require benefits that lead to community development (Barile *et al.*, 2015).

Therefore, producing an SBM (Nidumolu *et al.*, 2009; Bocken *et al.*, 2014) requires a focus on both competitiveness and economic and socio-environmental success (Schaltegger *et al.*, 2016).

Some researchers have taken up the challenge of integrating traditional business model drivers within a sustainable strategy that reconsiders the strategic profile (Hansen 2010; Stead and Stead, 2008; Wagner, 2007).

Specifically, to evaluate SBMs, Stubbs and Cocklin (2008) have proposed a systemic approach that mediates between structural attributes (organizational structure, processes, practices and organizational policies aimed at achieving sustainable outcomes) and cultural attributes (norms, values, behaviours and attitudes that increase stakeholder engagement).

In this approach, particular emphasis is placed on the human and cultural dimensions. Sustainable leaders incorporate sustainability principles in the organizational culture by establishing a cohesive set of values in the minds of key stakeholders (Bansal, 2002).

Adopting a comprehensive view, Bocken *et al.* (2014) understand SBMs as the outcome of a strategy that pursues the triple bottom line (TBL) and a diverse set of stakeholders with a wide range of economic and social interests. According to the authors, the strategic inclusion of sustainability within business models can act as a driver for competitive advantage and innovation development (Yip and Bocken, 2018).

Schaltegger *et al.* (2016) have emphasised the need to reformulate the business model for value proposition and dissemination, linking the sustainable strategy with the innovative practices and processes actually implemented. Following this reasoning, conducting eco-sustainable activities is insufficient; there is an urgent need to develop proactive, flexible managerial behaviour, aimed at confronting and managing risks dynamically and able to leverage skills and efficient information management to increase the likelihood of value creation. The critical dimensions of allocation and exchange of optimal resources and of knowledge and information management are thus introduced.

Viewing the business model as a framework that synthesizes a set of multi-stakeholder processes focused on long-term value creation, Geissdoerfer *et al.* (2018) have conceptualized Sustainable Business Model Innovation (SBMI) as an adaptation of the TBL business model by implementing proactive management principles aimed at stimulating the creation and spread of knowledge and new value (Boons and Ludeke-Freund, 2013; Bocken *et al.*, 2014; Geissdoerfer *et al.*, 2016; Schaltegger *et al.*, 2016).

Despite the different approaches in the literature, a conceptualization of categories of analysis (Bocken *et al.*, 2014; Schaltegger and Wagner, 2011; Stubbs and Cocklin, 2008) that orient SBMs towards innovation appears to be missing.

To meet this need for categorization, the present study, following on from that of Geissdoerfer *et al.* (2018), proposes a rereading of the classic business models based on sustainability principles, to identify the drivers of value creation and co-creation, and thus sustainable innovation.

Therefore, starting with the conception of sustainability as a strategic component to be synergistically amalgamated upstream of business models, and as a driving force and not a "mere" outcome of the business processes, the creation of new value, and thus sustainable innovation, is characterized as the outcome of dynamic, circular mechanisms for value generation and dissemination.

The value-based approach is integrated with the SBMI principles through a summary vision. From a cyclical perspective, new value

generation, dissemination and creation are to be managed through "apposite" co-creation strategies leading to innovative social, economic and environmental outcomes that can target development and sustainable growth precisely because they are consciously supported by and aligned with a coherent, cohesive organizational culture.

From a perspective focused on developing the human component (internal and external organizational skills, interpersonal skills, managerial skills and proactive leadership) in spreading this culture, the preliminary step for a truly sustainable business is to incorporate sustainability principles within the company's strategies and core values. The culture must be constantly renewed, creating a unique and thus inimitable value, deriving from the unique synergy induced by the exchange of resources among the multiple stakeholders, who share their skills, experience and creativity, stimulating ongoing, long-term and thus sustainable innovation (Sciarelli and Tani, 2015).

Within the perspective adopted in this study, the main dimensions to support the emergence of value in the SBMIs discussed in the literature are presented in Table 1. These variables are the reference topics for the empirical investigation.

Tab. 1: Summary of the main dimensions of SBMI and related/its value strategies

Dimensions	Value strategies	Sources
Strategy	Value proposition	Geissdoerfer *et al.* (2018); Bocken *et al.*, (2014)
Culture	Dissemination of a proactive culture aimed at sustainability	Geissdoerfer *et al.* (2016); Schaltegger *et al.* (2016); Bocken *et al.*, (2014); Boons and Ludeke-Freund (2013)
Resources	Exchange and combining of value	Geissdoerfer *et al.* (2018); Sciarelli and Tani (2015)
Partnerships	Creation and co-creation of social, environmental and economic value	Schaltegger *et al.* (2016); Bocken *et al.* (2014); Stubbs and Cocklin (2008)
Leadership	Harmonization of the exchanges and potential value renewal	Yip and Bocken (2018); Geissdoerfer *et al.*, (2018); Bocken *et al.*, (2014); Bansal (2002)

Source: Authors' elaboration

Specifically, based on the literature review and in line with the proposed synthesis approach, the dimensions (or drivers) that act as catalysts of social change and sustainability-oriented innovation are (1) strategy, (2) culture, (3) resources, (4) partnerships and (5) leadership. The synthesis approach first proposes that sustainable objectives be included in the company's overall strategies, so they align with processes and operating practices (Rosemann and Von Brocke, 2015). The fit between strategy and tactics can be improved by creating a cohesive culture that activates resource exchange between consonant individuals with complementary skills and competences, which, when appropriately and dynamically combined, can generate new sustainable value.

3. Research methodology

3.1 Research strategy

To investigate the factors and mechanisms enabling sustainable value creation, an exploratory approach was required. The aim of the first research question (RQ1) was to determine the critical factors (in terms of organizational strategies, culture and capacity, resources, partnerships and leadership) required to support a business model for sustainable innovation. For the second research question (RQ2), the intention was to reconstruct the process of new value creation, dissemination and capture by hypothesizing that it would intersect with the various areas, potentially creating a cycle of sustainable value creation. Specifically, we adopted a discovery-oriented approach (Wells, 1993), privileging a qualitative analysis to achieve a better understanding of the phenomenon under investigation. To that end, we chose a case study methodology, which enables investigation of the how and the why of a phenomenon in its natural context, especially when the boundaries between the phenomenon and the context are not clearly distinguishable (Yin, 2015).

The case studied is "Progetto Quid", an Italian firm in the women's fashion sector that combines innovation and sustainability. This is illustrated in the company's mission "to combine the beauty of fashion with ethical fashion: from surplus textile production to social value creation", through continuous investment in research and development (R&D), and a strong social, environmental and economic sustainability orientation. For these reasons, Progetto Quid provides an excellent empirical context for addressing the research questions.

3.2 Data collection and analysis

Secondary sources such as the corporate website and business documents provided general information about the company. The data collection also involved a series of in-depth interviews conducted between December 2018 and July 2019, in which the respondents identified what was relevant to the research objective (Alvesson, 2003). The interviewees included the vice president, the managing director, and managers and employees from administration and personnel, commercial and retail sales, institutional relations, digital and communications, and procurement and logistics. Selection was determined by the respondents' ability to holistically explain the processes underlying the business model. The face-to-face interviews, conducted at the company's head office, for about 50 minutes each, were based on a survey with open-ended questions posed to 10 participants.

In line with the research questions and the critical dimensions of the identified SBMIs (see Table 1), an interview guide was prepared (see Appendix).

Regarding the dimensions of "strategy", "culture", "resources", "partnerships" and "leadership" drawn from the literature review, the dimension "sustainable innovation development" was introduced (Topic 7 in the Appendix), understood as the outcome of the entire process

enabled by the antecedents relating to the dimensions in Topics 2 to 6. In other words, the sustainable innovation strategies were deduced from the analysis of the other variables using specific guiding questions aimed at detecting how much sustainable innovation was strategically pursued and continued over an extended period.

The guide therefore represented a list of macro areas examined in depth during the interview (Bichi, 2002), in a flexible manner, respecting the personal inclinations and profiles of the individuals investigated, so that the themes emerged as spontaneously as possible from the words of the respondents themselves. In this way, intervention of the interviewer, who played a strategic, interpretive role focused on listening to avoid potential distortion, was reduced to a minimum.

For the data analysis, a preliminary step was to design a research protocol for organizing and interpreting the data obtained gradually; the data were then classified into homogeneous categories to increase the overall reliability of the research (Yin, 2015). The iterative coding process was based on classifying, testing and redefining the data gathered.

4. Results

The analysis results were classified according to the subdivisions of the main drivers of the business models for sustainable innovation adopted as guidelines for drafting the interview.

Accordingly, for each of the variables in the interviews, the following subsections present (1) the key factors of Quid's innovation-oriented sustainable business model (RQ1); and (2) the strategies and main outcomes of sustainable value (RQ2) expected to emerge across the different business dimensions.

4.1 Company overview: Main activities and sales network

Progetto Quid was founded in 2012 in Verona as an organization for social advancement, through the initiative of five young Veronese friends who share a passion for fashion and a strong social conscience. Their experience in the world of economics and international cooperation has led them progressively to embrace the great challenge of creating an entrepreneurial project that combines ethical fashion, solidarity and sustainability.

Currently, the company produces limited-edition garments and accessories, using almost exclusively high-quality surplus fabric and textile elements (i.e. zippers, buttons, ribbons, etc.) donated by prestigious companies from the fashion and textile sectors. According to the procurement manager, "Often they are too small for large production or are no longer in use because of trends or technical characteristics of the fabric".

The head of institutional relations emphasized that "Quid aims to offer something more, in terms of both uniqueness and its contribution to resolving urgent social issues such as the protection and economic growth

of disadvantaged population groups, providing equal working conditions for women and valorizing cultural diversity". Moreover, the acronym Quid stands for the following: "'Q' means qualcosa in più [something more], 'U' is for unicità [uniqueness], 'I' for innovazione [innovation] and 'D' refers to donne [women], one of the main stakeholders".

The above statements highlight the steadfast willingness to pursue the economic and social objectives of the company's vision and mission. In fact, the sustainable principles appear to be closely linked to the constant pursuit of innovation. This is confirmed by one of the firm's priority objectives: "to create added value for the community, customers and partners, with a strong awareness of social and environmental problems".

Tables 2 and 3, drawn from the intersection of the interviews and the secondary data processing, highlight the company's development trends in terms of performance, relational networks and production capacity.

Tab. 2: Progetto Quid's development trends 2013–2019

Year	Turnover (million €)	Personnel	Women	Age (years)	Nationalities	B2B clients	Suppliers
2019	3.2	125	80%	19-67	15	10	42
2018	2.8	114	80%	19–67	15	10	40
2017	1.943	88	80.88%	19–67	13	10	17
2016	1.054	60	55.56%	18–65	11	8	7
2015	0.493	17	90.9%	27–61	3	4	ND
2014	0.290	5	80%	26–55	Italian	3	ND
2013	0.090	2	50%	25–31	Italian	2	ND

Source: Authors' elaboration from data collected through interviews and secondary sources

Tab. 3: Progetto Quid's production sites 2013–2019

Year	Production sites
2019	Production site in Avesa (Verona, Italy), and design workshops in the men's and women's sections of the Verona prison
2018	Renovation of the new production site in Avesa. Design workshop in the women's section of the Verona prison and opening of design workshop in the men's section of the Verona prison
2017	New production site in Avesa to be renovated. Design workshop in the women's section of the Verona prison.
2016	Production site in Avesa and design workshop in the women's section of the Verona prison
2015	Opening of a new production area in Avesa. Opening of a design workshop in the women's section of the Verona prison
2014	Opening of the first managed workshop
2013	Production outsourcing to 3 local cooperatives

Source: Authors' elaboration from data collected through interviews and secondary sources

Since the opening of its first pop-up shop in the summer of 2014, Quid has developed a path of constant growth with an annual increase in turnover and personnel, in 2019 reporting a turnover of about 3 million euro and 120 employees. In terms of the sales network, the company distributes its garments through six single-brand stores (in Verona, Vallese

[Verona], Mestre, Bassano del Grappa, Cadriano [Bologna] and Milan), two of which are located inside outlets; 80 multi-brand stores in Italy; and e-commerce through progettoquid.it/e-shop/. Quid also permanently collaborates with internationally renowned fashion and lifestyle brands to create lines dedicated to ethical accessories.

4.2 Strategy

Quid's raison d'être is a special interest in social challenges, such as inclusion, socio-economic development of disadvantaged population groups, and valorizing women's role. Therefore, social sustainability appears to be pivotal upstream of the company strategies, which consist of a preliminary set of core values aimed at spreading and promoting a culture oriented towards sustainable innovation.

Regarding the protection of women's work, the head of institutional relations emphasized, among the key values, the promotion of "work reintegration for people in difficult conditions, especially women, through their employment in productive activities that respond to market logic and stimulate active participation in beauty and creativity". Therefore, the company is committed to personnel development, particularly women who embody reliability and awareness.

The company's eye to the future is supported by a proactive leadership in constant pursuit of social change and advancement, and a fit between the sustainable strategies and the tactics and operational processes actually implemented.

Strategic planning for constant discussion of ideas, opportunities, proposals, criticalities, requirements and feedback develops a more efficient and effective collective thinking and commitment, and contributes to the spread of sustainable culture and rooting the company vision within the community: "When customers are informed about the ethical, social and environmental aims behind the product, they are even more willing to buy it. We want them to be attracted by its beauty and uniqueness". Table 4 summarizes the main results regarding the strategic variables.

Tab. 4: Main results for the "strategy" dimension

Main drivers (RQ1)	Strategies for managing drivers	Strategies for managing sustainable value creation (RQ2)	Main outcomes for innovation development
Sustainable orientation	Creation of a cohesive set of values to be disseminated to stakeholders based on: • social inclusion • uniqueness • ethical values • pursuit of social challenges and economic recovery	Designing a sustainable value proposition	Addressing social challenges such as: • social inclusion • protection of disadvantaged segments • women's employment development • creation of added value for the community
Leadership (innovative, proactive)	Reinforcement of shared vision (internal engagement)	Anticipation of environmental changes	• social change • creativity
Strategic planning for occasions for sharing	Translating vision into operational terms	Processes for aligning the company's sustainable strategy with: • implemented tactics • consumers' ethical values	Fit and cultural alignment

Source: Authors' elaboration

4.3 Culture

Quid disseminates its key sustainable culture values by promoting numerous social projects thanks to funds raised through participating in calls for proposals, competitions, and local and international prizes for social innovation and territorial development. This active engagement allows the company to carry on offering job placement support services, creating a genuine welfare system that includes a digital literacy course for all company staff. A project to measure the impact of social innovation initiatives has also been launched.

The push towards a new welfare system is also supported, from a more strictly cultural point of view, by institutionalizing new social norms, behaviours and lifestyles (see Table 5).

Tab. 5: Main results for the "culture" dimension

Main drivers (RQ1)	Strategies for managing drivers	Strategies for managing sustainable value creation (RQ2)	Main outcomes for innovation development
Sustainable collective culture	Provision of job placement support services	Dissemination of a cohesive culture based on shared sustainable values	Awareness of social issues, and of economic and environmental development
Development of social projects Institutionalization of culture through new social practices	Fundraising activities through participation in calls for proposals, competitions and prizes Development and transfer of the value of the garments' uniqueness	Creation of social value in the form of norms, practices, behaviours and attitudes	New welfare system New ethical lifestyle New way of experiencing fashion and new sustainable status symbol

Source: Authors' elaboration

As affirmed by Quid's head of industrial relations, "Our customers and partners are experiencing a new way of dressing. The consumers are the voice of a new lifestyle based on the need to own modern, unusual, exclusive garments accompanied by an awareness that what they are wearing is 'clean'".

Therefore, promulgating Quid's values means guiding the various individuals involved towards a new "clean" and ethical conception of fashion intended to convey a sense of uniqueness as well as responsibility; in other words, "to give a sense of prestige to the garments of our consumers, who don't wear mere clothes but wear true status because today fashion is no longer elitist but popular, and even if it aims for a unique style, it is done without compromising the material's quality or risking future generations' development".

4.4 Resources

The company has an extensive supply network that the vice president describes as a chain of solidarity between suppliers that directs and supports Quid in establishing new contacts. She emphasized that "the desire to put the fabric at the service of a social project is an important motivator for

the textile manufacturers to participate in the project". Consequently, the company prolongs the fabrics' life cycle through ongoing recovery and recycling, thereby reducing their carbon footprint through less resource and energy waste.

Alongside the resource allocation strategies, Quid uses strategies for value creation and exchange based on two main drivers (see Table 6): (1) organizational learning focused on the active exchange of knowledge and incentive logic for ongoing learning; (2) management of information processes and transparent communication through the synergic and efficient use of new technologies that also help to increase engagement.

Regarding the first aspect, the company is constantly redefining the skills of its employees and management, whose know-how linked to implementing sustainable practices is continually stimulated. Learning is intended as a key lever for capturing "weak signals" both within the organization for any emergence of organizational creativity and outside to intercept consumers' changing and emerging needs.

As reported by the vice president, "Since the birth of the company, more than 600, 000 euros have been raised from local and international foundations that support strategic investments and training courses". Ongoing learning is also stimulated through training projects, aimed at work placement and inclusion. The vice president clarified: "We work intensively on a leadership model and inclusive training, to protect and valorize linguistic, generational, cultural and skills diversity. We train people, who in turn supervise and train the company's human resources, using a pedagogical approach that can develop skills to explain concepts; to deal with overcoming errors (especially in the presence of people who have experienced traumatic violence); and to face linguistic and sensory barriers (for example, interacting without verbal language in the presence of deaf-mute people). We also invest in intercultural skills training".

Regarding the second aspect, the company's environmental, economic and social sustainability practices are supported, with the intention of creating engagement, at a strategic and operational level through interactive communication processes developed on social platforms and the institutional portal. Therefore, a sustainable infrastructure based on integrated technological tools not only improves information flow and harmonizes relationships but also continuously collects customer feedback through shops, agents, e-commerce, social media and customer care service, to capture continuous innovative ideas. As the communication manager explained, "Appreciation is expressed on social media; we receive a good response on Facebook and Instagram. Customers comment on the collection, express their satisfaction level and offer suggestions about our projects. All comments, statements and suggestions are continuously transmitted to the style office".

The main technological tools used are (1) computerized management systems for customer relationship management (CRM) and (2) social networks.

The head of R&D stated that the company has "integrated its own CRM with software for managing production processes (ERP, [enterprise resource planning]) specific to the fashion industry. An investment aimed

at reducing margins of error, monitoring consumption and costs, and making production more efficient". The company thus appears strongly oriented towards consolidating investments in network infrastructures and digitization projects, to efficiently and effectively support the implementation of their social and business initiatives.

The social networking strategy is carefully designed. Through Facebook and Instagram, the company communicates the social project themes and the value aspect of its offering, respectively. Social channels are useful for fuelling and raising the engagement level. Through Instagram, as reported by the digital and communications manager, "The company develops its own research in the style and design domain with the support of the communication team to internalize the evolution of ethical fashion in the proposed models in terms of styles, trends and demands". In this sense, stimuli and input contribute to formulating the product concept, the collection's narrative path, the photo shoot location choice and the ways to display the clothing.

In addition, the company has recently restructured its e-commerce portal to activate "a more user-friendly platform with a younger, fresh, immediate, intuitive and aesthetically more functional interface". The institutional website has also been equipped with an easier interface, and more importantly, it is also available in English, which is fundamental in light of Quid's strong international profile.

Tab. 6: Main results for the "resources" dimension

Main drivers (RQ1)	Strategies for managing drivers	Strategies for managing sustainable value creation (RQ2)	Main outcomes for innovation development
Development of supply chain and sustainable value chain	Creation of network for supply and distribution of "clean" raw material products	Allocation and management of renewable resources Emissions reduction	Tax benefits Reduction of fabric waste and increased production efficiency Building social recognition of the project
Organizational learning	Development of highly qualified skills through interfunctional integration of competences	Ongoing training activities Psychological and practical support service for staff	Updating of company skills Proactive management Creativity immersion
Digitization of business processes Information management Communication flow management	Investment in digital communication platforms: • e-commerce portals • institutional website • customer relationship management • social networks	Sustainable infrastructure integrated for: • support in formulating new product concepts • harmonizing of reporting • information flow management • data collection and creative stimuli (feedback) for co-innovation	Greater ability to "capture" the expressed and unexpressed needs of customers and stakeholders (feedback collection)

Source: Authors' elaboration

4.5 Partnerships

The "partnerships" variable refers to a complex relationship network created through involvement of a varied set of stakeholders, comprising (1) internal staff, (2) potential collaborators outside the organization, (3) suppliers, (4) for-profit companies, (5) non-profit organizations and (6) customers.

In terms of the internal profile, Quid's human resources comprise a cohesive team of designers, stylists, pattern-makers and sewing staff. The organization also has recourse to highly qualified professional figures distinguished by their teamwork and initiative. The teams in charge of fashion and social project development work closely together, and they are promptly and continually updated.

The staff have a strong sense of belonging to the company community. The vice president maintains that an important shift towards internal integration is taking shape, evidenced by the numerous photos frequently posted by employees with their colleagues and by their active participation in the monthly meetings arranged in house with a psychologist (who has a stress thermometer), as well as the various social occasions organized over the year, at Christmas, in the summer…

Regarding potential employee recruitment, in the second half of 2018 a new CSR was launched with the aim of strengthening inclusion through work. The intervention areas are diversity valorization, migrant integration and women's leadership valorization. "In the last five years", the managing director reported, "Quid has made significant investments in production capacity by hiring an increasing number of disadvantaged women workers". He added, "For the years 2019–2021, the company has set itself the objective of strengthening the range and depth of its social impact".

With respect to suppliers, as indicated by the head of institutional relations, Quid "has consolidated its partnerships over the years with 40 suppliers among the main European and international producers of fine fabrics".

Collaborations have also been established with non-profit organizations and for-profit companies. Co-design projects to create lines dedicated to ethical accessories in the fashion, textile and home sector are conducted in partnership with internationally renowned brands. In this context, long-term agreements have also been developed referring to Article 14 of the Biagi law on the employment of protected categories. These partnerships, in the vice president's vision, "are invaluable for entrenching the idea that the product codesigned and produced by Quid really does have 'something more', achieving greater social recognition of the project, supporting the targeted placement of personnel, recovering cost-free fabric inventories, obtaining physical spaces for production activities or pop-up shops, providing services such as shared values promotion and marketing, and distributing products made in the network".

The vice president also reported that nurturing relationships with important national and international organizations is also fundamental in three respects: "They enable Quid to be economically sustainable, because they help to fund projects that can generate well-being and not just profit;

they enable us to critically reflect on our projects, since we often interface with people for whom philanthropy is a job, and an area of research and personal interest, and who therefore contribute valuable observations and constructive comments. They enable us to activate contacts, by being included in a national and international network where like-minded people generate other contacts. They enable us to engage with smaller social fashion enterprises where tutoring or mentoring activities contribute to catalysing the impact".

These partnerships and collaborations have also prompted Quid to think differently about its networking methods.

Finally, Quid's key stakeholders are both business and consumer clients. The latter are mainly women between 30 and 65, with moderate spending power; the former are boutiques, often family-run shops located mainly in northern and central Italy, and agents, who manage the boutiques by geographical area. Client relationships are based on trust, sharing and co-creation of value. In particular, the company is able to increase their engagement through constant peer-to-peer dialogue and an understanding of their needs. "Our project", explained the vice president, "works well if the customer is on our side. We are interested in selling, but our foremost goal is to explain why our products are not always perfect, so they are motivated to continue buying our clothes for the values they symbolize. It's important to communicate the social mission, the effort, what we are doing. We must be able to maintain a relationship that communicates meaning in the purchase that goes beyond 'I like the style' and 'The shape is nice'".

As highlighted by the head of commercial and retail sales, Quid has introduced a business model that is "collaborative based on open innovation, that is, innovation created from the bottom up that not only aims to identify and respond to the community's needs but enables us to predict their needs and to contribute to their enrichment, by guiding them towards sustainability". Table 7 summarizes the main stakeholders in the network created by Quid.

Tab. 7: Main results for the "partnership" dimension

Main drivers (RQ1)	Strategies for managing drivers	Strategies for managing sustainable value creation (RQ2)	Main outcomes for innovation development
Network of relationships with stakeholders and strategic partners	Collaborations and development of relationships with: • internal staff • potential external collaborators • suppliers/distributors • non-profit organizations • for-profit enterprises • consumers	Creation and sharing of sustainable culture for a sustainable innovation-oriented network Involvement of a varied set of stakeholders in the co-creation of value	Social inclusion Product development and service aimed at eco-sustainability Tactical flexibility based on established strategies

Source: Authors' elaboration

4.6 Leadership

Quid's management has developed a series of dynamic capabilities and organizational skills that enable the company to acquire, combine and transform tangible and intangible resources in different ways, to

continuously address environmental change conditions, strengthen competitive capacity, improve performance and offer sustainable value. The company's leadership works tirelessly to harmoniously orchestrate relationships, company processes and the fit between strategies and tactics (see Table 8).

As highlighted by the head of human resources, "Central is the entrepreneurship role represented in the company by a young, multifaceted woman, whose ability to lead is perceived by the company's internal and external communities as versatile, adaptive and proactive". Her direct collaborators describe her as a person who is "constantly involved in the activities to be carried out, engaged, focused on sharing strategies and knowledge, open to discussion and dialogue, innovation oriented, and focused on encouraging internal connection/cohesion. She expresses a visionary leadership and relies on it to develop the skills of others".

Therefore, tactical flexibility and proactive redesigning of the business model in the constant pursuit of sustainable strategies are the key capabilities that support the people at Quid's helm. In addition, management's lean green manufacturing skills are key levers for creating a sustainable offering. However, "mere" know-how about eco-sustainable practices is not enough. Indeed, Quid's founder and president has a solid managerial economics background, is an expert in international relations and specializes in women's empowerment. As the head of institutional relations stated, "Before founding Quid at the age of 25 she gained experience working in international cooperation in India and Haiti, and in 2018 she was a finalist in the EU Prize for Women Innovators". The management comprises 90% women aged between 25 and 40: apprentices and professionals who, after training abroad in leading fashion companies, have chosen to put their talent at the service of social entrepreneurship. The vice president also pointed out that "Quid intends to continue to support an internal leadership model, built from below. How we want to be, how we want to behave, how we want to organize ourselves, the importance we give to the limitations that each of us brings to the workplace, the extent to which we can ask a colleague to do more and the extent to which we want to personally intervene, including in cultural and intercultural issues".

Strong organizational skills accompany the development of projects from the conception phase to the implementation phase. Each project is directed by a specially created team and strategic planning activity fuelled by continuous moments of sharing aimed at strengthening internal engagement. Operating at the same location, or in adjacent locations, leads to constant, timely updating. A human resources employee stated, "We hold a coordination meeting every Monday morning attended by all team representatives and vice representatives, and we plan dedicated meetings between closely collaborating teams".

Ultimately, thanks to skilful mediation between strategies and tactics and between implementation of sustainable culture and extensive feedback collection, the leadership stimulates and develops constant renewal of new sustainable values co-created inside and outside the organization, aiming to increase well-being in terms of continual, long-term social, economic and environmental production.

Tab. 8: Main results for the "leadership" dimension

Main drivers (RQ1)	Strategies for managing drivers	Strategies for managing sustainable value creation (RQ2)	Main outcomes for innovation development
Leadership with proactive managerial skills and sustainable know-how	Ability to recognize the cost and opportunity benefits of social projects launched on behalf of staff Harmonization of company processes and relations	New value creation and renewal through institutionalization Continuous, long-term value regeneration through circular processes of knowledge exchange	Well-being and shared growth Multiple community benefits (environmental, social, economic)

Source: Authors' elaboration

4.7 Development of sustainable innovation

Strategic management of the analyzed business dimensions (strategy, culture, resource, partnerships and leadership) and their synergistic combination lead to co-creation of renewed sustainable value. Quid's business model tirelessly pursues generation of economic, social and environmental outcomes, achieved through constant nurturing of relationships with a variety of stakeholders who share ethical values and are proactively involved. The triple objective of sustainability cuts across all business processes, which are firmly linked to the strategies of sustainable value development and creation, leading to innovative technological, process and product/service profiles.

Quid's business model has been recognized at the European level as a sustainable model aimed at environmental innovation; in particular, for the activities of "recovery of a large amount of fabric waste, thus avoiding disposal to landfills, which are prone to producing a powerful greenhouse gas, methane". This result is also supported by its waste disposal practices and reduced environmental emissions: "Energy consumption associated with waste disposal is also reduced, with a knock-on effect of cost savings. During the first four years of operation, Quid reduced its carbon dioxide emissions by around 18, 000 tonnes". Moreover, in the social sphere, its innovative business approach has been recognized by the European Economic and Social Committee with the Civil Society Prize. The GreenItaly 2017 report cited Quid for best practice, and at the United Nations Framework Convention on Climate Change events "Momentum for Change" and "From Waste to Wow", the company stood out for its commitment to protecting the environment and fighting against gender inequalities. Finally, in 2018 it won the "Best Wwworkers" award, according to the head of digital and communications, for "its ability to combine social value and attention to environmental impact with the opportunities offered by the web and by digitization". Ongoing participation in national and international events, awards and competitions provides an important platform to transmit the business model concept behind Progetto Quid as well as its positive, hopeful narrative. As the vice president indicated,

"They are an important visibility showcase, they are moments when we can collect many contact opportunities and business cards, and they are a starting point for many partnerships".

Finally, the company offers support and mentoring to start-up companies in terms of training (resources), development of human resources (people), and creation of a network of social and sustainable partners, "thus extending those that can benefit from the sustainable circular economy methods developed by Quid".

Table 9 classifies the different types of value outcomes of Quid's sustainable innovations.

Tab. 9: Main results for the "sustainable innovation development" dimension

Main innovative outcomes	Sustainable value achieved	Type of value co-created
"From Waste to Wow" (UNFCCC), winner of the European Social Innovation Competition 2014	Waste management Reduced environmental emissions Energy conservation Cost reduction Women's social inclusion Reinterpretation of Made in Italy Combating climate change Combating gender inequalities	Environmental Social Economic
Civil Society Prize	Social inclusion Fostering economic development for migrants	Social Economic
GreenItaly 2017	Development of human resources Creation of a network of social and sustainable partners Circular economy models	Social Economic
"Momentum for Change" (UNFCCC)	Health of the planet and climate neutrality Valorization of women's work pro the environment "Climate friendly" investments	Environmental Social Economic
Best Wworkers 2018	Reduced environmental impact Valorization of Made in Italy and artisan production Exploiting the potential of new technologies	Environmental Social

Source: Authors' elaboration

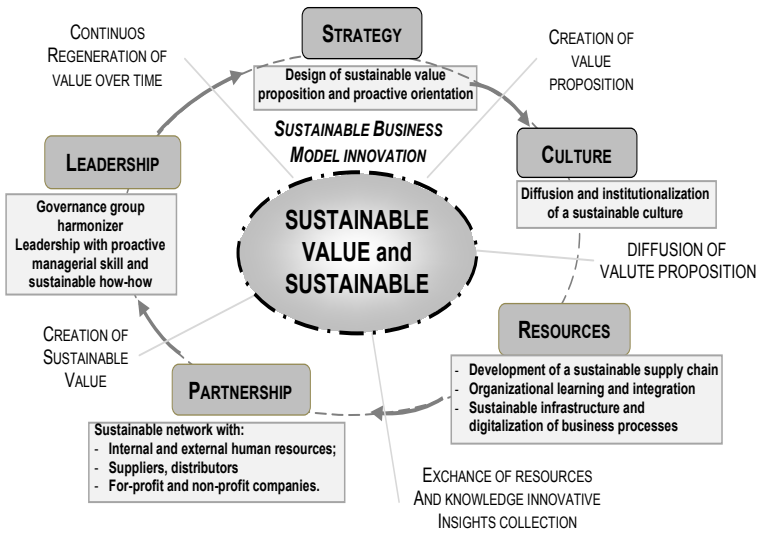
5. Discussion

The study results enable us to answer the research questions. In particular, the main critical success factors for creating an SBMI (strategies, culture, human resources, partnership and leadership) were found to be present within Quid's activities and processes, as described by the interviewees. In addition, strategies that cut across the process management of the above dimensions (RQ1) were identified. It was also possible to reconstruct for each dimension the process of new value creation, diffusion and capture (RQ2), which was confirmed as "intersecting" along the various areas, creating a perpetual cycle of sustainable value creation underlying the overall business processes.

Finally, it was found that the triple objective of sustainability is pursued by Quid in all its business initiatives and innovative practices. Therefore, it has adopted a conscious innovation strategy by creating a cohesive culture, stakeholder engagement and a leadership aimed at optimizing the key drivers to generate social, environmental and economic innovation. Sustainable value creation is the result of a crucial strategic focus. The basic concept is that the company's survival is linked, on the one hand, to its ability to attract the best resources through its overall supply system to guarantee continuity and development of its activities, and on the other, to its ability to respond to its stakeholders' expectations in a coherent and conscious manner, building and strengthening relationships of mutual trust. The Quid microcosm is animated by co-participative and co-creative collaborations at a strategic level.

The Quid case study enables further specification of the macro dimensions of the SBMs identified in the literature review. To this end, a framework for the SBMI is proposed (see Figure 1).

Fig. 1: The SBMI framework



Source: Authors' elaboration

The first dimension (strategy) is implemented through dissemination of a sustainability orientation, as evidenced by the management's continuous focus on environmental protection, energy conservation and minimizing the impacts associated with the transformation, production and consumption cycles, and the conscious use of resources to promote responsible, sustainable development of the territory in which the company operates.

Two main drivers disseminate this orientation: (1) a proactive, synergistic leadership; and (2) mechanisms for sharing and aligning strategies and objectives.

In the first case, there is a need for "socially minded leadership" aimed at innovation and social control of production methods and value distribution, balancing private interests with social interests, and reconciling shareholders' expectations with enduring development of natural, human and social resources (Arru and Ruggeri, 2016). This organizational ability supports the conception and implementation of value propositions that meet the customers' expressed or unexpressed needs, and the implementation of technological investments for production processes to improve their efficiency.

In the second case, the sharing mechanisms provide for constant alignment of the emerging strategy with the tactics, the company's operations and the consumers' individual ethical values.

The sustainable orientation is translated into a shared vision within the company's community (culture) by company members transmitting and internalizing sustainable principles. An indicator that an effective sustainable culture has been created is the proposal of new social norms (in this case, a new welfare system) and new attitudes, customs or practices (a new lifestyle and way of understanding fashion).

A sustainable company not only has the task of identifying resources in line with its sustainable strategy (resources), it must also redefine the supply chain management with sustainable standards and aim for continuous renewal of internal skills able to support, in all company processes, the drive for economic, social and environmental innovation.

To support the resource allocation strategies, an efficient SBM should include the following subdimensions: (1) organizational learning based on active knowledge exchange; and (2) management of information processes and transparent communication through synergic and efficient use of new technologies that also help to increase engagement (Pencarelli *et al.*, 2019).

Organizational learning refers to the acquisition of knowledge and skills used in decision-making processes, in performing specialist activities and in distributing resources to support the management of sustainable practices. In this context, ongoing training is essential to understand the complexity and dynamism associated with these processes and to internalize a proactive, responsible sustainability mindset. The complexity, dynamism and investment required to design and implement business processes point to the need for interfunctional integration (Stone *et al.*, 2004), which the company conveys in the form of intense interaction between employees in different functional areas. Moreover, the process of exchanging resources and the efficient management of information and feedback received from users is harmonized by a sustainable technological platform that supports the business through the digitization of processes (Pencarelli *et al.*, 2019) with tools such as computerized management systems of CRM or social networks.

The partnerships variable is configured as a set of activities to identify and engage a varied set of stakeholders with whom the company has generated a relationship network. Networking with suppliers, business clients, consumers, public and private bodies and institutions, as well as internal staff, is an organizational ability that facilitates information

exchange, knowledge sharing and long-term collaboration, ensuring that relationships are based on co-evolution logic and are innovation oriented.

Ultimately, new value creation can be optimized and practised sustainably over time through the key mediation role of a leadership that ensures harmonization between strategies and business tactics and between sustainable culture implementation and the constant collection of feedback from users to share and intercept new requirements. In this way, by stimulating and developing perpetual renewal of the new sustainable values co-created within and outside the organization, the triple objective of sustainable innovation is achieved, bringing with it an increase in well-being and production of long-term social, economic and environmental development.

6. Theoretical and managerial implications

Overall, the study has increased understanding of the drivers and the consequent mechanisms through which a company can promote integrated value creation, thus contributing to management theory and practice.

First, starting from the lack of empirical studies that explain the processes and outcomes through which a business model can develop sustainability-oriented innovation (Thompson and MacMillan, 2010; Evans *et al.*, 2017), and considering sustainability a component to be amalgamated synergistically within the innovation-generating strategies and upstream of the business model, the in-depth study has led to a proposed framework that conceptualizes the categories of analysis that point towards an SBMI. It offers a summary vision of the drivers of the creation and co-creation of sustainable value and sustainable innovation, integrating the value-based approach with the principles of SBMI.

In the developed framework, sustainability is not "simply" an outcome of business processes, but assumes the role of a driving force for the development of sustainable innovation emerging from dynamic and circular value proposition mechanisms. The result is systemic management of the processes of new value generation and dissemination through specific co-creation strategies to create innovative social, economic and environmental outcomes aimed at contributing to sustainable development and growth as supported by and aligned with a sustainable organizational culture. The outcome of the process is new mutual and integrated value. Sustainable innovation can therefore be generated through the dynamic and "unique" combination of values, which emerges when a new value is created, a synergistic effect of the interrelationships between the knowledge of the members of an organization or network of organizations. It does not derive from the simple summation of these skills but from a "relational" plus.

Second, the proposed framework can support management in acquiring greater awareness of the opportunities and criticalities of implementing and managing an SBM oriented to the development of innovative practices (Maiolini *et al.*, 2018).

Further, at a broader level, the study provides a categorization of strategies and tools that policymakers can use to better understand the

business areas they should focus on to promote the adoption of sustainable policies (Tencati and Pogutz, 2015), from sustainable education programmes to specific welfare systems, taxation and incentives, from actions affecting the reduction of harmful emissions along the supply chain, to initiatives to raise awareness and spread the culture of sustainability.

Identifying the most appropriate steps for achieving an SBM can lead companies to experiment with such models through empirical research, simulations and scenario analysis. Reproducing human behaviour and business decision-making processes, the model can be validated through techniques such as fuzzy logic, scenario analysis or agent-based models (Zhang and Zhang, 2007; Vanhaverbeke and Macharis, 2011).

One of the main consequences of today's complex market is the uncertainty about the actual sustainability of company members' behaviour and their economic, social and environmental impact. It follows that being able to simulate this process can help companies to understand how sustainable their activities are and to identify the value created and detect its impact on performance and opportunities for development and innovation. Since business model innovations are considered value catalysts (Grieco and Cerruti, 2018), according to the SBMI model introduced, identifying drivers for sustainable practices can lead to development of indicators to assess the impact of and measure the value created.

Given the current lack of a measurement framework with a certain degree of consensus or clear and defined measurement procedures and items (Lee al., 2016), identifying potential outcomes in the economic, social and environmental spheres points towards the creation of a multidimensional model, based on the TBL, for measuring sustainable value objectives, performance and creation. For example, according to the dimensions proposed, the social sphere can include the key elements indicating partnerships and culture, the economic sphere can refer to resources and the environmental sphere to leadership.

7. Conclusions and research limitations

"Progetto Quid" has revealed an ability to propose and disseminate sustainable value that is deeply rooted in its strategic orientation and company culture. The business model, with characteristics of innovation and sustainability, is based on a holistic vision of all the factors suitable to ensure a skilful, continuous link between sustainable business strategies and the company's tactics, practices and processes, and between a sustainable organizational culture and the individual ethical values of the customers, whose feedback it is important to collect in order to intercept new needs and demands. The constant commitment to align and renew the values generated and shared within and outside the organization needs to be supported by the relationships and interactions that enable value creation and co-creation.

Although the study as a whole offers interesting points for reflection, it does have some limitations.

First, the analysis of a single company from the fashion industry does not allow generalization of the results. This research should be supported by a wider sample of companies operating in different businesses and representing business experiences with strong explanatory power, able to combine innovation and sustainability in the process of value generation and dissemination.

Second, the study was conducted from the company's perspective and does not take into account the viewpoint of the other players in its relationship system, with regard to which the processes of value co-creation were analysed to identify strategies for their effective management and the outcomes pursued in terms of sustainable innovation. Therefore, the study identifies the main phases that management could pursue at a strategic level for implementing an SBMI, in which, for example, the role of consumers is all pervasive in each phase, both because-as stated by the managers included in the sample-they are actively involved in each step, and because the company consciously modulates strategy, culture and selection of resources, partnerships and leadership in each business area and according to the other stakeholders.

Future studies could analyze consumer perception and practices through qualitative (in-depth interviews, focus groups) or quantitative (survey) techniques, specifically applying the proposed framework. Therefore, a future direction for the research, to explore the process of sustainable value creation and value capture more deeply, would be to extend the analysis to businesses other than fashion and to involve important actors such as partners, customers and consumers in order to understand operationally how the mechanisms through which sustainability-oriented innovation is generated are configured.

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Appendix: Interview guide

Topic 1 – General information about the company
- What is your company's mission?
- What are the main production and distribution options and how is the commercial network composed?

Topic 2 – Strategy
- What key values does your company pursue? How are they proposed and disseminated?
- What strategy and future plans guide the company?

Topic 3 – Culture
- Are the principles of sustainability and social change incorporated upstream of the company culture?
- Are there any activities aimed at disseminating the key values of sustainable culture?

Topic 4 – Resources
- What are the main resources required to create sustainable value?
- Are there strategies to regulate the exchange of resources?
- What role does the use of specific digital technologies play in your company?
- What is the role of digital technologies in innovation processes?

Topic 5 – Partnerships
- What are the main partnerships and collaborations activated by your company?
- Are there any training strategies oriented towards sustainability and aimed at internal and external members of the organization?

Topic 6 – Leadership
- What are the skills used to manage resources and partnerships in a logic of sustainable value?
- Are there any strategies for managing relations with partners?
- Are the values generated renewed over time through comparisons with users and partners and the exchange of resources?

Topic 7 – Sustainable innovation development
- What does sustainable innovation mean for your company?
- What have been and what are the main sustainable objectives pursued through innovation development?

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VARALDO R. (1987), "The internationalization of small and medium-sized italian manufacturing firms", in Rosson P., Reid S., (edited by), *Managing export entry and expansion: concepts and practice,* Praeger, New York.

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