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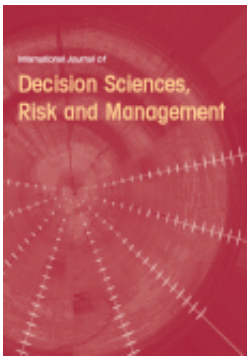

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Supply chain risk management for a sustainable strategy: a study in the furniture industry

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Abstract: Risk prevention and mitigation strategies, deriving from total-quality-oriented internalisation choices, cannot be observed regardless of the strategic orientation adopted by a business in managing its supply chain. The aim of the paper is to investigate how a business can manage the risk of social sustainability deriving from total-quality-oriented internalisation strategies. A case study is conducted in the furniture industry, for which data are collected through qualitative interviews with the management. The data shows that the supplier's involvement in implementing buyers' marketing strategy can support the latter in mitigating the social sustainability risk. The sharing of strategic marketing objectives becomes a driver of change for the supplier at both an organisational and a relational level: it can support the buyer

in mitigating the reputational risk within the business network and the local community and the risk of social sustainability created by vertical integration choices. In the academic debate, limited attention is paid to the relationship between supply chain risk management and sustainability. The paper aims to fill this gap.

Keywords: supply chain risk; management; risk assessment; strategy development; supplier management; vertical integration; sustainability.

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1 Introduction

Several supply chain management (SCM) studies follow a risk approach, with the aim of promoting the identification, management and reduction of risks. In studies conducted in recent years, academics and working groups direct their attention to SCM, with reference to sustainability, logistics, performance measurement and metrics, human resources, strategy, quality, risk management and product and process innovation [Swanson et al., (2018), p.14]. Regarding natural danger, market globalisation, the outsourcing trend and the complex needs of customers and companies, supply chains are becoming more complicated to manage (Craighead et al., 2007) due to the structural changes associated with geopolitical, socio-economic and technological risks, which should be mitigated. Whereas the strategies of vertical integration and internalisation of processing phases, on

the one hand, aim to achieve greater control over the manufacturing process and quality, on the other hand, they can expose the business to the risk of damaging the long-term relationships with the actors in their business network. A specialised supplier that suffers from a decrease in or cancellation of its turnover because its main customer decides to internalise the working phase on which the supply relationship is built is exposed to the risk of failure.

This risk of failure, in competitive contexts characterised by 'large-mesh' business networks, may appear like usual business risks, but, in a very interdependent and cohesive business network (such as a district network), it can also have negative impacts from a social point of view. In fact, a business network with a high level of mutual interdependence, in which the main actor leads the value creation process, the resource organisation and the value creation process are managed by splitting the manufacturing process along the entire extended supply chain. This includes a high number of suppliers and subcontractors, which are born and grow as suppliers of high-added-value services in synergy with the principal actor and proportionally to its turnover trend. The risks, in such types of business networks, are shared among a large group of SMEs, even though the constraint of excessive dependence on the main actor remains.

The boundaries between a business network and a social community tend to blur in such district realities. Therefore, the risk of causing the failure of one or more of these SMEs can negatively affect the reputation of the main actor within the business network and within the social community itself as well the social sustainability of the business since the main actor, to create value and to survive, can even indirectly cause a loss of jobs. Thus, a paradox can emerge according to which total-quality-oriented internalisation choices change the relationships in the supply chain, damage (or, in the worst cases, cause the failure of) some suppliers and affect the business itself, thus cancelling out the potential value created by the vertical integration.

Why does the principal actor decide to internalise one or more processing steps? The reason can be twofold: to optimise the costs of high-added-value phases and/or to gain greater control over these phases. A higher degree of control is especially necessary when the business aims to penetrate premium market segments, for which distinctiveness is the real driver of a competitive advantage. Therefore, the hypothesis that the principal actor, to improve its service and its reputation downstream, takes the risk of damaging it upstream in the supply chain appears to be paradoxical: the increase in the competitive advantage on the final market can be reduced or cancelled out by opposite pressures upstream in the procurement market.

In the academic literature, the SCRM topic is the subject of attention from different perspectives. According to Teuscher et al. (2006), many risks related to the sustainable management of a supply chain arise due to the absence of good partnerships. Therefore, the involvement, monitoring and evaluation of all partners should be promoted. Harilainen (2014) state that the risk of sustainability in a supply chain is associated with make or buy and reputational risks, so they investigate how the management can intervene with managerial policies to limit SCRM.

A recent study carried out by Swanson et al. (2018) relating to the connection between SCM and risk management reports that the connection between the two fields has been increasing in the last period. In particular, papers on SCRM increased by 78% in the period 2011–2015 compared with the number published in the period 2006–2011. This phenomenon highlights that, in the last period, scholars' interest in SCRM has grown [Swanson et al., (2018), p.14].

Assuming that risk prevention and risk mitigation strategies are related to a total quality management (TQM) perspective, even if the connection with the SCM strategy is not always explicit, the integration between TQM and SCRM perspectives represents a promising area for academic investigation to support businesses in developing more competitive and resilient strategies. These considerations and the literature analysis led us to identify a gap in the literature about the relationship between the two macro-variables, (social) sustainability and SCRM. Therefore, the aim of the paper is to determine how the risk of social sustainability can be managed and to try to answer the following research question:

RQ1 How can businesses manage the risk of social sustainability deriving from total-quality-oriented internalisation strategies?

For this purpose, the paper analyses a case study in the upholstered furniture industry: a global manufacturing business, located in south eastern Italy, that is strictly connected to its business network. The case is interesting and fits the research objectives for several reasons: strategic and operational decisions are changing the operational structure of the observed business according to a lean approach; the use of innovative digital technologies along the entire supply chain shows interesting management implications and accelerates the vertical integration process; and this aspect shows many implications for risk management and the sustainability of supply relationships.

2 Literature review

2.1 From supply chain management to supply chain risk management

SCM refers to the integration of logistics and supply chains to improve the communication and information flows (Ellram and Cooper, 1990) from the suppliers to the final customers, realising a total quality control system (Vahrenkamp, 2007). SCM is defined by Mentzer et al. (2001, p.4) as a set of "entities involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer". SCM is later redefined as "the systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across business within the supply chain" [Mentzer et al., (2001), p.18]. In a later study, Lambert et al. (2006, p.2) define SCM as "the integration of key business processes from end-user through original suppliers".

According to the perspective of Carter and Rogers (2008, p.368), SCM is "the strategic, transparent integration and achievement of an organisation's social, environmental, and economic goals in the systemic coordination of key interorganisational business processes". For Fritz (2019, p.1), SCM is "the management of products or services from the design phase to the different production stages starting with raw material extraction and ending with the delivery of the product/service to the end consumer".

Supply chains are often complex and difficult to manage, and to realise an efficient SCM, it is necessary to define different kinds of risks. For this reason, risk management activities are developed to protect companies from negative events and threats. Therefore, SCRM can be considered as an evolution of SCM and risk management (Zhao et al., 2013; Fitriani and Christi, 2018).

Yang et al. (2009) group the tools for managing supply chain risks into four themes: multi-sourcing (Anupindi and Akella, 1993; Babich et al., 2005, 2007), alternative sources (Serel et al., 2001; Kouvelis and Milner, 2002), flexibility (Van Mieghem, 2003; Tomlin and Wang, 2005) and supplier selection (Deng and Elmaghraby, 2005). For Narasimhad and Talluri (2009), the risk management applied to the supply chain is very important, especially for outsourcing, the market's globalisation, the suppliers' dependence on capabilities and innovation. Following these observations, SCRM is considered to be an emerging area that aims to identify the different type of risks and possible improvements that can reduce them (Singhal et al., 2011).

According to some authors, SCRM has emerged as a natural extension of SCM "with the prime objective of identifying the potential sources of risks and suggesting suitable action to mitigate them" [Singhal et al., (2011), p.16]; risk is defined as "the probability of an incident associated with inbound supply from individual supplier failure or the supply market occurring" [Zsidisin and Ritchie, (2008), p.3].

From an academic point of view, there is no unique definition of SCRM (Sodhi et al., 2012). Jüttner et al. (2003) define SCRM as "the identification and management of risks for the supply chain, through a coordinated approach amongst supply chain members"; according to Norman and Jansson (2004), SCRM means collaborating with partners to reduce logistic risks; Tang (2006) considers SCRM as "the management of the supply chain risks thorough coordination or collaboration among the supply chain partners so as to ensure profitability and continuity" (p.453); Wo (2010) views SCRM as a way to avoid risk by minimising costs and promoting the security and efficiency of the supply chain; and Thun and Hoenig (2011) define SCRM as "the identification and reduction of risks not only at the company level, but rather focusing on the entire supply chain" (p.243). For Trkman and McCormack (2009), SCRM is conditioned by supplier, market turbulence, technology and environmental aspects.

Moreover, supply chain risk depends on the development of lasting and collaborative partnerships (Lavastre et al., 2014): local collaboration with suppliers allows firms to operate in a more efficient way at all levels (Flynn et al., 2010; Fritz et al., 2017). SCRM can also be defined as "a set of approaches and practices for the effective integration of suppliers, manufacturers, distributors, retailers, and customers" (Andjelkovic, 2017). Ho et al. (2015) observe that a great number of SCRM studies make reference to quantitative methods and empirical analysis (around 76%) while qualitative methods are used less frequently (around 24%) (Ho et al., 2015).

Other authors explore the promotion of partnerships as one of the most effective strategies to implement SCRM (Lavastre et al., 2014). Gaudenzi et al. (2006) suggest that SCRM can be an efficient method to support managers in identifying risk indicators. Other studies (Zhu et al., 2017; Lackovic et al., 2018) propose an accurate literature review of SCRM and risks, suggesting how mitigating them. Norman and Lindroth (2002) define SCRM as the process of collaboration with partners aiming to manage risks with a direct impact on logistics and resources; Jüttner et al. (2002) consider risks as consisting of two different parts: the 'risk sources' (environmental, organisational and supply chain aspects) and the 'risk consequences' (connected to the impact of risks).

Studies published subsequently associate supply chain risk with four different areas: supply management, demand management, product management and information management (Tang, 2006). Other studies suggest pooling between partners to minimise risks (Chopra and Sodhi, 2004). Cavinato (2004) identifies the risks associated with

SCRM as physical, financial, informational and relational, while Diabat et al. (2012) connect SCRM to supply risks, operational risks and demand risks.

According to some researchers (Tang and Tomlin, 2008), flexibility strategies can be considered to be an efficient mechanism for mitigating supply chain risks; multiple sourcing, flexible supply contracts, flexible manufacturing processes and long-term relationships represent possible solutions. Harland et al. (2003) individuate operations, supply, customer, competitive and reputation risks; Jüttner et al. (2003) associate environmental risk, network-related risk and organisational risk with supply chain risks; Christopher and Peck (2004) distinguish external risk (environmental risk), which is external to the firm but internal to the supply chain (demand and supply risks), and internal risk (process and control risks); Tang (2006) defines operational risks (customer demand and costs) and disruption risks (hurricanes and economic crises); and Bogataj and Bogataj (2007) associate SCR with supply, production, distribution and environmental risks, while Tummala and Schoenherr (2011) define demand risks (inaccurate forecasts and seasonality), delay risks (transportation and lead time), disruption risks (natural disasters), inventory risks (demand and supply), manufacturing risks (quality and costs) and supply risks (quality of service and wrong partners).

While SCRM considers the risks connected to the suppliers, risks are increasingly being linked to sustainability. For this reason, it is necessary to take into consideration not only the operational risk linked to the supply chain but also sustainability-related risks. A lack of social sustainability (in terms of unemployment and a lack of collaborative partnerships) in SCM choices could expose companies to reputational risk. To avoid this situation, they should implement a risk management strategy that mitigates the risk related to social sustainability.

2.2 The evolution of a sustainable supply chain: the social sustainability aspect

The pursuit of sustainability is increasingly considered to be an effective strategy: a sustainable supply chain (SSC) is perceived as an important source of cost reduction and long-term profitability (Wang and Sarkis, 2013). Hence, the responsibilities of supply chain managers have evolved, especially with reference to sustainable sourcing, local production and the relationship with suppliers (Hofman et al., 2014).

In this sense, it is essential to operate according to a triple-bottom-line vision: there is an interaction between economic, social and environmental aspects and different types of advantages (Carter and Rogers, 2008): cost savings, packaging reduction, alternative materials, recycling, transport and emission reductions (Carter and Easton, 2011). An SSC can be considered to be an evolution of a supply chain: the introduction of sustainability into a supply chain leads to the consideration of social and environmental criteria; it includes human rights, health, safety (Dreyer et al., 2005), work–life balance, empowerment, community engagement, social inclusion, community cohesion and social interaction (Dempsey et al., 2011).

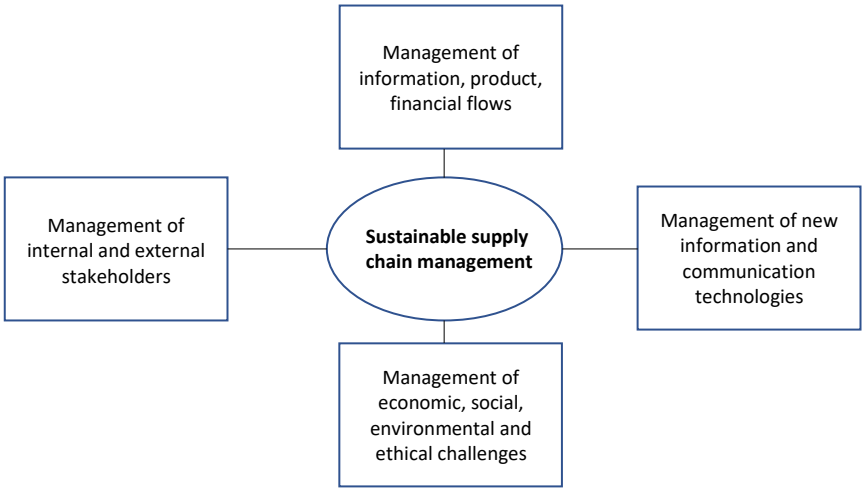
Social sustainability should be part of the business strategy because it affects the quality of stakeholder relationships, with impacts on employees, customers and local communities. Some scholars (Sharma and Ruud, 2003) define social sustainability as an ‘ethical code of conduct for human survival and outgrowth that needs to be accomplished in a mutually inclusive and prudent way’. In particular, with reference to manufacturing, socially sustainable practices can be defined as the product and process aspects that

determine human safety, welfare and wellness (Wood, 1991). Social sustainability issues are related to stakeholders, including suppliers, manufacturers, customers and society.

Social sustainability is not easy to measure. It is difficult to identify and to establish a way to measure it (Hutchins et al., 2008), but the European environment agency suggests different dimensions: equity, health, education, security and population (Department of Economic, and Social Affairs Staff, 2001). According to some authors, social sustainability is composed of four dimensions: safety, equity, eco-prosumption and sustainable urban forms (Eizenberg and Jabareen, 2017). Other authors identify six social dimensions: equity, philanthropy, safety, health and welfare, ethics and human rights. They underline the importance of the ethical dimension for suppliers and their relationship with supply chain social sustainability (Mani et al., 2016).

For these reasons, it is essential to develop operations, purchasing and the supply chain in an integrated manner with social, ethical and environmental aims, realising sustainable supply chain management (SSCM). In this way, SSCM combines the traditional activities of SCM with the management of environmental, social, economic and ethical challenges, according to the integration of the digitalisation trend (ICT technologies like augmented reality, IoT and virtual reality) (Fritz, 2019).

Figure 1 Sustainable supply chain management (see online version for colour)



Source: Fritz (2019, p.10)

Moreover, the sustainability aspect is considered to be an important part of business strategy because it has an impact on the environment, society and business viability (Krysiak, 2009), so the concept of SSC is evolving, implementing the green/environmental perspective – green raw material, green production, green packaging and green distribution (Mangla et al., 2015) – but also social and economic ones, and it requires companies to take into consideration the costs and risks associated with a sustainability strategy.

Furthermore, in addition to the typical risks of a supply chain, such as quality issues, delivery delays, product changes (Chopra and Sodhi, 2004), logistics, transportation (Wu and Blackhurst, 2009), demand volatility and inaccurate forecasts (Zsidisin et al., 2004),

it is necessary to take into consideration sustainability-related risks, such as corporate reputation, greenhouse gas emissions, energy consumption, packaging waste, damage during logistics and transportation and unethical behaviours (Anderson, 2005), which increase sustainability risk.

Social risk refers to the exposure to negative social conditions that undermine social sustainability (Pelletier et al., 2018). The social dimension involves the delivery of responsibilities towards employees, customers, business partners, governments and societies (Porter and Kramer, 2006; Pullman et al., 2009), such as overcoming the issues of excessive working time, no work–life balance, unfair wages, unethical behaviour, child and forced labour, discrimination, wrong working policies, social instability, pandemics and demographic changes (Giannakis and Papadopoulos, 2016).

Table 1 Sustainability-related supply chain risks

Endogenous	*Exogenous*
Environmental	
• Environmental accidents (fires, explosions)	• Natural disasters (e.g. hurricanes, floods)
• Pollution (air, water)	• Water scarcity
• Non-compliance with sustainability laws	• Heatwaves, droughts
• Emission of greenhouse gases, ozone depletion	
• Energy consumption (unproductive use of energy)	
• Excessive or unnecessary packaging	
• Product waste	
Social	
• Excessive working time; work-life imbalance	• Pandemic
• Unfair wages	• Social instability
• Child labour/forced labour	• Demographic challenges/ageing population
• Discrimination (race, sex, religion, disability, age)	
• Healthy and safe working environment	
• Exploitative hiring policies (lack of contract, insurance)	
• Unethical treatment of animals	
Financial/economic	
• Birbery	• Boycotts
• False claims/dishonesty	• Litigations
• Price fixing accusations	• Energy prices volatility
• Antitrust claims	• Financial crises
• Patent infringements	
• Tax evasion	

Source: Giannakis and Papadopoulos (2016, p.457)

Obviously, the identified risks are very difficult to eliminate, but they can be managed and mitigated through various strategies; in particular, the supply chain risk manager should:

- Avoid risk: make choices that limit the level of risk exposure, for example not choosing suppliers that are not environmentally friendly and that do not use sustainable technologies or processes.
- Control practices: adopt strategies that reduce the degree of risk exposure, for example developing a supplier development programme to reduce environmental incidents or developing a supplier reporting system for adverse events.
- Share risk: cooperate with suppliers to achieve risk pooling, such as multiple sourcing or sharing information with suppliers.
- Monitoring: monitoring the effects of the business strategy and identifying possible better solutions (Giannakis and Papadopoulos, 2016).

Generally, a gap in the literature between SCRM and sustainability emerges; therefore, some authors suggest investigating this relationship in future research (Lavastre et al., 2014). Social sustainability in terms of unemployment, a lack of collaborative partnerships, a lack of ethical working conditions and opportunistic attitudes are the principle problems that obstruct the realisation of SSCM. The results of the research by Da Silva et al. (2020) show that, for managers, the relationship between sustainable supplier selection and business strategy and stakeholder engagement is important and could be a strategic management opportunity to operate in a sustainable way as well as to manage the corporate reputation (Petersen and Lemke, 2015).

In fact, according to Teuscher et al. (2006) a great number of risks that represent obstacles to the creation of a SSC are due to the lack of good partnerships. The authors think that all partners, such as customers, suppliers and management, should be involved along the supply chain; by building strong and lasting partnerships, it is possible to create a competitive advantage for companies. Thus, it is necessary to have a complete overview of corporate processes and risks to realise a lean supply chain and introduce a strategic ethical and sustainable mechanism.

2.3 Supply chain risk management and the total quality management approach

Lean management is a managerial approach with the aim of reducing or eliminating any sources of waste, improving the ability to achieve a competitive advantage. The application of lean management principles to a supply chain is known as lean supply chain management (LSCM), the intention of which is to reduce costs and waste, guaranteeing efficient and effective results in terms of greater efficiency, lower inventory, higher customer satisfaction and better quality (Singh and Pandey, 2015; Núñez-Merino et al., 2020).

Lean principles' application to a supply chain is facilitated by the digitalisation process, which is defined as the use of information and communication technology to achieve a more efficient and effective value creation process (Núñez-Merino et al., 2020). The use of connectivity and different technologies in the manufacturing industry is referred to as Industry 4.0 (Lee et al., 2018). This term denotes the use of a wide variety of technologies to make production systems and supply chains autonomous, dynamic,

flexible and precise (Tortorella and Fettermann, 2018). Moreover, lean practices increase environmental performance because increased productivity creates opportunities for environmental improvement (Chen et al., 2020).

From a sustainability viewpoint, the realisation of a lean supply chain that is respectful of ethical and sustainable politics means directing the attention to health and safety conditions, waste and inefficiency reduction, technology and innovation, social interests, integration, collaboration with partners and the risk management approach. In this sense, the creation of a lean supply chain, which is risk oriented in line with a sustainability policy, has a positive impact on reputation and the corporate brand.

According to the literature review, risk strategies are related to a TQM perspective; in particular, the TQM strategy and SCM are two of the most important strategies in manufacturing. However, it is very difficult for a firm to guarantee the connection between supply chain quality and risk. The product quality in a supply chain is one of the most important problems for a firm; the risks associated with a supply chain's quality aspects of business are very different, and they include supplier qualification screening, multi-sourcing, flexibility and penalties levied for supplier non-performance (Yang et al., 2009). The problem of quality arises in a supply chain due to global sourcing and outsourcing of production and brand utilisation. Considering that many firms move their production offshore, it is extremely difficult to have total control of quality and safety of production (Tse and Tan, 2011).

Which practices are appropriate to control and manage the quality risk in a supply chain? Several studies define the integration between quality management and SCM as a concept of supply chain quality management (SCQM). It is the formal coordination and integration of business processes that involve all the partners in the supply chain network to measure, analyse and continuously improve products, services and procedures with the aim of creating value and achieving customer satisfaction in the market (Noor et al., 2020).

The literature review provides only a limited understanding (Tse et al., 2019) of which risk management practices can help to mitigate the negative consequences of quality risk and improve firms' performance (Hora et al., 2011; Tse and Tan, 2011). Some academics think that integrating TQM and SCRM with a sustainability perspective represents a promising area for academic investigation to support organisations in developing more competitive and resilient strategies. The connection between the two approaches could have a significant impact on companies' business strategy; the probability of occurrence of a negative event and the identification and minimisation of risks represent the TQM strategy features that, combined with a supply chain approach, could attenuate and mitigate risks. Some authors, such as Faisal et al. (2006), identify certain factors that can facilitate the risk mitigation strategy: information sharing; collaboration with suppliers; the realisation of long-term and collaborative relationships among supply chain partners (to minimise opportunistic situations); corporate social responsibility politics; and the realisation of strategic risk planning (Faisal, 2009).

Traditionally, the attention given to quality management policies was focused on waste reduction and the identification and elimination of problems to improve products and processes. From a modern perspective, manufacturing is characterised by a lean approach (Williams et al., 2006): flexibility, speed, innovation and performance, continuous improvement, waste and inventory reduction, and quality improvement. Therefore, the realisation of a TQM perspective is necessary to develop a risk management culture within businesses to guarantee a quality approach.

Moreover, the implementation of an SCRM should be part of the decision-making process and shared at all levels. For example, during the design stage, the supply chain vulnerability should be taken into consideration, such as the availability of components and lead times. Furthermore, in the case of business strategy changes, such as moving from offshore production to internal production, it is particularly important to consider the level of supply chain risk associated with the operations (Christopher and Peck, 2004). Hence, it is essential to make a profit without sacrificing quality and efficiency. In fact, production with poor quality influences a brand, and consequently its corporate reputation on the market, in a negative manner.

How can a company protect its reputation? First, it is vital to define social and environmental standards and codes of conduct to guarantee the compatibility of different interests, evaluating the business practices of partners, ensuring the efficiency of communication and guaranteeing the decision-making process and strategic planning to minimise business conflicts and monitor internal processes and their impacts [Teuscher et al., (2006), p.2]. In particular, stakeholders' engagement with partners, customers and suppliers in the business process represents a strategic way to improve the business performance, reducing risks across all the stages of the supply chain. Managers should consider the synergies between sustainable supplier selection and evaluation: the process of supplier selection is part of SSRM and influences reputation management.

In this sense, the strategic and sustainable management of the supply chain causes the evolution of the traditional 'make or buy' choice. There is a strategy change, moving from the buy to the make approach; through internalisation, companies should evaluate not only the benefits in terms of costs, control, quality and times but also the implications for stakeholders in terms of risks, referring not only to the operational risks associated with the supply chain but also the social sustainability risks. In this sense, the mitigation choice and strategy could be associated with a stakeholder engagement/involvement strategy (Passetti et al., 2019), promoting collaborative partnerships with suppliers.

The internalisation of some phases of the production process aims to obtain greater control over the production process and quality. In particular, by internalising, a company exposes itself to different social sustainability risks; in particular, our attention is focused on the relationship with suppliers, which could be exposed to the risk of failure due to the reduction or cancellation of orders.

3 A case study of supply chain risk management

3.1 The case study methodology

The interest in SCRM derives from unexplored risks that are related to the supply chain. These represent a threat to companies, and they should take into consideration not only the operational risk but also the social, ethical and environmental perspectives to realise a TQM-oriented management system. Since the integration of the TQM and SCRM perspectives represents a promising area for academic investigation, to support businesses in developing more competitive and resilient strategies, we present a case study conducted in the upholstery sector as a practical example of the SCRM approach according to a sustainability viewpoint.

We adopt a qualitative research approach to investigate some aspects that are difficult to measure through quantitative methods (the type of risk, the strategy adopted to manage

social risks, the total quality approach used and aspects of innovation to improve quality). The qualitative method is chosen for its flexibility: it allows researchers to ask different actors a question and to compare the information obtained, observing the same phenomenon from different aspects. To collect information, structured interviews are chosen due to the opportunity to collect managerial perspectives and experiences and explore different points of view (Goulding, 2002).

Structured interviews are considered to be a flexible and useful method of data collection; they are particularly suitable for collecting experiences and behaviours, facilitating the collection of large amounts of information that can be analysed in depth (Lambert and Loiselle, 2007; Coughlan, 2009). Interviews allow the collection of background information about companies, supply chains, environmental strategies, digital and innovation processes, supply chain organisation, sustainability practices, social problems and strategic policies.

From an academic point of view, the exploratory approach of the case study technique is considered to be the most popular method for examining a 'concrete case' in a 'real-life situation'. To understand 'how' in relation to certain phenomena, the use of qualitative research methods is appropriate for investigating real-life situations. In particular, the case study method is indicated when 'how' and 'why' questions are posed with reference to a realistic situation (Yin, 2014). Moreover, case studies are especially useful at the preliminary and exploratory research stages, especially if the boundaries between the phenomenon and the real-life context are not clearly evident (Eisenhardt, 1989).

Data are collected by conducting semi-structured interviews with the top managers of the following departments: supply chain, operations and information technology (IT). The interviews are built on 21 open questions concerning the following themes:

- the marketing strategy
- the manufacturing process
- the SCM strategy
- the digital technologies adopted.

3.2 Supply chain risk management in the furniture sector: the case of Natuzzi SpA

The paper presents a case study of a company located in south-eastern Italy, operating in the upholstered sofa industry.

Natuzzi SpA is a global manufacturing company, with strong roots in the network district of the upholstered sofa chain: born in the 1960s, it quickly grew to become an important industrial sofa manufacturer for the UK and US market. Between the 70s and 80s the company achieved a high level of brand awareness in the US through a strategy based on coloured leather sofas and inimitable comfort.

In the 1990s the company was listed on the New York Stock Exchange and, at the same time, it began to develop its direct store chain with the brand 'Divani and Divani'.

At the moment, Natuzzi Spa is one of the best known and appreciated companies in the furniture industry worldwide.

Natuzzi's plants are located in China, Brazil, Romania and Italy, where the manufacturing process is vertically integrated.

The observed business is positioned in the following market segments:

- unbranded sofas in the wholesale channel
- medium-end segment, with Divani and Divani and Natuzzi edition brands
- high-end segment, with 100% Made in Italy Natuzzi Italia brand.

Until 20 years ago, the business pursued a product oriented strategy, adapted exclusively to the wholesale channel, in which almost everything was uncontrollable: the supply chain of the sofa manufacturing process is very long, so, over time, the observed business has pursued a vertical integration strategy both upstream and downstream, in order to achieve a higher control in manufacturing, sales and brand management processes, thus becoming a global retailer.

4 Discussion

The observed business has recently adopted two total-quality-oriented strategies regarding its operations and SCM:

- the implementation of moving line production
- the internalisation of the chassis assembly processing phase.

'Moving line production' refers to a lean production process whereby three workers are involved in assembling individual parts of a sofa. With the previous operations management approach, a sofa was considered as a mono-block, but the business moved towards a modular production approach, basing on which a sofa is composed of several components (especially armrests and backrests) that, if properly designed, could be assembled into different sofas.

The manufacturing process moved from island production (sofa construction from scratch) to modular line production (a manufacturing process organised into several work stations), but, unlike the automotive production process, which moves along a traction line, in the Natuzzi moving line, there is a translator that moves the sofa's parts from one station to another. In this way, workers achieve a higher level of specialisation in the operations on a single part, ensuring, through the operations' repetitiveness, greater efficiency, speed and quality control.

The decision to internalise the chassis assembly is a direct consequence of the change towards 'moving line production'; from a purely logistical and organisational point of view, the incoming of a pre-assembled chassis is antithetical to the concept of production modularity, so it was necessary to internalise the chassis assembly and to divide the chassis parts into individual assembly stages.

Furthermore, this decision led the company to gain the following advantages: space optimisation, a decrease in WIP costs, a decrease in logistics costs (referring to the larger quantities of unassembled chassis managed) and an increase in quality control (referring to the risk mitigation of barrel damage during picking activities and to the assembly phase). On the other hand, the adoption of 'moving line production' was not only motivated by these organisational or cost rationalisation needs but also strongly influenced by the marketing strategy: the goal of penetrating the premium market can

only be achieved by ensuring the maximum quality control throughout the entire manufacturing process. This led to the decision to internalise one of the phases with the highest added value of the manufacturing process because the comfort of the seat mainly depends on the chassis quality.

The analysis of the managers' answers to the questions about the organisational change towards a lean structure highlights an interesting aspect: the total-quality-oriented strategies (the moving line production and the vertical integration of chassis assembly) are instrumental and preparatory steps for the effective implementation of the business marketing strategy, aimed at developing the market share and the brand awareness in the premium market segment.

These two total-quality-oriented strategies are based on the following pillars:

1 Downstream vertical integration in retail, through the opening, the management and the complete control of direct stores

2 Product range enlargement, including the home furnishings components that are complementary to sofas, such as lamps, drapery fabrics, carpets and shelving. This strategy aims at reinforcing and developing the country of origin (COO) Made in Italy effect and the concept of the Italian way of life, especially in growing markets such as China, which is strongly perceived as plus by the increasing 'new rich' Chinese social class. The product range enlargement is realised exclusively by the Natuzzi Italia brand, which aims at becoming a life brand, allowing customers (through (VR) technology) to live, directly in the store, the experience of seeing their desired sofa in their own living room

3 The internet of things applied in store as decision system support for merchandising to know the merchandise display in real-time in every store worldwide and to manage the worst performance. This technology aims at creating synergies, gathering signals from the customers and optimising the time and the information flow between the store managers, the plants managers and the suppliers. The IoT sensors applied in the retail stores allow the managers to measure which displayed products are being observed and for how long. By providing indications on products' positioning (in a particular position, with reference to a specific colour, etc.), the microsensors allow the marketing manager and store manager to optimise the sales efficiency in each store, thus improving their display capacity.

Another important digital innovation is the 3D VR viewer, which allows consumers to see a sofa directly in a home image to avoid colour, type or location mistakes. Moreover, an evolution of business figures is taking place from sales assistants to sales consultants, who use innovative digital technologies based on experiential marketing to sell products. Through the use of a 3D viewer, potential customers can have an augmented reality experience during which they can see the 3D sofa solution within their home, enabling them to evaluate the size, positioning and colour in the living zone of their home. The VR 3D configurator supports marketing campaigns and communication with the customer, and having the possibility to choose the colour and the positioning of the sofa has brought sales advantages due to the greater extent of personalisation.

5 Digital innovation in the manufacturing process

- 3D technology enables sofa prototypes to be designed and realised in plastic materials. In this way, the company has introduced PLM (product life cycle management) as a tool that gives the idea of the entire product life cycle to create a digital twin product (the sofa is realised digitally on a real scale)
- IoT sensors are applied to the production process to control the moving line production performance in real-time within each plant
- Artificial intelligence solutions are applied to the production line to control the aesthetic defects in the processing phases, blocking the moving line production in real-time
- Artificial intelligence is applied to the inventory planning, supporting the supply chain manager in forecasting the material requirements and purchasing process.

Therefore, the involvement of the chassis supplier in the aforementioned marketing strategy means, first, great commitment from the principal actor to transforming the supply relationship into a strong partnership aimed at attracting new customers in the premium market segment; in this way, the principal actor can assure the chassis supplier of satisfactory production volume (even if it is in a different modular way) and higher profit margins than the supplier can achieve by producing the chassis for sofas intended for the wholesale target.

The analysed business, in its principal actor role within the business network, seeks to transform the finished chassis supplier into a chassis modular part supplier: the decrease in assembled chassis orders can be counterbalanced by an increase in the number of modular chassis orders. More specifically, the emerging risk mitigation strategy is based on the following logic:

1 The principal actor must internalise the chassis assembly phase to optimise costs but, overall, to increase the quality control to attain (and to keep) market shares in the premium global market segment.

2 The reduction and/or the elimination of finished chassis volumes can cause the failure of the chassis supplier, with the consequent loss of employment; this risk can negatively affect the company's brand and image, especially within the business network and the local community.

3 To mitigate the risks of a negative impact on the business reputation and on social sustainability among the business network and the local community, the principal actor has adopted an informal risk management strategy aimed at supporting the chassis suppliers in facing this change:

   a By transforming the organisational structure into the supply of modular parts, it has adopted a win-win strategy. In this case, the observed business runs the path of the dyadic relationship with the supplier, aimed at involving the partner in a total-quality-oriented production structure change, which is aimed at the production of chassis modules with higher added value.

   b By increasing orders from competitors and adopting an informal business strategy network. In this case, the principal actor runs the path of informal business networking; the company uses the contractual weight to convey orders from external players to the chassis suppliers.

4 The volume decrease (number of finished chassis) and the turnover reduction (value of the assembled chassis) can be managed by increasing the volume of finished sofas and their unit price to the extent that there is the highest level of chassis supplier engagement with the concept of total quality and the greatest commitment to the guarantee of zero-defect production for the single modular parts.

5 By moving away from the win–lose logic of bargaining power, deriving from the market shares and the connected production capacity, and instead pursuing a win-win logic, the supplier engagement takes place informally within the dyadic stable business relationship that involves the two buyer-supplier actors.

It is interesting to underline that, to implement the risk mitigation strategy oriented towards social sustainability, the observed firm used exclusively relational tools. The supply chain manager and purchasing manager played an important role in the negotiations with the chassis supplier and with the other relevant actors within the business network. Furthermore, they leveraged intangible resources, which compose the business network, in particular the atmosphere within which the relationships with the actors are developed, including the chassis suppliers. With the latter, the logistics and purchasing managers had the important task of explaining the change and growth prospects in higher market segments. To mitigate the reputational and supply risks, Natuzzi has developed a strong partnership with suppliers aimed at gaining new customers jointly in the premium market segment, thus realising a win-win strategy.

6 Conclusions

The vertical integration and internalisation strategies of some processing phases aim to achieve greater control over the production process and quality, but they can expose a business to the risk of damaging the long-term relationships with supply chain stakeholders. In fact, the risk of suppliers' failure and the consequent loss of employment can damage the business's reputation both within the business network and within the related social community.

This hypothesis stimulated an in-depth study of a business, which plays the role of principal actor within a business network characterised by strong interdependence between actors and a close interconnection with the social community in which it developed. The study of the strategies implemented by the observed business, regarding the manufacturing process management, the supply relationships and the digital innovations, highlights several interesting aspects:

1 The reasons for the strategic decision to internalise a processing phase with high added value are not only connected to cost optimisation and to greater control over the entire manufacturing process but also arise from the strategic marketing objectives that the company aims to achieve. In fact, the premium market segment penetration implies indispensable direct quality control management at every critical processing stage.

2 Therefore, there is a link between the marketing strategy and the SCM's total-quality-oriented strategy.

3 The strategic choice of vertical integration implies the careful assessment of all the potential risks deriving from it, including the social one. From this consideration emerges interesting evidence on TQM and SCRM integration as a tool for supporting the company in the formulation and strategic implementation as well as the link between SCRM and the social sustainability of SCM strategies.

4 A way to mitigate the reputational risk and the social sustainability risk connected with the internalisation strategy lies in the involvement of the supplier in the principal actors' marketing strategy; it implies the sharing of different costs and responsibilities as well as an organisational change that, on one hand, protects the supplier from the risk of failure and, on the other, allows the supplier to achieve greater competitiveness and higher profit margins.

5 The social sustainability risk, deriving from the supplier failure risk, can be managed through an informal risk management strategy aimed at supporting the supplier in the reorganisation of its production process. The involvement of the supplier in the marketing strategy of the principal actor, aimed at penetrating the premium market segment, implies that the supplier produces modular chassis pieces with the highest possible value added.

The analysis reveals that an effective way to connect the total-quality-oriented internalisation strategy to the reputation risk mitigation consists of:

- vertical downstream integration in retail
- customer engagement in living design through experiential marketing
- supplier engagement in organisational changes.

It can be noted that the link between the TQ-oriented strategy and SCRM is represented by the integration with actors that are external to the manufacturing process: in the first case, there is a pure vertical integration downstream process; in the second case, there is the 'integration' of consumers' perception through their emotional involvement; and in the third case, there is the 'integration' of the strategic objectives of suppliers. In the last two cases, emphasis is placed on the emotional and relational aspects that the sales consultants and the procurement managers can and must leverage.

This aspect did not emerge clearly enough at the beginning of the survey but is the result of a careful analysis of the observed business marketing strategy. If the marketing strategy objectives had not been studied in depth, the answers to the first questions asked would have simply brought out the description of the two TQ-oriented choices and the two drivers underlying these choices, namely cost optimisation and the increase in the degree of control over the manufacturing process. However, it would not have been enough to reveal in greater detail the logical link that binds the supply chain strategy to the marketing strategy. Furthermore, this logical link in the case study emphasised the need for total control of the quality of the individual processes. The business relied on this aspect to develop supplier engagement into a sort of shared adventure of conquering new markets. The possible social sustainability risks deriving from total quality-oriented strategies, such as the internalisation of chassis assembly, have been managed fundamentally through two complementary paths: downstream integration in the retail

channel, aimed at increasing sales volumes through the engagement of the final consumer thanks to digital VR technologies, and vertical upstream integration, by engaging the suppliers in the implementation of a marketing strategy aimed at increasing the medium-high segment of home furnishings in the global market.

The empirical evidence emerging from the case study appears to be consistent with the insights found in the academic literature: the collaboration with partners allows the firm to operate in a more efficient way at all levels (Chopra and Sodhi, 2004; Norman and Jansson, 2004; Flynn et al., 2010; Lavastre, 2014; Fritz et al., 2017) to realise community engagement through social inclusion and community cohesion (Dempsey et al., 2011), minimising opportunistic situations (Faisal et al., 2006), avoiding affecting the corporate reputation (Anderson, 2005; Petersen and Lemke, 2015) and mitigating social instability through a shared risk strategy (Giannakis and Papadopoulos, 2016).

The paper shows the typical limitation of a single case study: a comparison with different case studies could strengthen the implications as well as identifying some indicators to measure the level of social sustainability risk. At the same time, the paper tries to integrate several academic concepts, such as SCM, risk management, SSCs, quality management, lean management, identifying the possible social sustainability risks that can be generated and integrating sustainability into supply chain decisions.

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