



Do stakeholder capabilities promote sustainable business innovation in small and medium-sized enterprises? Evidence from Italy

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ABSTRACT

Sustainable innovation and its management have become fundamental forces for change in business and society. Paradoxically, little attention has been given to how small and medium-sized enterprises (SMEs) manage sustainable innovation in the current knowledge-intensive context. By studying 80 SMEs from the high-tech manufacturing sector in Italy, this research has found that, when combined with stakeholder engagement, sustainable innovation management becomes a pivotal phenomenon for new and established SMEs. Stakeholders proved instrumental in generating the sense of environmental responsibility in SMEs. As a pioneer combination of stakeholder theory and innovation management theory, our research found that stakeholder-related capabilities, both tangible and intangible, influence the firm's orientation towards sustainable innovation, its environmental responsibility and related capabilities. Our research assists the sustainability, adaptation, innovation and growth orientation of SMEs in a knowledge-intensive environment by recommending that, in their relationship with stakeholders, SMEs become more open to co-create, share and reuse environmental knowledge.

1. Introduction

For the last two decades, sustainable innovation has been considered a fundamental force for change in business and society (Larson, 2000). Growing economic and social challenges have emerged, accompanied by developments in information and communication technology (ICT) that have encouraged the study of sustainable innovation from multiple points of view (Bates et al., 2011). A basic assumption has been that the innovations provided by ICT are causing disruptive changes both socially and economically (Del Giudice, 2016; Caputo and Walletzky, 2017; Santoro, Bresciani, & Papa, 2018; Scuotto, Del Giudice, Bresciani, & Meissner, 2017; Aquino et al., 2018).

Taking this scenario as a starting point, several studies analyse the extent to which it is possible to maximise the positive impact while reducing the risks associated with technological developments in order to better understand the factors that enable sustainable innovation (Del Giudice & Straub, 2011; Martinez-Conesa et al., 2017). A growing number of scholars are studying the involvement of stakeholders and the role they play in the strategic management of an organisation. Consistent with stakeholder theory (ST), interaction with both market

and non-market players is shown to affect company performance (Freeman, 1984). As Werther and Chandler (2011) point out, stakeholder engagement affects the economic and social value of a firm in both the medium and long term. Relationships with stakeholders increase trust and social capital, thereby reducing transaction costs (Greenwood, 2007; Greenwood et al., 2010). In this way, a firm's ability to manage its relationship with stakeholders for value creation, known as its stakeholder-related capability, acquires increasing relevance in the stakeholder theory debate (Jones and Wicks, 1999; Walsh, 2005; Freeman et al., 2010; Fernando & Lawrence, 2014; Jones et al., 2018). Stakeholder engagement allows organisations to acquire information from their stakeholders (Sharma, 2005), and this supports the development of individual and organisational knowledge (Nelson and Zadek, 2000; Katsoulakos and Katsoulacos, 2007). Firms can then use this knowledge to improve their operation and profitability.

As highlighted in the discussion about open innovation, firms are required to adopt a collaborative approach in which chain partners and even competitors work together to develop new products and processes quickly and effectively (Chesbrough et al., 2006; Santoro et al., 2018). To this end, firms should develop the necessary organisational and

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individual capabilities to explore and integrate external sources of information (Nonaka and Toyama, 2007).

Stakeholder engagement can enhance an organisation's integrative capability (Senge, 2006) as well as its ability to accomplish knowledge retention and knowledge exploitation (Ayuso, Rodríguez, & Ricart, 2006; Chang, 2003; Macpherson, Jones, & Zhang, 2004). This means that firms can successfully complement their own internal resources through gaining access to the internal resources of connected actors. Organisations, particularly small and medium-sized enterprises (SMEs), are under increasing pressure to enhance their technical, organisational and social capabilities and to capitalise on dynamic factors such as innovation and competitiveness (Del Giudice et al., 2017; Scuotto, Del Giudice, Della Peruta, & Tarba, 2017). For this reason, stakeholder-related capabilities could become not only a driver but also a precondition for SMEs to effectively promote growth when facing the dynamic conditions of the current business environment (Del Giudice, Scuotto, García-Perez, & Petruzzelli, 2018). SMEs have particular potential to be enabled by interaction with their various stakeholders (Scuotto, Caputo, Del Giudice, & Villasalero, 2017). This interaction becomes an important source for the creation of inimitable value-generating resources and is referred to in the literature as an innovation network (Gulati, Nohria, & Zaheer, 2000).

Against this background, this study develops a theoretical model that aims to analyse the extent to which stakeholder-related capabilities and engagement determine the sustainable innovation orientation of SMEs in a knowledge-intensive context. More specifically, this research extends the previous literature on sustainable innovation in three main areas.

First, while the role of stakeholder engagement in sustainability management is widely recognised (Bowen et al., 2001; Handfield et al., 2005), little attention has been given to how SMEs manage sustainable innovation in a knowledge-intensive context. Findings from studies on large firms cannot be applied to SMEs due to substantial differences in the way they respond to social and economic pressures. These responses depend on (a) the exposure of the SMEs to stakeholders' expectations and (b) their ability to respond. The reality is that SMEs are generally affected only indirectly by pressure from stakeholders. They usually lack the personal, financial and time resources to respond to stakeholders' demands (Roberts, 2003, p. 164). This is why research is needed to understand better the extent to which SMEs could use their stakeholder relations to improve their resources for cooperating with societal stakeholders and responding to their demands (Dietsche, 2009).

Second, this study intends to connect stakeholder theory with innovation management theory (IMT). The study will be pioneering in this area as there are very few studies that take into account the relationship between knowledge acquisition and knowledge exploitation (Blomqvist, Hara, Koivuniemi, & Äijö, 2004; Chang, 2003; Kogut & Zander, 1992; Santoro & Usai, 2018; Wang, Clegg, Tang, & Fang, 2015; Weng & Huang, 2017) or the effect that the management of relationships between an organisation and its stakeholders can have on value creation (Fernando & Lawrence, 2014). The combination of stakeholder engagement and innovation management is a pivotal phenomenon for both new and established small firms and has been known for several decades to be a vital component of socio-economic growth (Birch, 1989; Rothwell & Zegveld, 1982; Rothwell, 1989; Pera, Occhiocupo, & Clarke, 2016). Paradoxically, literature reporting on efforts to understand and operationally assist in the sustainability, adaptation, innovation or growth orientation of SMEs is still limited. The intention of this research is therefore to explore, from an innovation management perspective, the role of stakeholder engagement in the entrepreneurial development of SMEs. Following the pivotal study by Ayuso, Ángel Rodríguez, García-Castro, and Ángel Ariño (2011), our aim is to operationally assist the sustainability, adaptation, innovation and growth orientation of SMEs by studying the extent to which stakeholder-related capabilities and engagement determine their sustainable innovation

orientation.

Finally, this study contributes to the main literature on orientation towards sustainable innovation as a combination of innovativeness, innovation capacity, and research and development (R&D) intensity (Ayuso et al., 2006, 2011; Hurley & Hult, 1998; Nejati, Amran, & Hazlina Ahmad, 2014). In addressing these questions, the paper starts by introducing the theoretical background to the research. In the next section, its hypotheses are presented. These are followed by a description of the methodology used for the collection and analysis of the data. To test our theoretical arguments, we analyse data collected from a dataset of 80 SMEs operating in the high-tech manufacturing sector, a knowledge intensive industry in Italy, by using the SEM methodology. Thereafter, the data analysis and its results are presented. The paper ends with a discussion of the research findings and their limitations and then concluding remarks.

2. Theoretical background and hypotheses

2.1. Sustainable business innovation

Innovation is a term used in many ways as determined by the context and the nature of the analyses. It can take several forms and be embedded, or it can result in products, production processes or management systems. The more 'macro' the approach (e.g. when used societally and culturally) the more varied and amorphous does the usage of the term become. West and Altink (1996) refer to the distinction in innovation made by Damanpour (1987) as being either technical or administrative. In most cases, innovation will be related either to R&D and consumer needs, to changes aimed at increasing productivity or to adaptation and the improvement of processes in managing people and organising work (Shingo, 1986). However, whether the innovation occurs in the technical systems of an organisation and is directly related to its primary work activity, or whether it appears in the social system of an organisation and affects the organisational structure and management of people (Damanpour, 1987, p. 677), every innovation enables entrepreneurs to exploit change as an opportunity (Drucker, 1985, p. 28). This is one of the reasons why, in recent years, an optimistic language has emerged where the terms innovation and entrepreneurship are often used interchangeably (Johnson, 2001).

More than just a concept, entrepreneurship is a process, a phenomenon that involves both the entrepreneur and essential entrepreneurial attitudes and behaviours (Clarysse & Moray, 2004; Lumpkin & Dess, 1996). An entrepreneur is an individual who takes both agency and initiative, who assumes responsibility and ownership for making things happen, is both open to novelty and able to create it, who manages the risks attached to the process and perseveres when faced with difficulties (Naman & Slevin, 1993; Johnson, 2001). Entrepreneurial attitudes and behaviours include three key dimensions, defined as innovation, risk-taking and proactiveness (Zahra, 1991, 1993; Morris & Lewis, 1995; Lumpkin & Dess, 1996; Balabanis & Katsikea, 2003; Johns & Mattsson, 2005). These are often expressed in attitudes such as creativity, motivation, accountability, the ability to see and realise opportunities and the capacity to tolerate ambiguity and uncertainty. Innovation in this context is defined by these authors as the seeking of creative, unusual and novel solutions to problems and needs. Such a definition of innovation as a dimension of entrepreneurship shows how intertwined these concepts are.

Because the ability to innovate when combined with a proactive approach to entrepreneurship enables new ventures to survive and then to thrive, both concepts are often related to SMEs. However, there is enough evidence in the extant literature to argue that the size of the organisation does not determine its capacity to act entrepreneurially and to stimulate or foster innovation (Johnson, 2001). Provided entrepreneurial qualities exist within individuals at all levels of an organisation, the entrepreneurs will support and enhance the efforts of the leaders, dealing with changes in the current dynamic environment and

with the challenges they pose for the business (Morris & Lewis, 1995).

Grossi (1990) pointed to the ability to adapt to changes in the environment as the key to organisational success. Thus, innovation in management systems, or business innovation, helps organisations to adapt their systems to new environmental conditions and to improve the way in which people are managed and work is organised (Martínez Lorente, Dewhurst, & Dale, 1999). This study therefore deals with innovation in management thinking as motivated by changes in the external and internal environment, that is, in the business and among its stakeholders, and it seeks to illustrate the value that is added when all stakeholders grasp the concepts of entrepreneurship and innovation.

Another crucial factor driving organisational performance in the current context is knowledge intensity. Knowledge intensity is a multifaceted concept that depends on the type of organisation, the industry within which it operates, its innovation system, the knowledge and skills of the individuals that drive it (e.g. founders, managers and employees), its relationship with its stakeholders and the external business environment (Chen, Yeh, & Huang, 2012; McKelvey & Lassen, 2013). Knowledge intensity therefore brings an additional dimension to business innovation and entrepreneurship, and it covers measures and indicators such as investment in R&D and networking or human capital, depending on the operational model of the enterprise (Sallos et al., 2017). This collaboration between entrepreneurs and their external and internal stakeholders for the purpose of sharing knowledge and resources for innovation management (Faems et al., 2005), results in continuous, purposive inflows and outflows of knowledge that bring the dual advantages of accelerating internal innovation while expanding markets for the external use of the innovation. This process, defined by Chesbrough et al. (2006) as open innovation, relies on the engagement of stakeholders and their capabilities together with the processes of innovation and entrepreneurship existing within the firm. Open innovation requires firms to develop external links and to exploit opportunities to access innovative ideas from outside of the organisational boundaries. This allows them to access the knowledge of actors involved in the relationship (Almirall and Casadesus-Masanell, 2010). These dynamics represent connective capacity or the ability of the firm to maintain knowledge in relation to other firms. This ability includes elements of alliance and interpersonal skills (Kale and Singh, 2007; Cruz-González, López-Sáez, Emilio Navas-Lopez, & Delgado-Verde, 2014; Gualandris et al., 2015; Ferraris et al., 2017). The lack of these capacities could explain why firms perform more inbound than outbound activities (Chesbrough and Crowther, 2006). Research into the factors that enable sustainable innovation could also contribute to the literature on open innovation management (OIM).

2.2. Stakeholder-related capabilities and environmental capabilities

Stakeholders increasingly require firms to become more environmentally aware and socially responsible, and the scientific debate on environmental responsibility (ER) has grown significantly in recent years. According to Mazurkiewicz (2016), ER refers to the commitment of firms to reduce their negative environmental impact. In order to effectively manage the environmental concerns of stakeholders and to achieve sustainable competitive advantage, firms should improve their environmental capabilities (EC) through their internal resources (Bae and Lee, 2017; Baranova and Paterson, 2017; Girod and Whittington, 2017; Caloghirou, Kastelli, & Tsakanikas, 2004). The management of environmental resources during production processes allows firms to meet their stakeholders' expectations (Grant, 1991; Strand and Freeman, 2015). Hence, environmental capability is closely related to internal and external collaboration and to the management of individual and organisational knowledge (Easterby-Smith and Prieto, 2008; Girod and Whittington, 2017). Since ER is only possible if firms become aware of the environmental issues relating to their organisational management, stakeholder engagement takes on strategic importance in addressing environmental concerns (Elkington, 1998;

Klassen and Vachon, 2015). Considering the importance of comprehensive value creation, recent developments in stakeholder theory highlight the relevance of interaction between corporations and their stakeholders to strategic management (Scherer and Palazzo, 2007; Freeman, 1984). In fact, such engagement supports firms in developing continuous relationships with relevant stakeholders and in fostering value creation (Baden-Fuller and Morgan, 2010).

As Arnstein (1969) points out, stakeholder engagement can function at different levels depending on the firm's commitment: a low level of involvement is based on passive interactions in which stakeholders only provide information; a high level of involvement is based on active interactions in which stakeholders initiate and co-design a process together with the firm. Several authors have attempted to analyse the role of stakeholder engagement in sustainability-oriented innovation. According to Ayuso et al. (2006, 2011), stakeholder engagement, as an organisational capability, is positively related to sustainability-oriented innovation. Therefore, to effectively engage stakeholders, firms should develop the capacity to deploy both tangible and intangible resources (Amit & Schoemaker, 1993; Grant, 1991; Teece, 2009; Inan & Bititci, 2015).

The study of organisational capabilities is not new, and these have been described in the literature as the coordinating mechanisms that enable the most efficient and competitive use of the firm's tangible and intangible assets (Day, 1994). Furthermore, these are found to generate innovations that are not limited to technological innovations but include those that improve business processes (Del Giudice & Straub, 2011; Edvinsson & Sullivan, 1996; Kaplan & Norton, 2004; Pironti, Pisano, & Papa, 2018; Riahi-Belkaoui, 2003). According to Sharma and Vredenburg (1998), stakeholder-related capabilities become, both directly and indirectly, a source of innovation and a driver to entrepreneurship within a firm.

The competitive advantage embedded within organisational capabilities stems from their elusive nature based on their social complexity and deep embeddedness in organisations (Hart, 1995; Teece, 2009; Winter, 1987). They are often invisible (Itami, 1987) and are based on tacit learning (Hart, 1995; Polanyi, 1962), which is acquired through knowledge exchange between internal and external stakeholders over time (Barney, 1991; Dierickx & Cool, 1989; Hart, 1995). Stakeholder-related capabilities are key to stakeholder theory studies. One of the main issues in stakeholder theory is the management of the relationships between an organisation and its stakeholders for purposes of value creation (Fernando & Lawrence, 2014). This defines the managerial aspect of the theory and its understanding of effective business management as creating as much value as possible from stakeholder-firm relationships (Freeman et al., 2010; Walsh, 2005; Jones and Wicks, 1999). From the perspective of stakeholder theory, stakeholder capabilities can be defined as the stakeholders' effective opportunities to undertake actions and activities with the firm through which they choose to engage in the value creation process (Garriga, 2014). The fact that stakeholder capabilities are directly related to a process of creating value that is of relevance to both the stakeholder and the firm points towards a firm-stakeholder alignment in at least one area, whether strategic or otherwise.

Another dimension of the firm-stakeholder relationship involves the role of fringe stakeholders who operate at the periphery of the traditional stakeholder networks but still remain a potentially valuable source of new capabilities and opportunities for the firm (Hart & Sharma, 2005). The concept of radical transactiveness—first introduced by Hart and Sharma (2005)—enables firms to acquire and integrate knowledge from their peripheral stakeholders (Fabricius & Currie, 2015; Gadenne, Kennedy, & McKeiver, 2009; Maier, Brem, & Kauke, 2016; Nkoana, Waas, Verbruggen, Burman, & Hugé, 2017). The term 'transactive' refers to the principle of influencing each other by means of a two-way stakeholder dialogue (Maier et al., 2016). In this way, stakeholders have a double function: they can influence and be influenced by firms (Freeman, 1984; Dawkins, 2015). Therefore,

stakeholder dialogue holds the potential to 'generate imagination and ideas about unmet needs, potential new products, and business innovations' (Hart & Sharma, 2005, p. 10). This alignment helps individual stakeholders and their capabilities to play a significant role in the perception of both parties as being environmentally responsible. Moreover, when firms proactively address social and environmental issues in their business strategies, stakeholder related capabilities may emerge (Sharma & Vredenburg, 1998). On this basis the following hypothesis is proposed:

Hp1. Stakeholders' capabilities in relation to environmental responsibility are positively related to the environmental capabilities of SMEs.

2.3. Sustainable innovation orientation

Sustainable innovation has been broadly defined in the literature as the capacity of an organisation to adopt new ideas and successfully implement these ideas in new products or processes with acceptable levels of resource consumption and waste generation (Anttonen, Halme, Houtbeckers, & Nurkka, 2013; Boons & Lüdeke-Freund, 2013; Boons, Montalvo, Quist, & Wagner, 2013; Varadarajan & Kaul, 2017). In other words, sustainable innovation considers environmental and social issues as well as the needs of future generations (Ketata, Sofka, & Grimpe, 2015; Nakata & Viswanathan, 2012). Although a relatively new and still largely unexplored paradigm, sustainable innovation is considered a fundamental force for change in business and society (Larson, 2000). In fact, several innovations provided by ICTs are already affecting social and economic configurations (Assink, 2006; Del Giudice, 2016; Caputo and Walletzky, 2017; Santoro et al., 2018; Aquino et al., 2018). This means that they not only facilitate the achievement of competitive advantage for firms but also affect sustainable development. Among the multiple insights that address these challenges, a considerable number of contributions refer to factors that enable sustainable innovation.

Studies that analyse these enabling factors emphasise that innovation is driven by internal resources (Teece, 2009; Cohen and Levinthal, 1990; Conner and Prahalad, 1996; Eisenhardt and Martin, 2000). To achieve a sustainable competitive advantage, firms should turn environmental concerns into opportunities. To achieve this, firms should share their internal environmental capabilities with their stakeholders. This can enable them to achieve a sustainable competitive advantage in the market. As several researchers have pointed out, collaboration with external parties benefits the innovation process, while a firm's philosophy of doing business in an environmentally and sustainable way will support its sustainability-oriented innovation (Kuckertz and Wagner, 2010; Ayuso et al., 2011; Roxas and Coetzer, 2012). To develop sustainability-oriented innovation, firms should balance stakeholders' interests and integrate their knowledge internally (Ayuso et al., 2006). This means that the ability to use, manage, share and capitalise on their knowledge can assist the firm in adapting to changes in the external environment and in improving their competitive advantage (Del Giudice et al., 2014; Ranga and Etzkowitz, 2015; Del Giudice and Della Peruta, 2016; Vrontis et al., 2017).

Authors such as Jorna (2017) highlight the importance of individuals' knowledge if sustainable innovation strategies are to succeed. This suggests that there are significant challenges in measuring the intensity of a firm's orientation towards sustainable innovation as it depends not only on the firm and its context but also on its relationship with its internal and external stakeholders, as well as on their individual tangible and intangible assets. However, the literature contains reports on initiatives that have measured the orientation towards sustainable innovation as being a combination of innovativeness, innovation capacity and R&D intensity (Ayuso et al., 2006, 2011; Hurley & Hult, 1998; Nejati et al., 2014). This covers a range of issues, from the evoking of new ideas to the ability to stimulate their creation and to bring such ideas to fruition. Ayuso et al. (2011) found that knowledge

sourced from engagement with internal and external stakeholders contributes to a firm's sustainable innovation orientation. This becomes relevant in areas related to environmental protection, which often demand multiple disciplines and the engagement of stakeholders, and where studies are scant and too heterogeneous to allow for generalisations. However, there is a need for better understanding of the drivers of a firm's orientation towards sustainable innovation, particularly in relation to its environmental capabilities. We therefore hypothesise that:

Hp2. The environmental capabilities of SMEs are positively related to their orientation towards sustainable innovation.

2.4. Stakeholder capabilities in relation to environmental responsibility

Although they are not new, over the last decade, environmental and social responsibility have gained greater prominence across businesses and in society (Jamali, 2007; Kalamas, Cleveland, & Laroche, 2014; Lee, Kim, & Kim, 2018; Reed, 2008; Renouard & Ezvan, 2018; Ruepert, Keizer, & Steg, 2017). The terms environmental responsibility and social responsibility have both been related to corporate social performance, a term defined by a number of scholars (e.g. Agle, Mitchell, & Sonnenfeld, 1999; Bhardwaj, Chatterjee, Demir, & Turut, 2018; Deniz-Deniz & De Saa-Perez, 2003; Graves & Waddock, 1994; Orlitzky, Schmidt, & Rynes, 2003; Puncheva-Michelotti, Hudson, & Michelotti, 2018; Strand, 1983; Wartick & Cochran, 1985; Wood, 1991). Corporate social performance refers both to *responsiveness* (i.e. internal organisational social adaptations) and *responses* (i.e. external organisational social adaptations).

Having a culture of proactive environmental responsibility is not only a source of competitive advantage for many firms but also a source of value for their stakeholders. A number of practitioners argue that by focusing on a process of value co-creation with a range of stakeholders, environmentally responsible firms will generate positive financial returns (Albort-Morant, Leal-Millán, & Cepeda-Carrión, 2016; Aquilani, Silvestri, & cRuggieri, 2016; Mehrpouya & Chowdhury, 2018). Such a process of the co-creation of value to be shared among different stakeholders and actors assumes that co-creatively leveraging all stakeholder capabilities within a network of social, business, civic, and natural communities can lead to better states of governance, infrastructure development and sustainability, with 'win-win' outcomes and the expansion of wealth, welfare and well-being all round (Kazadi, Lievens, & Mahr, 2016; Ramaswamy & Ozcan, 2014).

Since the practice of environmental responsibility reflects stakeholders' interests, the perception of environmental responsibility will depend simultaneously on the stakeholders' capabilities and sense of environmental responsibility (Williamson et al., 2006). An analysis of stakeholder perceptions could highlight their expectations and tensions. Hence, understanding perceptions could help firms to reduce conflict (Shackley and Deanwood, 2002). This suggests that not only are the notions of environmental and social responsibility deeply intertwined but that they are also strongly related to the capabilities of the firm and its stakeholders (Montiel, 2008; Ommen, Blut, Backhaus, & Woisetschlager, 2016). On this basis we hypothesise that:

Hp3. Stakeholders' capabilities in relation to environmental responsibility are positively related to a perception of environmental responsibility within SMEs.

2.5. Environmental responsibilities within the firm

Organisations are faced with a new context where advanced and active social and environmental management policies are required, which consider not only the traditional issues of quality, cost efficiency, marketing and ethics but also the issues of environmental risk and social responsibility (Ludevid, 2000).

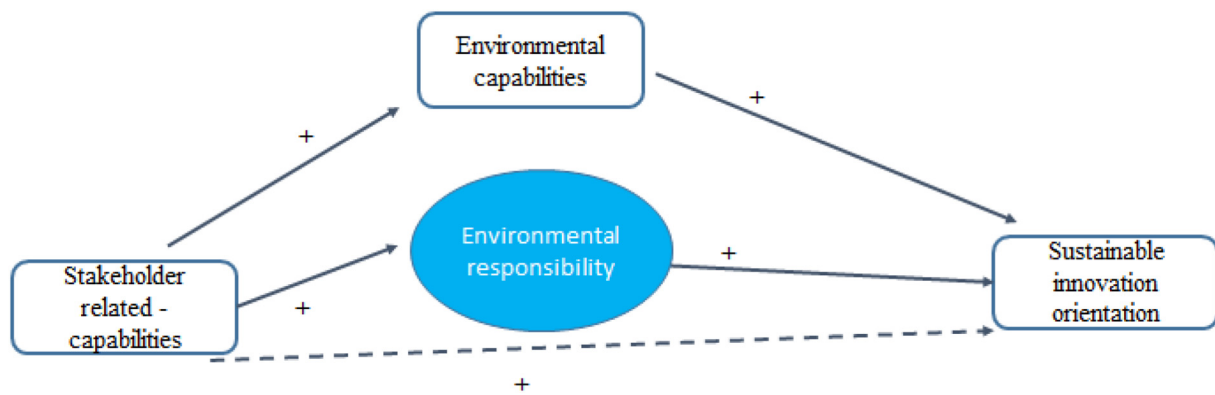


Fig. 1. Research model.

Environmental and technological changes are transforming the competitive landscape, requiring firms to adopt an orientation that supports sustainable innovation. To achieve a sustainable competitive advantage, enterprises must embrace a sustainable innovation orientation by improving both the innovative and sustainable attributes of their products, processes and business models (Sharma & Vredenburg, 1998; Nidumolu et al., 2009; Spiller, 2000; Heffner & Sharif, 2008).

A key starting point is a debate on the processes that help organisations to be aware of their environmental impact and responsibilities (Rocha et al., 2007). Inclusion of stakeholders and the integration of their unique expectations (Seuring and Gold, 2013) is suggested as a critical factor in environmental responsibility. This is due to the fact that firms' attempts to show high levels of social and environmental responsibility lead them to look beyond the financial benefits of their products and services and to explicitly consider the environmental and social benefits (Morgan, Hine, Bhullar, & Loi, 2015).

As firms have become more aware of limitations in natural resources and their own impact on the environment, their commitment to the environment has improved and is now perceived by many as an integral responsibility of individuals and organisations operating in all sectors (Bell, 2005). We argue that as awareness of the need for social and environmental responsibility increases, internal and external forces drive a gradual transformation of the traditional corporate culture to develop advanced social and environmental management strategies. On this basis we hypothesise that:

Hp4. A perception of environmental responsibility within SMEs is positively related to their orientation towards sustainable innovation.

2.6. Stakeholder related capabilities and the firm's orientation towards sustainable innovation

From the analysis in this section it seems plausible to infer some indirect correlation between stakeholder capabilities and the firm's orientation towards sustainable innovation. A review of the extant literature suggests that there is a rationale for such an inference. Several scholars (Christmann & Taylor, 2002; Ottman, Stafford, & Hartman, 2006) have found evidence that a significant number of firms are modifying their orientation towards sustainable innovation and adopting responsible corporate behaviour as a result of the increasing pressure that they are facing from their stakeholders, including governments and non-governmental organisations (NGOs). Ketata et al. (2015) refer to this as a pressure-driven facet of sustainable innovation, which complements the demand-driven facet whereby stakeholders increasingly demand products that have been produced in a sustainable way. This attitude to sustainability is related to efficient production processes, less resource and energy consumption, environmental stress reduction and improvement of health and safety conditions for employees, customers, the local community and society in general

(Paramanathan, Farrukh, Phaal, & Probert, 2004).

While stakeholders—and most importantly, customers—support firms that are known for their sustainable development strategies or their reputation for sustainable conduct (Ayuso et al., 2006), they have been known to react with extreme aggressiveness, even boycotting certain products or services, if firms allegedly ‘mis-behave’ in this domain (Ketata et al., 2015).

As more firms find that product- and process-driven enhancements have a positive effect and that environmental initiatives contribute to a firm's environmentally-friendly reputation, these in turn, create for them a competitive advantage since they constitute a substantial part of the perceived utility of a product or service (Gilley, Worrell, Davidson III, & El-Jelly, 2000; Rindova, Williamson, Petkova, & Sever, 2005). We therefore hypothesise that:

Hp5. Stakeholders' capabilities towards environmental responsibility are positively related to an orientation towards sustainable innovation within SMEs.

Supporting this hypothesis could lead us to point out that knowledge sourced from engagement with internal and external stakeholders contributes to a firm's environmental responsibility and, in turn, to its sustainable innovation orientation.

In sum, the hypotheses outlined in this section can be represented in the conceptual framework presented in Fig. 1.

3. Research methodology

3.1. Data collection and sample

The research sample consisted of a number of organisations operating within the knowledge intensive industry in Italy. This was achieved by selecting organisations from the high-tech manufacturing sector, which is a knowledge intensive industry. This sector has gained in significance over the last decade due to the potential impact of its products and services on the environmental and social issues driving the sustainability agenda. Over the last five years, the knowledge intensive activities in this sector have grown by 0.9%, but show an increase of 17 percentage points when compared with other European countries (Eurostat, 2016). A second reason for selecting this group for the data collection was that the study of these issues in the context of SMEs would bring added value to the research and practice communities. Given the innovative attitude of Italian SMEs, Italy's capacity for innovation is more advanced than most other countries, strengthening its research and innovation system. This has resulted in new public and private collaborations with external stakeholders. Furthermore, a regional sectoral specialisation has formed, which has prompted the introduction of new legal frameworks for innovative SMEs in order to facilitate their access to finance (European Commission, 2003). Thus, the authors sought to engage with small and medium-sized enterprises

Table 1
Measures and items.

Measures	Items	Sources
Stakeholder related capabilities	Stakeholder perception Stakeholder integration Radical transactiveness	Litz, 1996; Sharma & Vredenburg, 1998; Hart & Sharma, 2005; Gadenne et al., 2009; Freeman, 1984.
Sustainable innovation orientation	Innovativeness Innovation capacity R&D intensity	Ayuso et al., 2006, 2011; Hurley & Hult, 1998; Nejati et al., 2014.
Environmental responsibility	Social responsibility Social responsiveness	Jamali, 2007; Spiller, 2000.
Environmental capabilities	Knowledge acquisition Knowledge exploitation Learning	Kogut & Zander, 1992; Grant, 1996; Blomqvist et al., 2004; Caloghirou et al., 2004; Chang, 2003; Macpherson et al., 2004; Weng & Huang, 2017; Wang et al., 2015; Santoro & Usai, 2018.

in conducting their research.

In line with the Italian classification of SMEs, this study started by adopting the European Commission's (2003) definition of SMEs, whereby these organisations are characterised as having 250 or less employees. However, taking into consideration the classification of SMEs beyond the European context, we sought to engage with organisations that had a maximum of 150 employees. By ensuring that all organisations involved would be classified as SMEs in countries both within and outside of Europe, we sought to improve the generalisability of our research findings and their validity in emerging economies such as Malaysia, where SMEs are defined by having up to 150 employees in the manufacturing sector and up to 50 in the service sector (SME Corp, 2012). These considerations led to the authors collecting their data from a sample of 80 Italian SMEs with fewer than 150 employees and operating in the high-tech manufacturing sector.

Data were collected using a questionnaire comprising 20 closed questions. The web-based survey was structured around the measures and items included in Table 1, which were selected following a careful literature review. The survey was administered to individuals in senior positions within the organisations, defined either by their ownership or by their decision-making capabilities. These individuals were perceived to be the most suitable participants for this research due to the fact that they made all the critical decisions in the SMEs involved (Nejati et al., 2014). This is particularly relevant in Italy where SMEs have historically played a major role in the economy (Goodman, Bamford, & Saynor, 2016). According to the OECD (2017), in Italy, SMEs contribute around 60% of the gross domestic product and employment.

The 20 closed questions were assessed using seven-point Likert-type scales, ranging from 1 (strongly disagree) to 7 (strongly agree). The questionnaire was developed in English and then translated into Italian by one of the authors who is a native Italian speaker together with an SME consultant to ensure a good understanding of the questionnaire from the participants' standpoint. Interaction between the author and consultant during the translation of the questions resulted in the questions being adapted to fit the culture and context of the industry while remaining aligned to the theoretical underpinnings of the research. This was followed by a third stage wherein the authors and consultant came to agreement on the final version of the questionnaire. Finally, the questionnaire was tested on a sample of 23 decision makers from local SMEs in order to avoid bias in the data collection process. This small number was considered sufficient for a pilot test, which became a "dress rehearsal of the instrument with a small but relevant sample" (Lewis, Templeton, & Byrd, 2005, p. 392). The results from the pilot test showed no particular bias, and the respondents had no difficulty in understanding the questionnaire and the individual items.

On validation of the questionnaire, it was sent to a population of 298 SMEs, from which 80 usable questionnaire responses were obtained. The questionnaire was sent with a cover letter in which the

scope of the research was described and the required time for completing the questionnaire was stipulated. The cover letter also stated that the all the data provided by participants would remain anonymous and would be used only for the purposes of this research. The data was collected over a period of eight months. Towards the end of this period a reminder was sent to participants, resulting in 25 additional responses being received. The *t*-test did not indicate any difference between participants who replied after the first reminder (wave 1) and those who replied after the second reminder (wave 2).

3.2. Data analysis

The next step consisted of an assessment of the hypotheses, that is, an evaluation of the following correlations between constructs: stakeholder-related capabilities and environmental responsibility; stakeholder-related capabilities and environmental capabilities; stakeholder-related capabilities and sustainable innovation orientation, environmental capabilities and sustainable innovation orientation; and, environmental responsibility and sustainable innovation orientation as shown in Fig. 1.

The correlations were assessed by using structural equation modelling (SEM). 'SEM is a second-generation data analysis technique that enables researchers to answer interrelated research questions in a single, systematic and comprehensive analysis by modelling the relationships among multiple independent and dependent constructs simultaneously' (Gefen, Straub, & Boudreau, 2000; p. 3–4). A careful review of the literature informed our decision to classify each relevant construct as either a latent exogenous or endogenous variable.

3.2.1. Exogenous variable

Stakeholder-related capabilities was defined as an exogenous variable and correlated to environmental responsibility, considered by Ayuso et al. (2006, 2011) as its antecedent. Stakeholder related-capabilities was defined as a combination of *stakeholder perception*, *stakeholder integration*, and *radical transactiveness* (Freeman, 1984; Gadenne et al., 2009; Hart & Sharma, 2005; Litz, 1996; Sharma & Vredenburg, 1998).

3.2.2. Endogenous variables

Environmental responsibility, environmental capabilities, and sustainable innovation orientation were defined as endogenous variables.

Environmental responsibility was understood as a combination of *social responsibility* and *social responsiveness*, key drivers for any innovation process (Jamali, 2007; Spiller, 2000) that involves responsible activities that meet stakeholders' expectations (Fuller and Lewis, 2002).

Environmental capabilities, as a variable, embraced *knowledge acquisition* and *knowledge exploitation* (Chang, 2003; Macpherson et al., 2004; Santoro & Usai, 2018; Wang et al., 2015; Weng & Huang, 2017). For instance, Kogut and Zander (1992) and Grant (1996) argue that

knowledge and learning are key determinants in the creation of organisational capabilities (Ayuso et al., 2011, p. 1401; Darroch, 2005). This calls for the process of knowledge acquisition to be deployed within and across SMEs' boundaries, in line with reports in the extant literature (Blomqvist et al., 2004; Caloghirou et al., 2004).

On the basis of previous studies, sustainable innovation orientation is understood as the combined effect of *innovativeness*, *innovation capacity*, and *R&D intensity* (Ayuso et al., 2006, 2011; Hurley & Hult, 1998; Nejati et al., 2014; Nejati et al., 2014).

Our understanding of the hypotheses and the variables to be studied enabled an assessment of the 80 responses to the web-based survey by using SmartPLS (Ringle, Wende, & Will, 2005). We used a bootstrap technique to evaluate the correlations between the variables, and this allowed a simulation of a larger sample size by redrawing records already in the sample, and in this case, placing the drawn record back into the sampling pool to potentially be picked again (Nejati et al., 2014, p. 2032).

4. Results

As it emerged from the data analysis, stakeholder related capabilities were positively correlated to sustainable innovation orientation via environmental responsibility. However, the environmental capabilities of the organisation were not significantly correlated to the sustainable innovation orientation. Overall, the bootstrap technique shows a t-statistic of over 3.4 for the correlation between stakeholder capabilities and environmental responsibility and for environmental responsibility with sustainable innovation orientation. Additionally, the correlation between stakeholder capabilities and environmental capabilities was shown to be significant (t-static 3.8). Therefore, the **Hp1: Stakeholders' capabilities towards environmental responsibility are positively related to the environmental capabilities of the organisation** is supported. **Hp3: Stakeholders' capabilities towards environmental responsibility are positively related to a perception of environmental responsibility within the organisation** is supported. **Hp4: A perception of environmental responsibility within the organisation is positively related to its orientation towards sustainable innovation** is supported. Finally, **Hp5: Stakeholders' capabilities towards environmental responsibility are positively related to an orientation towards sustainable innovation within the organisation** is supported.

Nevertheless, the correlation between environmental capabilities and sustainable innovation orientation was not significant (t-static 1.8). Hence, the **Hp2: The environmental capabilities of the organisation are positively related to its orientation towards sustainable innovation** was not supported (Table 2 and Fig. 2).

The path analysis is part of the structural model which is used to assess the correlation between the latent exogenous and endogenous variables (Chin & Newsted, 1999). Additionally, this model also measured the endogenous latent variables by R-squared. In this case, they were: 1. Environmental responsibility; 2. Environmental capabilities; 3. Sustainable innovation orientation (Table 3).

Therefore, this model is accompanied by the measurement model, which analyses the correlation between each latent variable and the relative manifest variables. To assess this correlation, Cronbach's alpha

technique was employed, and showed a positive reliability with the value of 0.81 (Table 4). Following this assessment, the internal consistency or internal correlations are shown in Table 5.

In sum, as mentioned, the results of all correlations are significant. In fact, as it emerged from the path analysis and as shown in the figure below, the values of all correlations are > 2.0, except for the correlation between environmental capabilities and sustainable innovation orientation, which resulted in a value < 2.0, which therefore had no significance.

5. Discussion

The current literature offers qualitative studies (Hockerts et al., 2009; Holmes & Smart, 2009; MacGregor & Fontrodona, 2008) and quantitative studies on corporate businesses (Ayuso et al., 2011). However, this analysis employs a quantitative study on SMEs.

From the findings, it emerged that the influence of stakeholders generates a sense of environmental responsibility. This result supports the **Hp1: Stakeholders' capabilities towards environmental responsibility are positively related to the environmental capabilities of SMEs**, and it is in line with the concept of stakeholder theory that states that the well-being of a firm relies on its propensity to satisfy shareholders' needs and expectations (Freeman, 1984). Firms seeking to engage with their stakeholders can capture their insights and embrace them within their organisational process (Ayuso et al., 2006). As declared by Fuller and Lewis (2002), SMEs depend on their stakeholders in their daily decision-making process.

The results of the non-significant **Hp2: The environmental capabilities of SMEs are positively related to their orientation towards sustainable innovation**, showed that SMEs do not employ any kind of sustainable practice due to their lack of resources and because they do not perceive any benefits to be derived from these practices (Nejati et al., 2014). They need more empirical evidence to convince them that being more environmentally responsible would improve their business performance (Revell & Blackburn, 2007). Groundwork (1995, 1998) shows that SMEs are not convinced that environmental practices enhance their business. This has resulted in their engaging less in acquiring environmental capabilities (Roberts et al., 2006). SMEs' owner-managers believe that their business impact on the environment is minimal and that it does not justify the cost of environmental practices (Tilley, 1999; Hillary, 2000; Pimenova and van der Vost, 2004; Revell & Blackburn, 2007; Bradfors and Fraser, 2008). This explains the unsupported hypothesis (i.e. Hp2), which shows that environmental capabilities are not significant and do not influence sustainable innovation orientation. It may be that, in Italy, SMEs still consider environmental practices to be peripheral to their business (Redmond, Walker, & Wang, 2008). They will only embrace these practices if the business costs are reduced (Hillary, 2000; Revell & Blackburn, 2007).

The results supported the proposed **Hp3: Stakeholders' capabilities towards environmental responsibility are positively related to a perception of environmental responsibility within SMEs**. These results show that Italian SMEs are more prone to embed the environmental responsibility into their organisational culture if this is pushed from the outside. This emerged as a vivid sense of preserving for future generations (Ketata et al., 2015) and requiring a change in business and society (Larson, 2000). In these circumstances, SMEs tend to reduce the levels of their resource consumption and waste generation, creating a more efficient production process (Anttonen et al., 2013; Bakshi and Fiksel, 2003; Boons & Lüdeke-Freund, 2013; Boons et al., 2013). This new scenario is in line with the research design shown above (Fig. 2), where the role of stakeholder related-capabilities is highly significant to the process of sustainable innovation orientation.

This last statement enforces the positive correlation that emerged between environmental responsibility and sustainable innovation orientation, and also between stakeholder related-capabilities and sustainable innovation, as was suggested in the **Hp4: A perception of**

Table 2
Path analysis results.

Hypothesis	Path	t-statistics	p-value
Hp1	SRC → EC	3.4	***
Hp2	EC → SIO	1.8	0.309
Hp3	SRC → ER	3.2	***
Hp4	ER → SIO	4.5	***
Hp5	SRC → SIO	2.8	***

Notes: *** Standardised regression coefficient is significant at the 0.001 level (two-tailed).

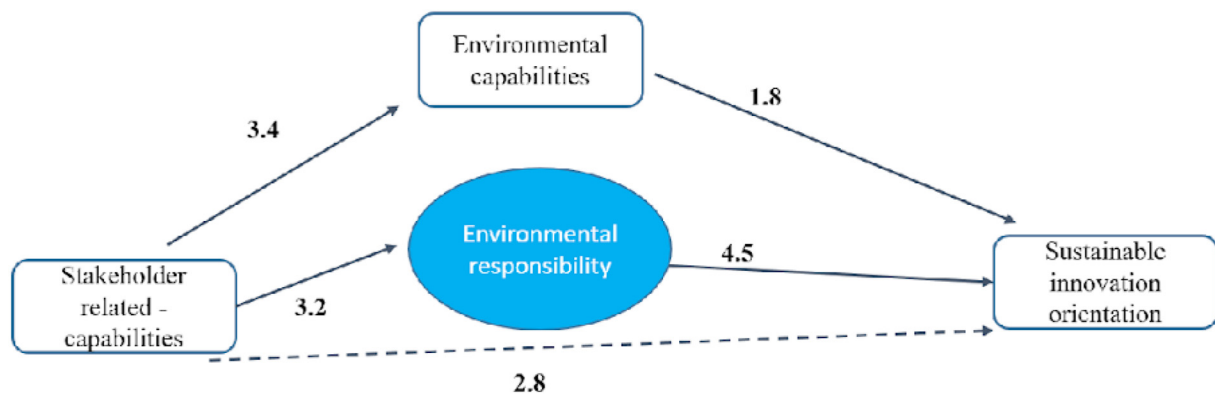


Fig. 2. Research model and SEM results.

Table 3
R².

	ER	EC	SIO
R ²	0.56	0.47	0.75

Table 4
Reliability.

Reliability test		
Cronbach's alpha	Cronbach's alpha (standardised items)	Items
0.81	0.78	80

Table 5
Internal consistency coefficients and correlations between measures and items.

		Cronbach's alpha	(1)	(2)	(3)	(4)	(5)
(1)	SRC	0.81	1				
(2)	ER	0.79	0.825 ^a	1			
(3)	EC	0.74	0.150 ^a	0.009 ^a	1		
(4)	SIO	0.78	0.538 ^a	0.733 ^a	0.194 ^a	1	

^a Significant at 0.01.

environmental responsibility within SMEs is positively related to their orientation towards sustainable innovation, and in Hp5: Stakeholders' capabilities towards environmental responsibility are positively related to an orientation towards sustainable innovation within SMEs. From these results, the definition of sustainable innovation can be extended to include the concept of the environmental responsibilities of a firm and the stakeholders' capabilities. According to Duker, stakeholders are more conscious about how a firm treats the external environment and tend to promote businesses that are more environmentally friendly. Moving in this direction, firms are increasingly developing eco-sustainable projects. For instance, Italy was placed 7th in the 2017 Eco-innovation Index thanks to the adoption of innovative and sustainable approaches in its production processes (European Commission, 2003). This has enabled firms to meet stakeholders' expectations (Grant, 1991; Bowen et al., 2001; de Bakker and Nijhof, 2002; Strand and Freeman, 2015) and, in some cases, to improve the SMEs' environmental capabilities (EC) as internal resources (Baranova, 2017; Girod and Whittington, 2017; Caloghirou et al., 2004). Moreover, these internal resources are not used in only one way, but they are combined with external resources in engaging with stakeholders and creating sustainable innovations (Ayuso et al., 2006, 2011). Nowadays, the concept of sustainable innovation is embedded within SMEs' philosophy (Kuckertz and Wagner, 2010; Ayuso et al., 2011; Roxas and Coetzer, 2012) and also influences stakeholders in their approach to business. As

highlighted in the literature, a focus on environmental responsibility by stakeholders can enhance financial returns (Albort-Morant et al., 2016; Aquilani et al., 2016; Mehrpouya & Chowdhury, 2018). This evokes a nexus of *responsiveness* (i.e. internal organisational social adaptation) and *responses* (i.e. external organisational social adaptation) in the new sustainable business environment.

6. Implications, limitations and further research

Coming from the sustainable innovation management standpoint, our research has focused on the study of factors that influence an orientation towards sustainable innovation in a firm. We have studied the extent to which stakeholder-related capability and engagement determine the sustainable innovation orientation of SMEs in the knowledge-intensive context. In line with existing theories on sustainable innovation, we started by assuming that it is driven not only by factors within the firm and within its context but also by the relationship between the firm and its internal and external stakeholders. Ayuso et al. (2011) have claimed that stakeholder-related capabilities and engagement are relevant to the innovation process of firms. We support this, and we also add that this factor is important in the sustainable innovation orientation of SMEs, mediating through environmental responsibility and capabilities.

Conceptually, our research went on to suggest that stakeholder-related capabilities, both tangible and intangible, influence the environmental responsibility and related capabilities of the firm. We argue that these, in turn, influence the firm's orientation towards sustainable innovation. Our research therefore suggests that, in line with the findings of other context-specific research reported in the literature, organisations need to consider not only their own environmental responsibility but also that of relevant stakeholders when designing their business strategy. Additionally, we learned from the research participants that 'relevant stakeholders' is a term used to refer not only to customers, the government and non-government environmental lobby groups; current and potential employees, suppliers, competitors and many other entities, from the 'person on the street' to society in general, are also considered relevant stakeholders in the sustainable innovation management context. These findings, therefore, make it plausible for us to argue that our research has contributed to current efforts to understand the challenges in measuring the intensity of a firm's orientation towards sustainable innovation.

The nature of the data that support our findings is an additional strength of this research. The use of data collected from SMEs from the high-tech manufacturing sector in Italy brings together three complementary dimensions in our analysis, namely (1) the size of the organisations with their challenges and potential impact on socio-economic development; (2) the knowledge-intensive nature of the industry within which they operate; and (3) the cultural and socio-economic factors that define their context. The combination of these three

elements means that our findings translate directly into recommendations for management practice on how to strengthen the sustainable orientation of a firm.

We deem that the environmental responsibility of an SME depends to a large extent on its own views and on the environmental capabilities of the owners, directors, employees, suppliers and other entities whose interests might be related to its success or failure. We therefore suggest that *sustainable conduct* should be considered as a criterion for stakeholder selection by SMEs as it is likely to have a direct effect on the organisation's reputation and thus, on its competitiveness. This is connected with a firm's sustainable innovation orientation in a knowledge-intensive setting, which in turn, influences its competitiveness. This resonates with the findings of Ayuso et al. (2011) and the application in contexts that require the engagement of multiple disciplines and stakeholders. We therefore recommend that, in their relationship with stakeholders, SMEs are open to co-create, share and reuse environmental knowledge to increase competitiveness.

In addition to knowledge and its sharing, our research also highlights the importance of the co-creation of values to be shared between the firm and those entities whose interests are affected by its success or failure. Such a value co-creation process has previously been found to lead to benefits, which include improved sustainability governance (Ramaswamy & Ozcan, 2014). In turn, this results in increased competitiveness.

Finally, while our findings can be translated into management recommendations on how to strengthen the sustainable innovation orientation of an organisation, they are constrained by certain limitations derived from the nature of the origins of the data, that is, SMEs from the high-tech manufacturing sector in Italy. The following limitations are identified, which may in turn, provide opportunities for further research. First, our findings rely on the views of firms from a high-tech manufacturing sector, which is indicative of their engagement, to some extent, in innovation activities. Future research may be conducted to study sustainability orientation in organisations from a context characterised by a lesser degree of knowledge intensity. Second, our analysis is limited to Italy and therefore, to sustainable innovation in a specific societal, political and regulatory context. Our findings may not apply to other countries and therefore, we recommend a comparative study based on our findings. Finally, despite efforts to adopt a definition of SME that is representative of that adopted in other countries, our findings are related to organisations of a specific size, and this may, therefore, face similar challenges in terms of sustainable innovation strategies. We therefore recommend a comparative study that uses data from organisations with a wider range of sizes and from different industries and societal, political and regulatory contexts.

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