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Linking corporate social responsibility, cooperation and innovation: the triple bottom line perspective

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Abstract

Purpose – Drawing on the resource-based view (RBV) and knowledge-based view (KBV) theories, this study contributes to deepen the knowledge that corporate social responsibility (CSR) exerts on firms' innovation, considering the role played by cooperation. The research also seeks to ascertain the factors that influence the development of business cooperation.

Design/methodology/approach – The database used is the Community Innovation Survey (CIS, 2014) applied in the European Union (EU) during the time period 2012–2014. A sample of 7083 Portuguese firms were analyzed through the partial least squares structural equation modeling (PLS-SEM).

Findings – The results suggest that CSR positively relates with firms' innovation, and business cooperation partially mediates this relationship. The outcomes also reveal that investing in certain types of innovation activities increases the firms' willingness to cooperate.

Originality/value – The findings contribute to encourage an open innovation strategy as an easy and effective way to cope with rapid trends and changes, since it demonstrates the complementary between innovation and cooperation, as sources of value creation. From a triple bottom line (TBL) perspective, it also highlights that CSR must include social, economic and environmental initiatives, and should be a part of the firms' innovation strategy. As a result, managers who intend to contribute for society in the long term should plan, monitor and manage all CSR dimensions.

Keywords Corporate social responsibility, Cooperation, Innovation, Eco-innovation

Paper type Research paper

1. Introduction

Over the last decades, corporate social responsibility (CSR) has gained particular relevance in the management field, being considered a relevant driver for competitive advantage (Currás-Pérez, Dolz-Dolz, Miquel-Romero, & Sánchez-García, 2018). At the same time, moral values are changing, and firms' innovation must be responsive to new shareholders demands (Sánchez-Hernández, Gallardo-Vázquez, Dziwiński, & Barcik, 2019). Considering that organizations must apply CSR principles on their products and processes, "*CSR will be a driver of companies' innovation practices*" (Gallego-Álvarez, 2011, p. 1710). However, the

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existing literature on the CSR–innovation relationship provides heterogenous findings (e.g. Bocquet, Le Bas, Mothe, & Poussing, 2013; Mithani, 2017; Bacinello, Tontini, & Alberton, 2020). A significant gap remains on the perceptions of scientific CSR academics, becoming essential to develop "*more ambitious goals [. . .] relating CSR to [. . .] innovation*" (Bocquet *et al.*, 2013, p. 642).

Simultaneously, it is widely acknowledged that cooperation is a powerful tool to promote the development of technological capabilities, to solve resource constraints and to maximize firms' value (Belderbos, Carree, Diederen, Lokshin, & Veugelers, 2004). For several countries, there are many studies showing the relevance of cooperation for innovativeness (e.g. Lewandowska, Szymura-Tyc, & Gołębiowski, 2016; León-Bravo, Caniato, Caridi, & Johnsen, 2017; Garcés-Ayerbe, Rivera-Torres, & Suárez-Perales, 2019). As far as the Portuguese case is concerned, the previous findings of CISEP/GEPE (1992) and the research conducted by Simões (1997) revealed the importance of external partnerships for innovation in Portuguese firms. Over the last years, some studies have emerged, claiming a positive relationship between cooperation and innovation on national businesses (e.g. Faria, Lima, & Santos, 2010; Braga & Braga, 2013; Fernandes, Cesário, & Barata, 2017).

In addition, the 2030 Agenda for Sustainable Development, adopted by the United Nations members in 2015, includes 17 Sustainable Development Goals (SDGs) to be accomplished by 2030. These SDGs set the agenda for trends in CSR, which will gain an important position in the upcoming years. Considering the 17 goals, firms around the world are seen as relevant drivers in ensuring the development of this agenda. Although the advances in our understanding of how CSR may enhance innovation-related capabilities (He & Shen, 2019), due to the focus on economic benefits, previous studies have failed to explore the consequences of CSR for environmental innovation (hereafter, eco-innovation) (Pan, Sinha, & Chen, 2020). This is extremely important since eco-innovation is more closely related to sustainable benefits – at least in the short-term – than to economic interests that firms pursue. Thus, we intend to develop theoretical and practical contributions grounded on the ambitious goals of the 2030 Agenda, particularly, at the 9th SDG – Industry, Innovation and Infrastructure.

In line with the above discussion, we pose the following research questions: What relationship really exists between CSR and innovation? Is innovation enhanced by cooperation? Are CSR practices explaining innovation through cooperation? Trying to answer these questions, our research aims to achieve a better understanding of the CSR–innovation link, considering the role played by cooperation. This paper also examines the factors that influence the firms' willingness to cooperate. Addressing the research purpose, the database used is the Community Innovation Survey (CIS, 2014). The empirical analysis is carried out on a sample of 7,083 Portuguese firms from manufacturing and service sectors, covering a three year-period.

Portugal is a small open economy characterized by its strong innovation index (European Innovation Scoreboard, 2020). Considering the innovation production in small- and medium-sized enterprises (SMEs), Portugal assumes a leadership position by presenting highest shares of innovative products and business processes. According to the European Innovation Scoreboard [1] (EIS, 2020), between 2012 and 2019, the Portuguese innovative performance grew more than 20% in three interfaces: (1) innovation-friendly environment (e.g. broadband penetration), (2) investment level (e.g. non-R&D innovation expenditure) and (3) finance and support (e.g. venture capital expenses). For all of these reasons, the Portuguese economy represents a relevant setting for this study.

By using the partial least squares structural equation modelling (PLS-SEM), the current study provides interesting evidence of CSR–innovation relationship, expanding literature on this topic. As managers from innovation-oriented firms are concerned with making choices

that influence business prosperity, these findings may help to broaden the field of CSR research by identifying the factors that shape the firms' innovative orientation.

The remainder paper is structured as follows. After this introduction, a brief review of the relevant literature is presented. Next, we describe the methodology adopted for data analysis. Then, we present and discuss the research findings. The last section provides the study's main conclusions, implications and limitations, as well as potential lines for future research.

2. Conceptual background

2.1 Cooperation

The model of firms operating in isolation lost interest, and, currently, a new perspective has been developed, where the organizations acting jointly face greater possibilities of success (Bayona, García-Marco, & Huerta, 2001). Accordingly, cooperation corresponds to "*connections based on partnerships with external actors that can be defined as bilateral cooperative relations with environmental constituents*" (Lee, Lee, & Pennings, 2001, p. 620). Although the firms have their own resources, they recognize the relevance of interacting with other stakeholders who have additional assets; thus, external contacts play a very important role in obtaining those assets and identifying entrepreneurial opportunities, since autonomous actions are embedded within higher interorganizational networks (Granovetter, 1985; Burt, 1992).

Therefore, the establishment of cooperative relationships with other firms or institutions is seen as an opportunity to access complementary resources for faster development of innovations, to enhance competitive advantage and to share costs and risks (Faria *et al.*, 2010). In order to overcome certain economic or technological constraints, firms establish relationships based on cooperation that represents interdependent and common goals (Easton & Araújo, 1992). The neoclassical theory emphasizes the economic agent as an isolated individual, neglecting the relevance of social ties; nonetheless, the economic sociology introduced a new element to the analysis, considering that economic decisions are embedded in a broad system of social connections (Braga, Gonçalves, & Braga, 2016).

In interorganizational networks, the process of knowledge transfer can be conducted formally and informally (Powell, Koput, & Smith-Doerr, 1996). The *formal* (or *business*) cooperation is contract-based since the relationship is based on regulations, while *informal* (or *social*) cooperation is trust-based ensuring the sustainability of business relationship (Hakansson & Johanson, 1998). In this paper, the term *cooperation* is used to denote a set of connected actors, which may be either organizations or individuals (Coviello & Cox, 2006). More specifically, we focus on *formal* (or *business*) cooperation, including collaboration among several partners and interfirm alliances with firms of the same group, suppliers, customers, competitors, consultants, universities, government and research centers (Batas & Liu, 2013; DGEEC, 2016a).

2.2 Innovation

Over the last decades, innovation has been highlighted as a competitiveness factor since the firms, in order to accomplish their goals, face the challenge of adapting to the environment pressures. Several scholars (e.g. Schumpeter, 1942; Hipp & Grupp, 2005; Amara, Landry, & Doloreux, 2009) have tried to conceptualize and explain the innovation process. The construction of this concept constantly meets the theories of Schumpeter (1942) that defines innovation as the application of new ideas in the generation of products or processes.

Thus, innovation can be categorized in different typologies depending on the influence that will be placed at the organizational level. The Oslo Manual (OECD, 2005) defines four types of innovation: (1) *product innovation* concerns to the design and commercialization of

new or improved products/services; (2) *process innovation* relates to the production of new equipment on production processes; (3) *organizational innovation* encompasses the introduction of a new structure inside the organization and (4) *marketing innovation* involves the implementation of new marketing practices (e.g. new approach to sales).

According to Flikkema, Jansen, and Van Der Sluis (2007), innovations can be classified as *technological* when they apply to products or processes and *non-technological* when referring to organizational or marketing aspects. Schumpeter (1934) distinguishes between five types of innovation, emphasizing that two of them correspond to *technological innovations* (i.e. the introduction of new products and processes), while the remaining are intertwined with *nontechnological innovations* (i.e. the creation of new organizational structures, opening to new markets and developing new sources of raw materials). Moreover, the term *innovation* can be employed in different contexts referring either to a process or an outcome (OECD, 2018). Following the Manual Oslo (OECD, 2018) guidelines, to avoid this confusion, we use *innovation activities* to denote the process whereas *innovation* is limited to the outcome:

> An *innovation* is the introduction of new or significantly improved product, process, organizational or marketing methods [. . .] *innovation activities* include the acquisition of machinery, equipment, buildings, software, and licenses, engineering and development work, feasibility studies, design, training, R&D and marketing when they are specially undertaken to develop and/or implement a product or process innovation (DGEEC, 2016a, p. 91).

Nowadays, innovation management has evolved, and firms are adopting business models based on eco-innovation (Valdez-Juárez & Castillo-Vergara, 2021). *Eco-innovation* (also called *environmental, sustainable* or *green*) is a relevant approach for addressing environmental concerns, offering double externalities to effectively control pollution and resource use (Pan *et al.*, 2020). Thus, this concept evolved from practices exclusively oriented to environmental damage reduction (Rennings, 2000) towards a more complex multidimensional level (Pereira, MacLennan, & Tiago, 2020).

In a broader scope, eco-innovation can be scaled from traditional types of innovations that occur at the product level, production process and organizational management (Kemp & Pearson, 2020). Drawing on the Oslo Manual definitions (OECD, 2005), Kemp and Pearson (2020) define an eco-innovation as the "*production, assimilation or exploitation of a product, production process, service, management or business method that is novel to the organization [. . .]*" resulting "*in a reduction of environmental risk [. . .]*" (p. 7). In other words, a sustainable innovation relates to the development of new/improved products, processes, organizational or marketing methods, focusing on environmental benefits (DGEEC, 2016a).

Accordingly, in this study, *innovation activities* are understood as the *process* that generates innovation (*outcome*). The innovative outcomes (i.e. product, process, organizational, marketing and eco-innovations) involve the development of something new (*radical innovations*) and/or the gradual improvement in what already exists (*incremental innovations*) (Leifer *et al.*, 2000; Gupta, 2008). Following the extant literature (e.g. Bocquet *et al.*, 2013; Costa, Lages, & Hortinha, 2015; Zhu, Zou, & Zhang, 2019; García-Piqueres & García-Ramos, 2020), *innovation* is considered a multidimensional concept (Figure 1).

2.3 Corporate social responsibility

The firms' survival involves not only maximizing profits but also generating benefits for stakeholders and related communities (Yáñez-Araque, Hernández, Gutiérrez-Broncano, & Jiménez-Estévez, 2020). The interest on CSR adoption and its influence on businesses has increased considerably (Boesso, Favotto, & Michelon, 2015; Reverte, Gómez-Melero, & Cegarra-Navarro, 2016). According to Perdomo and Escobar (2011), there is not a universal measurement of CSR; over the time, different approaches have emerged with several studies characterizing CSR as a multidimensional construct (e.g. Bocquet *et al.*, 2013; Cegarra-

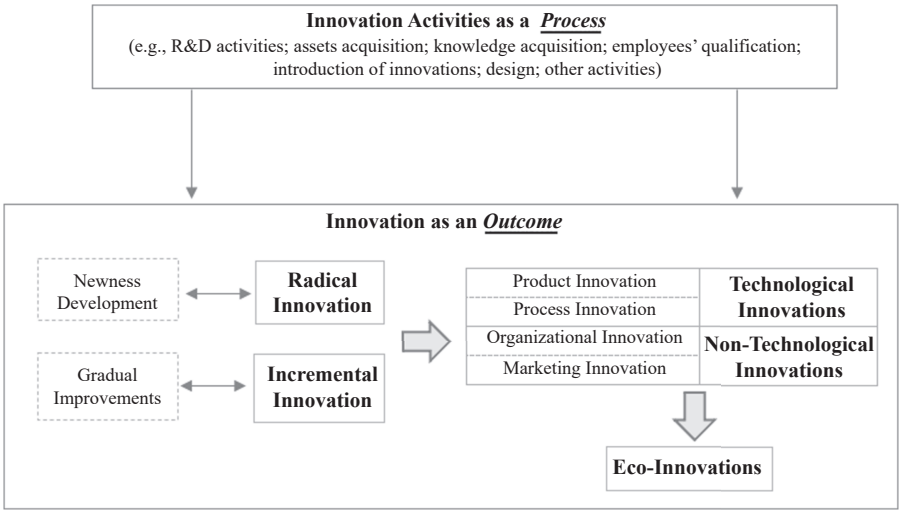

Figure 1.
The innovation measurement framework | based on the literature review

Navarro, Reverte, Gómez-Melero, & Wensley, 2016; Guerrero-Villegas, Sierra-García, & Palacios-Florencio, 2018; García-Piqueres & García-Ramos, 2020).

Carroll's (1979) research defined CSR as a construct with four dimensions: economic, legal, ethical and discretionary responsibilities. Analyzing 37 definitions of CSR, Dahlsrud (2008) concluded that the concept includes five dimensions: environmental, social, economic, stakeholders and voluntariness. The Organization of Economic Cooperation and Development (OECD, 2009) describes a responsible business conduct as "*making a positive contribution to economic, environmental and social progress.*" This notion represents the widely acknowledged triple bottom line (TBL) perspective, unpacking CSR into social, environmental and economic dimensions (Bansal, 2005).

While institutional and stakeholders' theories are used to explore the antecedents of CSR, the resource-based view (RBV) is applied to evaluate the consequences of CSR (Pan *et al.*, 2020). The RBV has become a central framework in strategic management (Barney, 1991), focusing on economic issues to explain sustained competitive advantage (Pan *et al.*, 2020). The economic CSR relates to the shareholders' perspective, supporting the idea that the firms' interactions with suppliers, customers and other stakeholders influence sustainability and performance in the long term (Torugsa, O'Donohue, & Hecker, 2013).

However, the existing RBV suffers from some constraints by ignoring the interaction between the organization and its natural environment (Hart, 1995). Built on the RBV, the natural resource-based view (NRBV) describes how firms obtain competitive advantages that allow to sustain the earth's natural resources and ecosystems (Svensson *et al.*, 2018). The environmental CSR emphasizes the introduction of specific actions that minimize the firms' environmental footprint, allowing an efficient use of the available resources (Orlitzky, Siegel, & Waldman, 2011).

Nevertheless, the RBV and the NRBV's do not consider the TBL's social dimension (Svensson *et al.*, 2018). Addressing this gap, the social resource-based view (SRBV) tries to explain how social capabilities may complement the two other dimensions, extending the scope of analysis by including a broad range of economic, social and environmental stakeholders (Tate & Bals, 2018). Accordingly, all three dimensions should be linked to achieve shared TBL value since "*the global economy serves society, which lies within Earth's*

life-support system" (Griggs *et al.*, 2013, p. 306). In social CSR, workplace and community assume an important role (Torugsa *et al.*, 2013), since "*the health, safety and general well-being of employees*" allow "*firms to act as good citizens in the local economy*" (European Commission, 2003, p. 5).

Despite distinctive, social, environmental and economic CSR are not mutually exclusive (Pan *et al.*, 2020); indeed, the three dimensions must be integrated to achieve sustainability (Bansal, 2005). In line with recent studies (e.g. Cegarra-Navarro *et al.*, 2016; Guerrero-Villegas *et al.*, 2018; García-Piqueres & García-Ramos, 2020), this paper considers CSR as a multidimensional construct adopting the TBL's framework: economic, social and environmental dimensions (Figure 2).

3. Research model and hypothesis development

The competitiveness in international markets has promoted the development of cooperation agreements (Freire, 2000). Considering business innovation, Lundvall and Nielsen (1999) confirmed that a strong knowledge-base and R&D investments are key to firms' success. These researchers also pointed that the reinforcement of employees' skills enhances firms' willingness to introduce innovations.

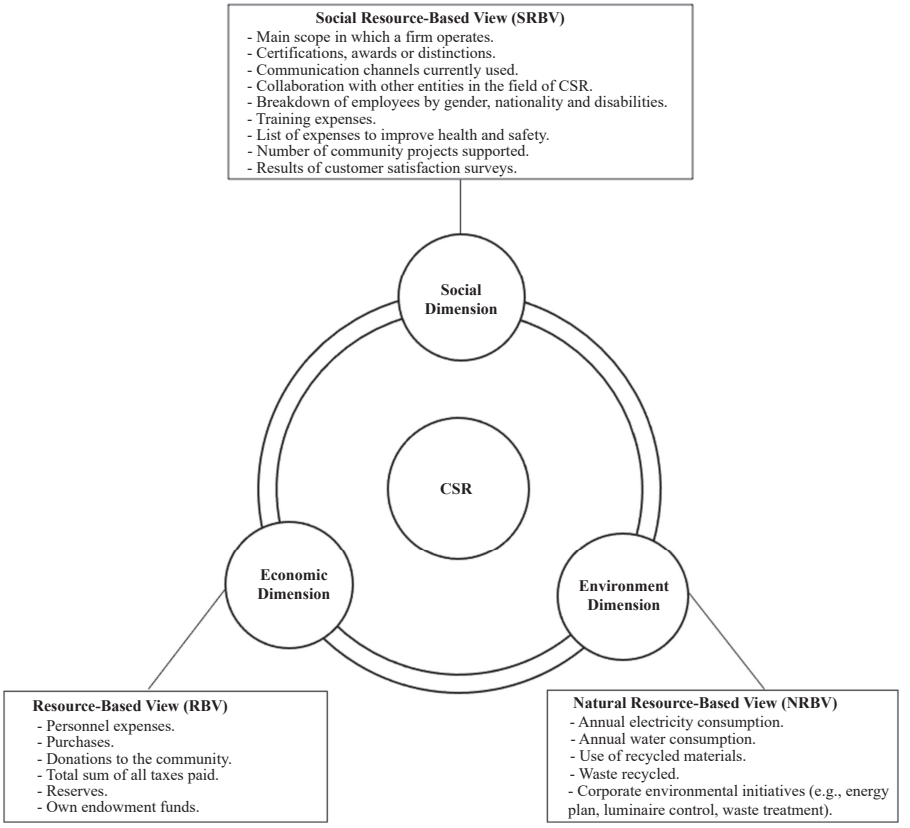

Figure 2.
The triple bottom line of CSR | based on Yáñez-Araque *et al.* (2020)

Nevertheless, firms cannot be restricted only to their capabilities; they need to benefit from external resources, establishing relationships with other stakeholders and extracting from them the effects of interactive processes (Caloghirou, Kastelli, & Tsakanikas, 2004). Previous studies display that "*if alliances are about knowledge acquisition, the number of alliances will be limited by its absorptive capacity*" (Grant & Baden-Fuller, 2004, p. 78). Following this reasoning, Tsai (2009) underlined the relevance of such ability and the effectiveness of collaborative networks on recognizing new opportunities.

A firm's decision to cooperate is driven by the fact that cooperation is an effective way to improve firms' success (e.g. Becker & Dietz, 2004; Abramovsky, Kremp, López, Schmidt, & Simpson, 2009). The literature has been trying to isolate the factors that influence the decision to cooperate (Faria *et al.*, 2010). In agreement with this research stream, R&D activities, human resources qualification, firm size and competitiveness have emerged as the most important antecedents of cooperative interactions (Abramovsky *et al.*, 2009).

The institutions with certain internal competencies in R&D, as well as those that obtain technologies outside, are more likely to interact with other partners (Bayona *et al.*, 2001). Caloghirou *et al.* (2004) also explored to what extent the firms' internal and external capabilities affected, or not, their innovation level. The results suggested that the improvement of R&D potential and the investments on human resources exert positive effects on developing new or improved products.

Hence, the literature highlights that the investments in innovation activities related to buildings, equipment, software and external knowledge are driving forces of business cooperation (e.g. Mansfield, 1988; Shields & Young, 1994; Weiss, 2003; Camacho & Rodríguez, 2005; Elche & González, 2008). According to these scholars, firms that invest in R&D, in improving their structures and training their employees obtain different technological abilities and, consequently, have a greater ability to cooperate. Through previous studies, the following hypotheses are proposed:

H1a–h. The investments in innovation activities (i.e. in-house R&D; external R&D; assets acquisition; knowledge acquisition; employees' qualification; introduction of innovations; design; other activities) are positively related to firms' willingness to cooperate.

The RBV describes the firm as a unit of resources that create competitive advantages and enhance long-term performance (Barney, 1991). Considering that CSR actions encourage the development of the firms' intangible resources, these practices allow the development of capabilities that lead to sustained competitive advantages (Gallego-Álvarez, 2011). However, the RBV is limited since it does not explain the differences between general resources and knowledge-based capabilities; thus, the analysis of CSR can be complemented by adding the knowledge-based view (KBV), which considers the firms as entities able to integrate and distribute knowledge (Grant, 1996).

The adoption of CSR is a driving force of network relationships and leads to the development of strong ties with firms' stakeholders (Jansen, Van Den Bosch, & Volberda, 2006). As socially responsible organizations, it is essential to recognize the relevance of each stakeholder and integrate this knowledge into their strategy (Gras-Gil, Manzano, & Fernández, 2016). In this way, CSR practices bring external knowledge to the firm (Luo & Du, 2015), resulting in new ideas (Katila & Ahuja, 2002). Accordingly, CSR may contribute to the innovation strategy in three ways: (1) through the interactions with internal and external stakeholders; (2) identifying new business opportunities arising from social demands and environmental concerns and (3) creating better working conditions based on employees' confidence (Hernández & Sánchez, 2012).

Therefore, CSR practices have become a vital condition to firms' innovation and cooperation (Alarcón & Sánchez, 2013). The establishment of cooperative relationships

allows sharing resources, capabilities or activities that support the knowledge inflow ensuring business prosperity (Caro, Peñalver, & Nieto, 2011). In a complex and unpredictable environment, cooperation brings more flexibility (Briones Peñalver, Bernal Conesa, & Nieves Nieto, 2018). Consequently, the sources that determine cooperation do not reside exclusively in the firm but are also related to external contingencies (e.g. social and environmental aspects). Given this pattern, the following hypothesis is proposed:

H2. CSR initiatives have a positive influence on firms' cooperation.

The research on firm's cooperation with other stakeholders, and its potential effect on innovation, is not new (Fernandes *et al.*, 2017). Literature emphasizes that the organizations that do not cooperate, and do not formally or informally exchange knowledge, limit their capability to adapt to market uncertainties (Hanna & Walsh, 2008). Typically, the process of developing an innovation involves three strategies: (1) generate internal knowledge (make), (2) purchase it (buy) or (3) cooperate with other agents (Navarro, 2002).

The firms' decision to cooperate is driven by the fact that the actors' linkages are an efficient channel to produce product/services innovations (Becker & Dietz, 2004). However, several other factors can support such decision- share expenses and risks, exploit synergies, recognize new opportunities and benefit from government financial support (Becker & Dietz, 2004; Freel & Harrison, 2006). According to Kotler *et al.* (2000), an innovation structure must include the means for the systematic generation of new ideas to implement in renewed products. These ideas can come from internal, external and institutional sources that have a positive influence on innovation production (Braga & Braga, 2013; Bach, Lojpur, Peković, & Stanovčić, 2015).

This is consistent with the *open innovation* paradigm popularized by Chesbrough (2003). *Open innovation* includes R&D externalization, outsourcing, interfirm collaboration and organization-environmental interaction (Lazzarotti, Manzini, Nosella, & Pellegrini, 2017). According to this approach, the development of innovative outputs is facilitated by the firms' openness towards external knowledge sources (Chesbrough, 2006; Ferreira & Teixeira, 2019). Empirical evidence shows that firms implementing *open innovation* need to interact with a complete network of suppliers, customers, high education institutes, competitors and research centers (Perkmann & Walsh, 2007; Gassmann, Enkel, & Chesbrough, 2010). Thus, several researchers (e.g. Koschatzky & Sternberg, 2000; Miotti & Sachwald, 2003; Becker & Dietz, 2004; Faems, Looy, & Debackere, 2005; Faria *et al.*, 2010; Lewandowska *et al.*, 2016) acknowledge that innovation is enhanced by cooperation (see Appendix 1).

A recent research stream, focusing on environmental issues, also underlines those cooperative mechanisms as relevant drivers of sustainable practices and eco-innovations (e.g. Scandelius & Cohen, 2016; León-Bravo *et al.*, 2017; Garcés-Ayerbe *et al.*, 2019; Pereira *et al.*, 2020). The assumption that environmental issues do not represent the core competencies of most companies is unanimous (Horbach, Oltra, & Belin, 2013). In this context, the collaboration with external partners enables to access useful knowledge for developing eco-innovations (Melander, 2018), by allowing the integration of sustainable aspects into product design (Juntunen, Halme, Korsunova, & Rajala, 2019). From a cost point of view, cooperation is essential to the eco-innovation process since generates economies of scale and promotes knowledge overflows (Fabrizi, Guarini, & Meliciani, 2018). Accordingly, we argue that cooperation with several partners has a leverage effect on innovative outcomes:

H3a–c. Cooperation with different partners positively influences the firms' innovation (i.e. technological, nontechnological and eco-innovations).

Although the extant literature acknowledges the positive effect of CSR on innovation (e.g. Cegarra-Navarro *et al.*, 2016; Briones Peñalver *et al.*, 2018; Zhu *et al.*, 2019), this relationship is not unanimous (García-Piqueres & García-Ramos, 2020) (see Appendix 2). Using a survey of

Spanish firms, García-Piqueres and García-Ramos (2020) concluded that CSR positively influences product, process and organizational innovations. Bocquet, Le Bas, Mothe, and Poussing (2017) also confirmed this positive link, highlighting that innovation serves as a mediator between CSR and firm performance. Following the TBL's perspective, Bacinello *et al.* (2020) unpacked CSR into social, economic and environmental dimensions, identifying a positive influence on innovation outcomes.

On the other hand, some studies reported a mixed or even negative effect (e.g. Gallego-Álvarez, 2011; Bocquet *et al.*, 2013; Costa *et al.*, 2015; Mithani, 2017). According to Bocquet *et al.* (2013), proactive CSR is positively related to innovation, whereas reactive CSR has a negative effect. Likewise, Mithani (2017) found that ecological and social contributions weaken the effect of R&D, suggesting that "*managerial attention to innovation can be undermined by a greater emphasis on social responsibility*" (p. 699). The current lack of consensus is also aggravated since previous research suggests that innovation can be antecedent, moderator or an outcome of CSR initiatives (Pan *et al.*, 2020).

Despite the relationship between CSR and general innovation is well documented, a limited number of studies have analyzed eco-innovation resulting from CSR (Pan *et al.*, 2020). With increasing environmental issues, firms are more concerned about future generations raising more investments to facilitate sustainable environmental innovations (Aragón-Correa, Hurtado-Torres, Sharma, & García-Morales, 2008). Although the theoretical perspective considers that social and economic CSR may not directly relate to environmental issues, some scholars suggest that the three dimensions are interconnected (e.g. Bansal, 2005; Torugsa *et al.*, 2013).

Social CSR provides complementary resources by increasing the commitment with environmental values and improving employees' skills for adopting sustainable activities (Graafland, Van de Ven, & Stoffele, 2003). In contrast to the literature revealing that firms targeting financial goals tend to be less focused on other nonmarket strategies (i.e. social and environmental initiatives) (Friedman, 2007), recent findings suggest that, in the long run, economic and environmental interests can coexist (Jamali & Karam, 2018; Vishwanathan, 2020). The emphasis on long-term economic performance can generate sufficient cash flow to environmental practices, fostering a stable relationship with stakeholders; this provides access to human capital and land that are required for eco-innovation development (Pan *et al.*, 2020). Thus, we hypothesize as follows:

H4a–c. CSR initiatives are positively related to firms' innovation (i.e. technological, nontechnological and eco-innovations).

Figure 3 presents a conceptual model based on hypothesis development.

4. Methodology

4.1 Data collection and sample

For this study, a secondary database was selected based on the Portuguese Community Innovation Survey. The CIS instrument provides useful information on how firms interrelate with the external environment in order to access powerful information for the development of new innovation projects. In doing so, firms might use external agents as information sources or engage in formal cooperation activities (Fernandes *et al.*, 2017). Developed under the guidelines of the Oslo Manual, the survey is the main statistical instrument to monitor the Europe's progress in terms of innovation. Each member of the European Union (EU) performs, at the firm level, the usual consistency and logical tests, as well as corrections for potential bias (Faria *et al.*, 2010). The CIS questionnaire and the methodology of analysis are harmonized across countries allowing the comparison of results in different EU members.

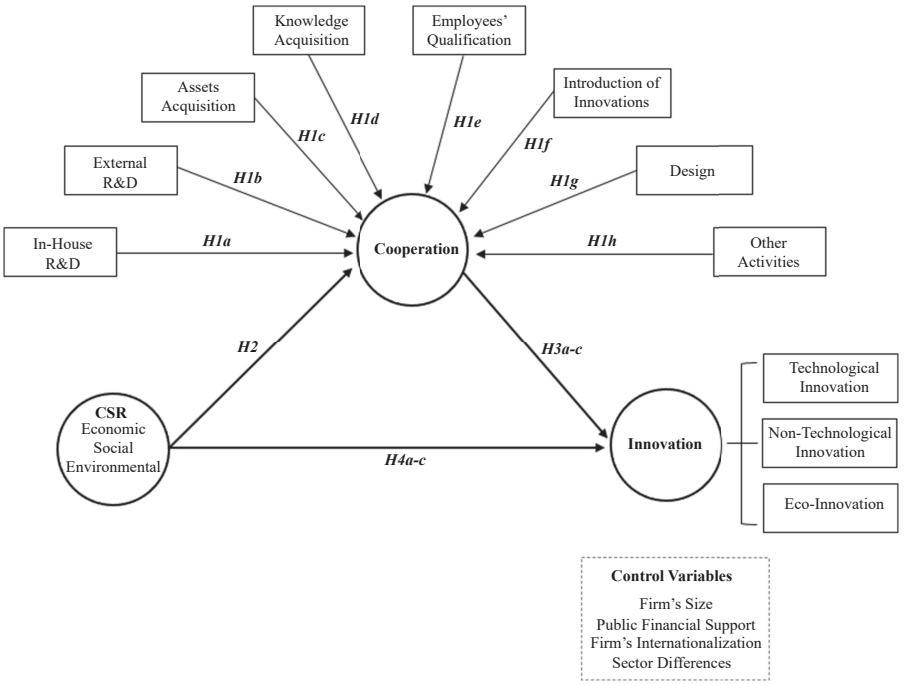

Figure 3.
Theoretical framework

This survey aims to collect data on innovation understood in a broader perspective rather than exclusively examining the invention process. Thus, the questionnaire comprises a wide range of innovation activities going beyond R&D expenditures, personnel training, market analysis and trial production to include the introduction of innovative production processes and organizational changes (Faria *et al.*, 2010). Following the Eurostat recommendations, the Portuguese version directly collects information on product, process, organizational, marketing and environmental innovations. The dataset analyzes the period between 2012 and 2014, contemplating firms with ten or more employees operating in different sectors (Table 1). The CIS questionnaire was available between 9th October 2014 and 8th June 2016

NACE codes Rev.3	Description	Total
7–9	Mining and quarrying	111
10–12	Food, beverages, tobacco	428
13–18	Textiles, wearing, leather, wood, paper, printing	1,137
19–25	Coke, chemicals, nonmetal, metal products	1,323
26–27	Computer, electrical equipment	138
28–33	Machinery, transport equipment, furniture	784
35–38	Electricity, gas, water supply, sewerage, waste	278
42–43	Construction	29
46–53	Wholesale, retail trade, transportation, storage	1,686
68–63	Information, communication	347
54–75	Financial, insurance, legal, accounting, others	804
86	Health	18
	Total	7,083

Table 1.
Sample distribution by NACE codes

(DGEEC, 2016b). Based on census combination for large firms and random sampling for other groups, the survey consisted of 9,455 enterprises. In the corrected sample of 8,736 companies, 7,083 valid answers were considered (i.e. 81% response rate) (DGEEC, 2016b). As shown in Table 2, most of sampled firms are from manufacturing sectors (manufacturers = 4,088). Further, following the European recommendation (Decree-Law No. 98/2015), more than half are classified as SMEs (84.9%).

In order to examine the sample, we performed correlation analysis and *t*-tests. The different analyses were conducted using IBM SPSS Statistics software, version 25. Correlations are generally low to moderate given an indication that there is a low risk of facing collinearity issues on the partial regressions (see Appendix 3). It is noteworthy that there is a strong positive correlation between technological and nontechnological innovations (0.585^{***}), since they can be considered measuring the firms' innovation accomplishments. Addressing this issue, we analyzed the common method bias through a full collinearity assessment approach (Kock, 2015). According to the author, the occurrence of Variance Inflation Factor (VIF) values greater than 3.3 is an indication of pathological collinearity. As all VIF values are clearly below to 3.3, the entire dataset can be considered free of common method bias (see Appendix 4). Regarding sector differences, the *t*-tests revealed significant statistical differences for social ($p < 0.001$) and environmental ($p < 0.001$) CSR dimensions (Table 3). Manufacturing firms are more concerned about issues underlying the social (mean for manufacturing = 2.90 vs mean for service = 2.65) and environmental dimensions (mean for manufacturing = 2.14 vs mean for service = 1.92), compared with service firms. To uncover any significant differences between industry typology and cooperation, a *t*-test confirmed that there are not statistically differences in the firms' cooperation (t (3537) = −0.650, $p = 0.516$) for manufacturing and service firms. Finally, concerning innovation differences, the *t*-test revealed statistical differences for product ($p = 0.004$), process ($p < 0.001$), organizational ($p = 0.001$), marketing ($p < 0.001$) and eco-innovations ($p < 0.001$). Manufacturing firms are more concerned in developing technological (i.e. product and process) and eco-innovations, while service firms tend to focus on nontechnological innovations (i.e. organizational and marketing).

4.2 Measurement, scale development and analysis techniques

Following previous research (e.g. Costa *et al.*, 2015; Cegarra-Navarro *et al.*, 2016; Briones Peñalver, Bernal Conesa, & de Nieves Nieto, 2018; Bacinello *et al.*, 2020), this study adopts the PLS-SEM to test the proposed model. According to Hair, Risher, Sarstedt, and Ringle (2019), this technique was primarily selected because

(1) The structural model is complex and includes many constructs, indicators and relationships.

(2) The research is based on secondary data.

(3) This method works well with larger samples.

(4) Distribution issues are concerned, such as lack of normality.

		n	%
Sector	Manufacturing firms	4,088	57.7
	Service firms	2,995	42.3
Size	Small (under 50 employees)	4,704	66.4
	Medium (50–249 employees)	1,311	18.5
	Large (over 250 employees	332	4.7

Note(s): 736 of sampled firms (10.4%) did not provide information about the number of employees

Table 2.
Sample profile by sector and size

Table 3. Differences between manufacturing and services firms regarding CSR, cooperation and firms' innovation

	Manufacturing firms		Service firms		Levene test for equality of variances		T-test for equality of means			
	n	Mean	*n*	Mean	*F*	Sig	*t*	df	Sig (two-tailed)	Mean difference
Social CSR	4,088	2.90	2,995	2.65	35.422	0.000	−9.206	6,353.168	0.000	−0.244
Economic CSR	2,164	331721.78	1,375	394,854.14	11.262	0.001	1.260	2,162.940	0.208	63132.365
Environmental CSR	1,823	2.14	911	1.92	2.564	0.109	−5.583	2,732	0.000	−0.220
Cooperation	2,164	0.26	1,375	0.25	1.703	0.192	−0.650	3,537	0.516	−0.010
Product innovation	4,088	0.47	2,995	0.42	6.731	0.009	−2.903	6,474.405	0.004	−0.048
Process innovation	4,088	0.75	2,995	0.55	122.126	0.000	−8.996	6,901.423	0.000	−0.201
Organizational innovation	4,088	0.51	2,995	0.58	23.984	0.000	3.272	6,247.262	0.001	0.075
Marketing innovation	4,088	0.59	2,995	0.68	41.295	0.000	3.506	6,079.818	0.000	0.093
Eco-innovation	2,453	2.15	1,714	1.25	95.173	0.000	−16.201	3,954.973	0.000	−0.903

Note(s): F = F-statistic; sig = significance; df = degrees of freedom

Considering the sample size ($n = 7{,}083$), the variables included on the analysis do not follow a normal distribution. Thereby, the lack of distributional assumption was the main reason for choosing PLS-SEM (Hair, Sarstedt, Ringle, & Mena, 2012; Nitzl, 2016). It should be noted that, in a limited number of situations, nonnormal data may also influence the PLS-SEM results. The use of bias-corrected and accelerated (BCa) bootstrapping handles this issue, as it adjusts the confidence intervals for skewness (Efron, 1987). Following these guidelines, we employed the BCa bootstrapping in order to adjust the data for skewness and potential bias (Aguirre-Urreta & Rönkkö, 2018).

The CIS questionnaire used in this study is divided into 13 sections. There are five sections accessing product, process, organizational, marketing and eco-innovations. To evaluate the firms' innovation, we adopted scale validated in previous research (e.g. OECD, 2005; Flikkema *et al.*, 2007; Kemp & Pearson, 2020). With regards to cooperation, new variables were defined according to the type of partner and the geographic market in which it is located (Portugal, Europe, USA, China/India, other countries). CSR was operationalized using the TBL perspective: economic, social and environmental dimensions (Yáñez-Araque *et al.*, 2020).

The measurement of innovation activities is grounded in the theoretical definition of OECD (2005), which describes them as the process that generates innovation (e.g. R&D activities, assets and knowledge acquisition, among others). Following previous research (e.g. Baum, Locke, & Smith, 2001; Caloghirou *et al.*, 2004; Tourigny & Le, 2004; Casanueva, Castro, & Galán, 2013), this study also controls firm size, public financial support, firm internationalization and sector differences. Appendix 5 provides complete information regarding the variable's operationalization, as well as how they relate with the CIS questionnaire.

5. Findings

The reflective measurement model evaluation focuses on the constructs' convergent validity, internal consistency reliability and discriminant validity (Sarstedt, Ringle, & Hair, 2017). We found that the four measurement models meet the relevant assessment criteria (Table 4).

Constructs	Indicators	Convergent validity Outer loadings	AVE	Internal consistency reliability Reliability CR	ρA	CA
Cooperation	Priv. sector customers	0.722	0.513	0.814	0.777	0.745
	Pub. sector customers	0.620				
	Competitors	0.774				
	Consultants	0.753				
	Suppliers	0.705				
	Business group	0.722				
	Government/research institutes	0.720				
	Universities	0.706				
CSR	Economic	0.747	0.522	0.718	0.786	0.754
	Environmental	0.653				
	Social	0.762				
Nontechnological innovation	Marketing	0.849	0.751	0.858	0.675	0.669
	Organizational	0.883				
Technological innovation	Process	0.908	0.775	0.873	0.738	0.713
	Product	0.852				

Note(s): AVE = Average extracted variance; CR = Composite reliability; CA = Cronbach's alpha

Table 4.
Reflective outer model evaluation

More specifically, all outer loadings are above 0.60 indicating a sufficient level of reliability (Hair, Hult, Ringle, & Sarstedt, 2013). Further, the AVE values are higher than 0.50, providing support for the measures' convergent validity (Fornell & Larcker, 1981). Composite reliability (CR) ranges from 0.718 to 0.873, which is above the recommended value of 0.70 (Hair *et al.*, 2019). Moreover, the Cronbach's alpha (CA) display values between 0.669 and 0.754, which is considered an acceptable measure (Hair *et al.*, 2019). Finally, most of the constructs have ρA values greater than 0.707 (Dijkstra & Henseler, 2015), except for nontechnological innovation that is slightly lower ($\rho A = 0.675$). These results suggest that the constructs exhibit sufficient levels of internal consistency reliability.

We access the discriminant validity by using the heterotrait–monotrait ratio (HTMT) (Henseler, Ringle, & Sarstedt, 2015) (Table 5). All the results are below to the conservative threshold of 0.85 (Kline, 2011). Moreover, we undertake the bootstrapping procedure with 5,000 samples selecting the no sign option, BCa bootstrap confidence intervals and one-tailed testing at the 5% significance level. The outcomes reveal that none of the HTMT confidence intervals include the value of 1, which means that discriminant validity has been established between all the pair of constructs. Thus, the reflective model suggests that measures display satisfactory levels of validity and reliability, i.e. we can proceed with the structural model evaluation.

The structural model assessment involves the analysis of collinearity issues through VIF values (see Appendix 4). As all VIF are below to the recommended value of 5 (Hair, Hult, Ringle, & Sarstedt, 2017), we conclude that multicollinearity is not a problem in our data. The path coefficients range between −0.159 and 0.176 with different significance levels (Table 6). We also found that the model explains 17.9% of cooperation, 16.4% of technological innovation, 14.3% of nontechnological innovation and 17.9% of eco-innovation. However, the constructs explained variance decreases when is adjusted for the number of variables in the model. The overall approximate model fits (SRMR) are below to the recommended value of 0.08 (Henseler *et al.*, 2014), being smaller than their corresponding 95 and 99% quantile (Henseler, Hubona, & Ray, 2016), which suggests the existence of a good fit.

6. Discussion

The results support some of the research hypotheses (Table 6). With regards to Hypothesis 1, the relationship between innovation activities and the establishment of cooperative agreements is partially confirmed. More specifically, the findings reveal that firms investing in asset acquisition (H1c: $\beta = 0.049$; $p < 0.001$), knowledge acquisition (H1d: $\beta = 0.058$; $p < 0.01$), introduction of innovations (H1f: $\beta = 0.075$; $p < 0.001$) and other activities (H1h: $\beta = 0.080$; $p < 0.001$) display a higher willingness to cooperate. With a higher investment in innovation activities, managers are more oriented to the firms' interests,

	Cooperation	CSR	Nontechnological innovation	Technological innovation
Cooperation				
CSR	0.626 [0.509; 0.808]			
Nontechnological innovation	0.143 [0.112; 0.186]	0.554 [0.448; 0.686]		
Technological innovation	0.108 [0.080; 0.144]	0.699 [0.593; 0.836]	0.844 [0.821; 0.868]	

Note(s): The values in the brackets represent the 95% confidence intervals

Table 5.
HTMT index

Table 6.
Structural model evaluation

	Partial least square regressions							
	Cooperation	f^2	Technological innovation	f^2	Nontechnological innovation	f^2	Eco-innovation	f^2
In-house R&D	0.023 (1.460)^{ns}	0.001						
External R&D	0.027 (1.224)^{ns}	0.001						
Asset acquisition	0.049 (3.540)***	0.002						
Knowledge acquisition	0.058 (2.360)*	0.003						
Employees' qualification	0.022 (1.397)^{ns}	<0.001						
Introduction of innovations	0.075 (3.907)***	0.005						
Design	−0.016 (0.924)^{ns}	<0.001						
Other activities	0.080 (4.311)***	0.006						
CSR	0.176 (3.469)***	0.031	0.140 (7.444)***	0.018	0.113 (6.102)***	0.011	0.132 (6.729)***	0.016
Cooperation			0.044 (2.372)*	0.002	0.073 (3.454)***	0.005	0.065 (3.120)**	0.004
Firm's size			0.107 (8.384)***	0.011	0.073 (5.508)***	0.005	0.078 (5.747)***	0.006
Public financial support			0.048 (3.127)**	0.002	0.056 (3.387)***	0.003	0.048 (3.033)**	0.002
Firm's internationalization			0.050 (3.640)***	0.002	0.015 (1.175)^{ns}	<0.001	0.026 (1.817)$^{(+)}$	0.001
Manufacturing firms			0.053 (4.298)***	0.003	−0.063 (5.168)***	0.004	0.159 (13.837)***	0.025
Service firms			−0.053 (4.324)***	0.003	0.063 (5.232)***	0.004	−0.159 (14.221)***	0.025
R^2	0.179		0.164		0.143		0.179	
R^2 adjusted	0.178		0.164		0.142		0.178	

Goodness of fit	Saturated model	Estimated model
SRMR	0.056	0.081
Critical thresholds: at 95%	0.132	0.133
at 99%	0.133	0.133

Note(s): R^2 = endogenous variable explained variance; SRMR = standardized root mean square. Path coefficients significant at p-values: $^{+}p < 0.05$; $^{*}p < 0.01$; $^{**}p < 0.005$; $^{***}p < 0.001$. The values in the brackets represent t-values. t-value thresholds at one-tailed test of alpha = 0.05 and 5,000 resamples: t (0.05; 4,999) = 1.645; t (0.01, 4,999) = 2.327; t (0.005, 4,999) = 2.576; t (0.001; 4,999) = 3.091

catering its values and commitments in strategic decision-making, becoming more receptive to knowledge exchange with different stakeholders.

Thus, we found support for the relevant role of assets acquisition, innovation introduction, knowledge acquisition and other-related activities (e.g. feasibility studies, testing, tooling up and industrial engineering) as driving forces of business cooperation. These outcomes not only validate the theoretical predictions but also conform to many earlier studies (e.g. Mansfield, 1988; Shields & Young, 1994; Weiss, 2003; Camacho & Rodríguez, 2005; Elche & González, 2008), highlighting the important role of innovation activities in shaping firms' strategies.

Moreover, Hypothesis 2 – CSR initiatives have a positive influence on the firms' cooperation – is also supported (H2: $\beta = 0.176$; $p < 0.001$). When the firm increases its commitment with CSR (i.e. economic, social and environmental initiatives), it becomes more able to develop network interactions. As socially responsible firms, they recognize the relevance of each partner for knowledge acquisition (Gras-Gil *et al.*, 2016), which is consistent with the KBV perspective (Grant, 1996). The TBL's of CSR allows the integration of new stakeholders with the ability to influence the firms' strategic decision. We conclude that the focus on CSR enhances the managers' openness to welcome new ideas and managerial approaches, supporting the development of an atmosphere that promotes business collaboration. Through constant interactions with diversified partners (e.g. customers, suppliers, universities, research centers), firms can internalize the shared knowledge to achieve more returns that noncooperative counterparts (Liao & Long, 2019).

A recent research stream also highlights that CSR actions are closely related to environmental social governance (ESG) mechanisms (Ruan & Liu, 2021). ESG includes the focus on environmental concerns (e.g. climate change), social responsibility (e.g. human rights) and corporate governance (e.g. shareholder protection) (Lagasio & Cucari, 2019). The firm's stakeholders – shareholders, investors, government and regulatory agencies – have shown increased interest in CSR and ESG issues. Among the existing studies, a lot have revealed that ESG reduce corporate risk-taking behavior (Di Tommaso & Thornton, 2020), allowing more stability and elasticity in terms of CSR operations (Almeyda & Darmansya, 2019). In a broader scope, CSR and ESG commitments function as a necessary stimulus for enterprises undertake cooperative relationships by reducing the firm's systematic risk (Zhao *et al.*, 2018) and increasing the quality of management practices (Ling, Forrest, Lynch, & Fox, 2007).

Likewise, Hypothesis 3 – cooperation with different partners positively influences the firm's innovation – is validated. Our study shows that cooperation with different partners leads to higher levels of technological innovation (H3a: $\beta = 0.044$; $p < 0.01$), nontechnological innovation (H3b: $\beta = 0.073$; $p < 0.001$) and eco-innovation (H3c: $\beta = 0.065$; $p < 0.005$). Network relationships allow resource and know-how interchange, reducing the costs of innovation process. Further, network members tend to lead firms' managers into an aspirational and risky growth path. These stakeholders have greater awareness of market opportunities and make better risk assessment. Thereby, firms with high level of collaboration are more likely to encourage an *open innovation* environment (Yun, Zhao, Jung, & Yigitcanlar, 2020), which can inspire shared knowledge to be turned into creative results (Li, Ma, Liu, & Liang, 2020). Our findings support the *open innovation* paradigm (Chesbrough, 2003) by emphasizing the vital role of business collaboration for the development of innovative outputs (e.g. Becker & Dietz, 2004; Faria *et al.*, 2010; Lewandowska *et al.*, 2016; Garcés-Ayerbe *et al.*, 2019; Pereira *et al.*, 2020).

Regarding Hypothesis 4 – CSR initiatives are positively related to the firm's innovation – the current research found that firms with higher CSR orientation increase the likelihood of introduce technological innovation (H4a: $\beta = 0.140$; $p < 0.001$), nontechnological innovation

(H4b: $\beta = 0.113$; $p < 0.001$) and eco-innovation (H4c: $\beta = 0.132$; $p < 0.001$). These results are in line with the extant literature (e.g. Bocquet *et al.*, 2017; Zhu *et al.*, 2019; Bacinello *et al.*, 2020; García-Piqueres & García-Ramos, 2020), suggesting that economic, social and environmental CSR are not mutually exclusive (Pan *et al.*, 2020) and must be integrated to achieve a higher level of innovative outcomes.

Moreover, our study provides an additional insight. The outcomes indicate that CSR initiatives have a direct and significant impact on innovation (Table 6) but also and indirect, mediated effect through cooperation (Table 7). Given this pattern, we conclude that the research model is partially mediated (direct effect of CSR on innovation plus an indirect effect through cooperation), i.e. a combination of CSR and cooperation helps to improve firms' innovation. Such implication confirms the Hernández and Sánchez (2012) findings, proposing that CSR enhances innovation through the development of interactions with internal (e.g. business group), external (e.g. suppliers, customers, competitors) and institutional stakeholders (e.g. universities, research centers).

Concerning to control variables (Table 6), the most of coefficients are statistically significant in the expected direction. Tables 8 and 9 summarize the results of each research hypotheses. Of the four hypotheses initially formulated, three are supported by data collected (i.e. H2; H3a–c, H4a–c). However, Hypothesis 1 – the investments in innovation activities are positively related to the firm's willingness to cooperate – is partially validated since only a few innovation activities explain interfirm collaboration (Table 9).

7. Conclusions

This article focuses on the effect of CSR on the firms' innovation, while exploring the mediating role of cooperation. We examined how the three dimensions of CSR affect innovation, which was classified into technological, nontechnological and environmental. The results suggest that CSR is positively related to all innovation types, and the development of cooperative relationships partially mediates this relationship. Moreover, we found that the investment in innovation activities (e.g. knowledge acquisition, innovation introduction, assets acquisition and other-related activities) tend to influence the firms' decision to cooperate.

Table 7.
Total and indirect effects of CSR and cooperation on firms' innovation

	Path coefficients	*t*-value	*p*-value
Specific indirect effects			
CSR → Cooperation → Technological innovation	$0.008^{(+)}$	2.288	0.011
CSR → Cooperation → Nontechnological innovation	0.013^{**}	2.901	0.002
CSR → Cooperation → Eco-innovation	0.011^{**}	2.642	0.004
Total indirect effects			
CSR → Technological innovation	$0.008^{(+)}$	2.288	0.011
CSR → Nontechnological innovation	0.013^{**}	2.901	0.002
CSR → Eco-innovation	0.011^{**}	2.642	0.004
Total effects (indirect plus path)			
CSR → Technological innovation	0.148^{***}	8.113	0.000
CSR → Nontechnological innovation	0.126^{***}	7.043	0.000
CSR → Eco-innovation	0.144^{***}	7.318	0.000

Note(s): Path coefficients significant at *p*-values: $^{+}p < 0.05$; $^{**}p < 0.005$; $^{***}p < 0.001$. The values in the brackets represent *t*-values. *t*-value thresholds at one-tailed test of alpha = 0.05 and 5,000 resamples: t (0.05; 4,999) = 1.645; t (0.01, 4,999) = 2.327; t (0.005, 4,999) = 2.576; t (0.001; 4,999) = 3.091

Target variables	Main findings
Cooperation	• Asset's acquisition, introduction of innovations, knowledge acquisition, other activities and CSR initiatives positively affect the firms' willingness to cooperate • Cooperation has a mediating role on the CSR–innovation relationship
Innovation	• CSR and cooperation positively influence the firms' ability to introduce technological innovation (i.e. product and process), nontechnological innovation (i.e. organizational and marketing) and eco-innovations • Larger firms are more strongly oriented toward technological, nontechnological and eco-innovations • Firms that receive financial support from public entities have better conditions to develop technological, nontechnological and eco-innovations • Firms with a higher level of foreign sales tend to introduce technological and eco-innovations • Manufacturing firms are more strongly oriented toward technological and eco-innovations • Service firms are more strongly oriented toward nontechnological innovations

Table 8.
Summary of main findings

Hypotheses	Results
H1a. The investments in in-house R&D are positively related to the firm's willingness to cooperate	*Not supported*
H1b. The investments in external R&D are positively related to the firm's willingness to cooperate	*Not supported*
H1c. The investments in assets acquisition are positively related to the firm's willingness to cooperate	Supported
H1d. The investments in knowledge acquisition are positively related to the firm's willingness to cooperate	Supported
H1e. The investments in employees' qualification are positively related to the firm's willingness to cooperate	*Not supported*
H1f. The investments in innovations introduction are positively related to the firm's willingness to cooperate	Supported
H1g. The investments in design are positively related to the firm's willingness to cooperate	*Not supported*
H1h. The investments in other activities are positively related to the firm's willingness to cooperate	Supported
H2. CSR initiatives have a positive influence on the firm's cooperation	Supported
H3a. Cooperation with different partners positively influences the firms' technological innovation	Supported
H3b. Cooperation with different partners positively influences the firms' non-technological innovation	Supported
H3c. Cooperation with different partners positively influences the firms' eco-innovation	Supported
H4a. CSR initiatives are positively related to the firms' technological innovation	Supported
H4b. CSR initiatives are positively related to the firms' non-technological innovation	Supported
H4c. CSR initiatives are positively related to the firms' eco-innovation	Supported

Table 9.
Hypothesis summary

7.1 Theoretical implications

Our research contributes to the literature in several aspects:

(1) Innovation corresponds to a systematic phenomenon in which integrative learning and cooperative entrepreneurship are fundamental. Therefore, firms investing in innovation activities are more likely to cooperate with diversified actors, in order to share knowledge and risks.

(2) Although the lack of consensus on defining CSR, there is a research stream highlighting its multidimensional nature (e.g. Guerrero-Villegas *et al.*, 2018; García-Piqueres & García-Ramos, 2020). Nonetheless, the previous literature has failed on using the three CSR dimensions (Gallagher, Hrivnak, Valcea, Mahoney, & LaWong, 2018), being mostly focused on limited indicators and/or a singular variable (Anser, Zhang, & Kanwal, 2018). From a TBL perspective, our research unpacked CSR into economic, social and environmental dimensions, concluding that CSR has a positive effect on innovation. This theoretical unpacking, through the lens of RBV, SRBV and NRBV, combined with its multidimensionality, may contribute to solve the inconsistencies reported on the CSR–innovation relationship. Therefore, this study supports the adoption of TBL's framework, which is linked with the SDGs of the 2030 Agenda for Sustainable Development, designed to address social, economic and environmental challenges faced by the planet.

(3) We add to the CSR–innovation literature by exploring the mediating role of cooperation. Anchored on the KBV framework, the results reveal that firms, simultaneously, oriented to CSR actions and cooperation agreements are able to increase their innovation level, which is a vital condition for growth and sustained competitive advantage.

(4) The integration of socially responsible actions not only results in an ethical and moral positioning but also allows the generation of intangible resources with a high strategic value, such as external cooperation and business innovation.

7.2 Managerial implications

First, firms need to devote resources for an *open innovation strategy* that allows to cope with trends and changes of the dynamic markets. Managers should consider the vital role of the relationships established with different stakeholders to explore new opportunities and maintain their competitive advantage. Second, considering that CSR contributes to innovation, this is a necessary stimulus for firms undertake CSR initiatives. This is a business vision that involves more than publicly demonstrate that organizations are socially responsible. SME owners may stop thinking that CSR is only applicable on larger firms who have the financial and human resources, breaking with the idea that, in smaller businesses, the costs of adopting CSR will exceed the benefits. Such a vision is an opportunity for all firms, regardless their size, to adapt on new circumstances (established in part by the 2030 Agenda) and to move from traditional management of CSR to its effective integration in firms' strategy. Therefore, true CSR must include social, economic and environmental initiatives and should be a part of the innovation strategy. As a result, managers who intend to contribute for society in the long term should plan, monitor and manage all CSR dimensions. Third, cooperation is the way by which CSR positively impacts firms' innovativeness, i.e. managers aiming to increase innovation should focus on CSR enhanced by network interactions. In other words, cooperation should be considered a mediator to achieve greater innovative outcomes. Finally, firms must be aware of the ESG role on their future sustainability. Around the world, there has been a proliferation of several reports aiming to incentive enterprises to improve their ESG performance. The European Directive 2014/95/EU encourages all firms to disclose in their annual reports nonfinancial information, namely (1) policies and outcomes regarding environmental, social and employee issues, (2) respect for the human rights, (3) anticorruption measures and (4) cultural diversity among workers. Indeed, after the appearance of COVID-19 epidemic, global investors' attention to CSR, ESG and sustainable investing have risen to a higher degree. Thus, managers should carefully consider the possibility of disclosing this type of information. In doing so, they will guarantee

the transparency of their operations avoiding to harm corporate reputation in the short-term and ensuring business prosperity in the long-term.

7.3 Limitations and future research

This research has some limitations that must be considered when interpreting the results. The first limitation is the cross-sectional nature of the data that does not allow evaluating the firms' evolution in terms of innovation. Besides, the investigation is limited by the time span considered (three-year period). Longitudinal analysis would be important to understand the influence of CSR and cooperation on innovation outcomes. Second, this study is limited in scope since we only tested a sample of Portuguese firms. Although the results can be generalized into a limited extent for smaller, open and relatively well-developed economies, future research should consider evidence from different countries in order to validate our findings in other contexts. Third, the database used has two mainly boundaries: (1) the CIS data are usually available for the community a lot of time after being collected and (2) the metrics used to operationalize CSR and innovation are restrained by the survey. In order to provide updated contributions, future studies could apply a questionnaire to the firms' top management team. Through a primary database, it would be possible to overcome the main constraints of CIS (2014). In addition, the analysis of effects related to regulation and market trends is a fruitful direction for new studies. Beise and Rennings (2005) found that ecologically sustainable products (e.g. green electricity) must comply with foreign market and regulative norms if producers intend to be internationally successful. This means that for introducing an eco-innovation in the external environment, both elements – international market and regulation – should be aligned and be coherent worldwide. A plausible avenue for future research could explore the effect of regulation systems on the mechanism through which CSR dimensions translate the effect of eco-innovation on the firm internationalization patterns (in terms of speed of internationalization).

Note

1. The European Innovation Scoreboard provides a comparative assessment of research and innovation performance in the EU members and other related countries. This report allows policymakers to assess relative strengthens and weaknesses of national innovation systems, track progress and identify priority areas to boost innovation (EIS, 2020).

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Appendix 1

Table A1.
The role of cooperation on the firm's innovation

Author(s)	Cooperation		Results	Main findings
Kaufmann and Todting (2001) Faems *et al.* (2005)	Business group	Vertical/ Noncompetitive	Positive	The ability to innovate results from an interactive process among firms reducing the risk of failures, as well as a continuous learning process
Tether (2002) Freel and Harrison (2006) Nieto and Santamaría (2007)	Customers	Vertical/ Noncompetitive	Positive	Customers are an important source of knowledge because its inputs help firms to generate new ideas, understand customers attitudes and identify new market trends in advance
Faems *et al.* (2005) Nieto and Santamaría (2007)	Suppliers	Vertical/ Noncompetitive	Positive	The cooperation with suppliers is privileged when the firms' objectives have a commercial nature. These actors allow more flexibility, productivity, quality improvement and market adaptation
Bayona *et al.* (2001) Miotti and Sachwald (2003) Nieto and Santamaría (2007)	Competitors	Horizontal/ Competitive	Positive	This type of interaction is quite appealing since contributes to (1) share risks; (2) intensify international competitiveness; (3) solve market failures and technological deficiencies and (4) improve products or processes through know-how exchange
Kaufmann and Todting (2001) Tether (2002) Becker and Dietz (2004) Faems *et al.* (2005) Nieto and Santamaría (2007)	Universities and research institutes	Horizontal/ Competitive	Positive	As research in firms becomes very expensive, specialized academic knowledge brings balance and complement the firms' R&D. This input allows the rise of technologies and the achievement of technological discovers, that lead to distinctive commercial products
Kaufmann and Todting (2001) Tether (2002)	Consultants and experts	Vertical/ Noncompetitive	Positive	Consultants and experts provide experience sharing, offer ideas on new needs or solutions, which brings a wide range of valuable inputs for innovation development

Appendix 2

Author(s)	Purpose	Data source	Method	Results	Main findings
Gallego-Álvarez (2011)	To analyse the bidirectional relationship between CSR practices and innovation following the RBV theory	500 European firms and 500 non-European firms	Linear and logistic regressions	Negative	• The bidirectional relationship between the two strategic options is negative • The relationship between innovation and CSR is not the same in different sectors
Bocqu *et al.* (2013)	To examine the link between CSR and innovation from a strategic perspective (strategic *vs* responsive firms)	266 Luxembourg firms	Bivariate probit model	Mixed	• Firms with strategic CSR are more likely to innovate in both products and processes, while reactive CSR creates barriers to innovation
Costa *et al.* (2015)	To explore how CSR principles influence the ability of technology resources to enhance firm innovation and achieve a better export performance	170 Portuguese firms	PLS-SEM	Mixed	• CSR contributes to enhance the impact of exploratory innovation on export performance • While CSR contributes to the development of exploratory innovations, its effect on exploitative innovation was not significant
Cegarro-Navarro *et al.* (2016)	To evaluate how the company's ability to innovate may results in the maintenance of an appropriate balance between economic and social objectives	133 Spanish firms	Factor analysis PLS-SEM	Positive	• Although firms are using innovation outcomes to support both economic and social achievements, they are only taking advantage of economic successes to obtain a higher financial performance

(*continued*)

Table A2. An overviewed of empirical studies on the CSR–innovation relationship

Author(s)	Purpose	Data source	Method	Results	Main findings
Bocquet *et al.* (2017)	To analyze the effects of both CSR and technological innovation on the firms' economic performance	213 Luxembourg firms	Probit and ordinary least square models	Positive	• Different findings were obtained from strategic *vs* responsive CSR on technological innovations • Firms with strategic CSR obtain growth through product and process innovations
Mithani (2017)	To examine whether ecological or social investments yield economic returns that are comparable from R&D investments and if the attention paid on these dimensions increases the economic benefits of R&D investments	5999 Indian firms	Fixed Effects models	Negative	• R&D has a significantly higher impact on economic performance than contribution to the ecological environment • Ecological and social contributions weaken the effects of R&D
Briones Peñalver *et al.* (2018)	To explore the relationship between CSR and its influence on innovation and cooperation	226 Spanish SMEs	PLS-SEM	Positive	• Innovation partially mediates the relationship between cooperation and performance • Cooperation has a mediating role on the link between CSR and innovation
Zhu *et al.* (2019)	To understand if the three innovation types (i.e. technology, management, and marketing) have a moderating and mediating effect on the relationship CSR practices–performance	494 Chinese SMEs	Hierarchical regression	Positive	• Innovation moderates the effect of CSR practices on three of four performance factors, strengthening this relationship • The results show a mediating role of three innovation factors. Except for one performance of social image, mediation effect exists for three of those factors

Table A2. (*continued*)

Author(s)	Purpose	Data source	Method	Results	Main findings
Bacinello *et al.* (2020)	To verify the influence of maturity in corporate social responsibility (CSRM) on the sustainable innovation (SIM) and their effects on business performance	154 Brazilian firms	PLS-SEM	Positive	• CSRM exerts a statistically influence on SIM and, both, positively influence business performance
García-Piqueres and García-Ramos (2020)	To examine if the relationship between CSR and innovation is homogenous or depends on the type of CSR and/or innovation	9501 Spanish firms	Random effect probit panel data	Positive	• Although the positive effect of CSR in innovation is confirmed in almost of the cases, there are differences one the innovation and CSR types

Table A2.

Table A3.
Mean, standard deviations and correlations (n = 7,083)

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0.596	0.491	1.000																	
2	411,744	1,460,218	0.156***	1.000																
3	3.703	3.455	0.102***	0.219***	1.000															
4	0.379	0.485	0.100***	0.100***	0.080***	1.000														
5	1.783	1.885	0.146***	0.191***	0.104***	0.119***	1.000													
6	0.499	0.500	0.178***	0.110***	0.101***	0.226***	0.157***	1.000												
7	0.262	0.440	0.095***	0.162***	0.107***	0.109***	0.123***	0.151***	1.000											
8	13.269	26.205	0.081***	0.217***	0.004ns	0.068***	0.129***	0.021(+)	0.077***	1.000										
9	1.311	0.565	0.045***	0.209***	0.040(+)	0.047***	0.122***	0.059***	0.148***	0.225***	1.000									
10	0.440	0.496	0.020ns	0.204***	0.105***	0.162***	0.120***	0.132***	0.301***	0.104***	0.150***	1.000								
11	0.304	0.460	0.108***	0.119***	0.145***	0.412***	0.127***	0.292***	0.178***	0.026(+)	0.053***	0.205***	1.000							
12	0.142	0.349	0.144***	0.092***	0.123***	0.170***	0.100***	0.219***	0.208***	0.002ns	0.047**	0.113***	0.230***	1.000						
13	0.577	0.494	0.069***	0.071***	−0.024(+)	0.020(+)	0.180***	−0.025(+)	−0.019ns	0.316***	0.021(+)	0.037**	−0.048***	−0.012ns	1.000					
14	0.423	0.494	−0.069***	−0.071***	0.024(+)	−0.020(+)	−0.180***	0.025(+)	0.019ns	−0.316***	−0.021(+)	−0.037**	0.048***	0.012ns	0.047***	1.000				
15	1.168	1.765	0.100***	0.156***	0.114***	0.259***	0.199***	0.218***	0.142***	0.044***	0.107***	0.135***	0.286***	0.175***	−0.047***	0.047***	1.000			
16	0.309	0.462	0.046**	0.145***	0.146***	0.269***	0.163***	0.164***	0.160***	0.083***	0.071***	0.179***	0.262***	0.181***	0.063***	−0.063***	0.211***	1.000		
17	0.413	0.678	0.167***	0.236***	0.205***	0.135***	0.115***	0.104***	0.227***	0.141***	0.100***	0.332***	0.173***	0.115***	0.068***	−0.068***	0.103***	0.180***	1.000	
18	1.112	1.454	0.167***	0.198***	0.088***	0.189***	0.211***	0.209***	0.107***	0.128***	0.155***	0.158***	0.202***	0.124***	0.083***	−0.083***	*0.585****	0.161***	0.112***	1.000

Note(s): 1. Assets Acquisition; 2. CSR; 3. Cooperation; 4. Design; 5. Eco-Innovation; 6. Employees' Qualification; 7. External R&D; 8. Firm's Internationalization; 9. Firm's Size; 10. In-House R&D; 11. Introduction of Innovations; 12. Knowledge Acquisition; 13. Manufacturing Firms; 14. Service Firms; 15. Non-Technological Innovation; 16. Other Activities; 17. Public Financial Support; 18. Technological Innovation. p-values significant at $^{+}p < 0.05$; $^{*}p < 0.01$; $^{**}p < 0.005$; $^{***}p < 0.001$; ns. not significant

Appendix 4

Table A4. Assessment of common method bias

	Partial least square regressions			
	Cooperation	Eco-innovation	Nontechnological innovation	Technological innovation
Asset acquisition	1.071			
Design	1.270			
Employees' qualification	1.168			
External R&D	1.167			
In-house R&D	1.173			
Introduction of innovations	1.342			
Knowledge acquisition	1.137			
Other activities	1.157			
CSR	1.092	1.168	1.168	1.168
Cooperation		1.084	1.084	1.084
Firm's size		1.089	1.089	1.089
Public financial support		1.101	1.101	1.101
Firm's internationalization		1.216	1.216	1.216
Manufacturing firms		1.116	1.116	1.116
Service firms		1.116	1.116	1.116

Table A5.
Variable's operationalization through CIS (2014)

Variables		Item(s)	Theoretical foundation	Proxies	Measurement	CIS (2014) (question number and description)
Target variables	Technological innovation	Product innovation	OECD (2005), Flikkema *et al.* (2007)	Sum of all 2 items	Ordinal variable (ranging from 0 = firm does not innovate in good/service to 2 = firm innovates in both)	(Question 2.1) During the three years 2012–2014, did your enterprise introduce (1) goods innovation, (2) service innovations? (Dummy variables: 0 = no, 1 = yes)
		Process innovation		Sum of all 3 items	Ordinal variable (ranging from 0 = firm does not innovate in process to 3 = firm innovates in all items of process innovation)	(Question 3.1) During the three years 2012–2014, did your enterprise introduce new or significantly improved (1) manufacturing methods, (2) logistics, delivery or distribution methods, (3) supporting activities? (Dummy variables: 0 = no, 1 = yes)
	Non-technological innovation	Organizational innovation	OECD (2005), Flikkema *et al.* (2007)	Sum of all 3 items	Ordinal variable (ranging from 0 = firm does not innovate in organizational methods to 3 = firm innovates in all items of organizational methods)	(Question 8.1) During the three years 2012–2014, did your enterprise introduce new (1) business practices, (2) organizing work responsibilities and decision making, (3) organizing external relations? (Dummy variables: 0 = no, 1 = yes)
		Marketing innovation		Sum of all 4 items	Ordinal variable (ranging from 0 = firm does not innovate in marketing to 4 = firm innovates in all items of marketing)	(Question 9.1) During the three years 2012–2014, did your enterprise introduce new methods of: (1) design or packaging, (2) product promotion, (3) product placement, (4) pricing? (Dummy variables: 0 = no, 1 = yes)
	Eco-innovation	Environmental benefits	Kemp and Pearson (2020)	Sum of all 6 items	Ordinal variable (ranging from 0 = firm does not introduce eco-innovations to 6 = firm innovates in all items of eco-innovation)	(Question 15.1) During the three years 2012–2014, did your enterprise introduce a product (good or service), process, organizational or marketing innovation with any of following environmental benefits: (1) reduce material or water use, (2) reduce energy or CO_2 footprint, (3) reduce air, noise or soil pollution, (4) replace a share of polluting materials, (5) replace a share of fossil energy; (6) recycle waste or materials? (Dummy variables: 0 = no, 1 = yes)

(*continued*)

Table A5.

Variables		Item(s)	Theoretical foundation	Proxies	Measurement	CIS (2014) (question number and description)
Mediating variable	Cooperation	Internal, external and institutional collaboration	Kaufmann and Todting (2001), Faems *et al.* (2005), Nieto and Santamaría (2007)	Sum of all 5 items for each partner in 5 markets (Portugal, Europe, USA, China/India, other countries)	Ordinal variable (ranging from 0 = firm does not cooperate with any partner to 5 = firm cooperates with one partner in all geographic markets) (scale adopted for each partner)	(Question 7.2) Please indicate the type of cooperation partner by location: (1) firms in the same group, (2) suppliers, (3) customers in private sector, (4) customers in public sector, (5) competitors, (6) consultants, (7) universities, (8) government/research institutes (dummy variables: 0 = no, 1 = yes)
Explanatory variables	CSR (TBL's framework)	Economic CSR	Yáñez-Araque *et al.* (2020)	Single item	Continuous variable (total expenditures in labor costs, contracted out activities and capital expenses on buildings and equipment)	(Question 5.2) How much did your enterprise spend on current expenditures in 2014? (Expressed in thousands of €)
Explanatory variables	CSR (TBL's framework)	Social CSR	Yáñez-Araque *et al.* (2020)	Sum of all 4 items	Ordinal variable (ranging from 1 = firm operates in one geographic market to 4 = firm operates in all geographic segments)	(Question 1.3) In which geographic markets did your enterprise sell goods and/or services during the three years 2012–2014? (1) local/regional within your country, (2) national (other regions of your country), (3) other EU or associated members, (4) all other countries (dummy variables: 0 = no, 1 = yes)
		Environmental CSR	Yáñez-Araque *et al.* (2020)	Single item	Ordinal variable (selected item "*high cost of energy, water or materials*" measured through a 3-point likert scale)	(Question 15.3) During 2012– 2014, how important were the following factors in driving your enterprise's decisions to introduce innovations with environmental benefits? (3-point likert scale ranging from 0 = not relevant to 3 = high relevance)
	Innovation activities	Activities and expenditures for innovation	Bayona *et al.* (2001), Weiss (2003), Elche and González (2008)	Binary variables	Dummy variables (0 = no, 1 = yes)	(Question 5.1) During the three years 2012–2014, did your enterprise engage in the following innovation activities: (1) in-house R&D, (2) external R&D, (3) acquisition of machinery, equipment, software and buildings, (4) acquisition of existing knowledge from other enterprises or organizations, (5) training for innovative activities, (6) market introduction of innovations, (7) design, (8) other activities? (Dummy variables: 0 = no, 1 = yes)

(*continued*)

Table A5.

Variables		Item(s)	Theoretical foundation	Proxies	Measurement	CIS (2014) (question number and description)
Control variables	Firm's size	Employees' number	Baum *et al.* (2001)	Single item	Continuous variable (average number of employees)	(Question 16.3) What was your enterprise's average number of employees in 2014?
	Public financial support	Financial support for innovation	Tourigny and Le (2004)	Sum of all 3 items	Ordinal variable (ranging from 0 = firm did not receive financial support to 3 = firm received financial support from all public entities)	(Question 6.1) During the three years 2012–2014, did your enterprise receive any public financial support for innovation activities from the following levels of government: (1) local or regional authorities, (2) central government, (3) european union (EU)? (Dummy variables: 0 = no, 1 = yes)
	Firm's internationalization	Sales for international markets	Casanueva *et al.* (2013)	Single item	Continuous variable (foreign sales as a percentage of total sales)	(Question 16.2) What was the percent of your total turnover from sales to clients outside your country in 2014?
	Sector differences	Firms' NACE codes	Caloghirou *et al.* (2004)	Binary variable	Dummy variables (0 = no, 1 = yes)	(Question 1) General information about the enterprise: Main activity (two-digit NACE codes)

Note(s): Based on the Eurostat guidelines (2020), firms were classified as manufacturing enterprises (NACE 10–12, 12–18, 19–25, 26–27, 28–33, 35–38) and service enterprises (NACE 07–09, 42–43, 46–53, 58–63, 64–75, 86)