



# The Influence of CSR Orientation on Innovative Performance: Is the Effect Conditioned to the Implementation of Organizational Practices?

Paula Anzola-Román<sup>1</sup> · Teresa Garcia-Marco<sup>1</sup> · Ferdaous Zouaghi<sup>1</sup>

Received: 3 October 2021 / Accepted: 20 March 2023 / Published online: 7 April 2023  
© The Author(s) 2023

## Abstract

Previous research has examined the relationship between CSR and innovation and has suggested that the former might positively affect the latter; however, the impact of CSR on innovation success needs further attention. This study aims to develop a deeper understanding of how environmental and social CSR are related to innovation performance and whether the implementation of organizational practices might moderate this relationship. The results are based on an unbalanced panel of 14,313 observations of 3713 firms covering 2011–2015. Using random-effects probit models and the estimation of average marginal effects (AMEs), this paper contributes to the literature on CSR by explaining how CSR dimensions affect innovation success differently and by addressing how this effect is influenced by organizational innovation. The results show that while environmental CSR orientation proves beneficial for the generation of process innovation, social CSR orientation contributes to the generation of both kinds of technological innovations only when internal organizational practices are implemented. This study provides valuable insights for managers aiming to implement a CSR perspective in their strategies to support the pursuit of innovation.

**Keywords** CSR dimensions · Innovation performance · Organizational practices

## Introduction

Firms are undeniably prominent socioeconomic agents that exert a notorious impact on their environment and determine the wellbeing of society and the overall conditions for the prosperity of the communities within which they operate. Because of this position, and taking into account the current emergency regarding climate, biodiversity, social inequality and growing social unrest, it is understandable that both business practice and academic research have been encouraging firms for some time to take responsibility for sustainability and social issues. Moreover, this encouragement is

sustained through not only a purely ethical perspective but also a business rationale since taking care of their stakeholders and environment has argued to be favourable to meet firms' more traditional economic goals (Ambec & Barla, 2006; Cochran, 2007). In this vein, business managers are more frequently inclined towards the adoption of sustainable practices; for instance, climate change is considered strategically important by an increasing percentage of executives (Dangelico & Pujari, 2010). Additionally, consumers are increasingly aware of their direct impact on the environment through their purchasing behaviour and express their concerns accordingly (Stolz et al., 2013), thus building on firms' propensity to become social and environmentally friendly.

Nevertheless, balancing the scores of the so-known triple bottom line (Elkington, 1997)—referring to economic, social and environmental criteria—is still a noteworthy challenge that should not be downplayed. Indeed, firms' managers might perceive that responsible business practices are problematic in terms of logistics because they require new equipment and processes or doubt customers' willingness to pay more for ecofriendly products (Nidumolu et al., 2009). Consequently, some firms might view their responsibility

✉ Teresa Garcia-Marco  
tgmarco@unavarra.es

Paula Anzola-Román  
paula.anzola@unavarra.es

Ferdaous Zouaghi  
ferdaous.zouaghi@unavarra.es

<sup>1</sup> Public University of Navarre, Institute for Advanced Studies in Business and Economics-INARBE, Pamplona, Spain

towards their natural and social environment as a trade-off opposing their economic interests and might therefore be pondering the perceived sacrifice.

Regarding the need to procure a good balance among profits and taking care of their environment, corporate social responsibility (CSR) has become the mainstream paradigm; thus, firms willing to take on the challenge incorporate a CSR perspective into their ethical philosophy and organizational culture (Golob & Podnar, 2021). A CSR perspective reflects a solid stakeholder orientation and ranges from community outreach and employee wellbeing programmes to ecologically friendly practices (Luo & Du, 2015), among other things. On another note, innovation is considered a key factor for firm performance (Damanpour, 1996; Johannesen, 2008; Cruz-Cázares et al., 2013); therefore, understanding how CSR might influence the success of firms' innovative endeavours becomes a pressing and most interesting research subject.

When examining the relationship between CSR and innovation, some empirical studies emphasize the causal nature of this relationship, stating that CSR is a prominent driver of innovation (e.g. Bendell & Huvaj, 2020; European Commission, 2005; Luo & Du, 2015; Martínez-Conesa et al., 2017; Nidumolu et al., 2009). For instance, Nidumolu et al. (2009) state that sustainability is the origin of technological innovations and that becoming environmentally friendly yields economic returns because it implies reducing the inputs used and generating additional revenues from better products. Furthermore, firms can build their differentiation strategy by developing new products with different features, including high functionality, safety, technological sophistication and ecological standards, which can be attained through a commitment to CSR activities (Golebiowski, T. Lewandowska, 2015). Other ways through which a CSR perspective might be helpful when pursuing innovation-driven differentiation are linked to the betterment of work conditions. In this regard, focusing on CSR with the purpose of guaranteeing safe workplace environments and good working environments might spur a climate favourable to socializing tacit knowledge and thus lead to better innovative performance (Boschma, 2005; Gangi et al., 2019).

Although theoretical approaches and empirical evidence have supported this positive relationship, many firms continue to resist adopting CSR practices. A plausible explanation might rely on the aforementioned dilemma by which companies perceive that acting responsibly towards society and the natural environment might be costly in terms of their ultimate economic goal. In this sense, Bendell (2017) notes that business owners' decisions related to environmentally friendly innovations depend on economic motivations; nevertheless, managers' individual values and motivations also play an important role in implementing said practices, thus adding complexity to the ethical dilemma. In any case, firms

tend to let their CSR perspective go when understanding that otherwise there might be negative consequences for economic performance. In this sense, Zhong et al. (2022) explain that firms facing performance shortfalls are likely to reduce CSR levels to meet profit goals in the short term. Indeed, CSR practices can be understood as a long-term investment, requiring time to realize benefits and thus implying a sacrifice in terms of relevant resources (Yuan et al., 2020).

Consequently and given that the nature and particularities of the relationship between CSR and innovation remain somewhat unclear (Surroca et al., 2010), several authors call for more research to further understand it (e.g.; Ratajczak & Szutowski, 2016; Bendell, 2017, Yuan et al., 2020).

In particular, some authors stress the importance of addressing the multidimensional nature of both constructs – innovation and CSR. Regarding the first, it has been stated that different types of innovation outcomes should be considered to understand how each is affected by CSR strategies (Bocquet et al., 2013). For the second construct, previous literature defines a broad, multidimensional concept and states that each different dimension of CSR influences innovation in its particular way (Bendell & Huvaj, 2020; Ratajczak & Szutowski, 2016). In line with this, most studies devoted to the definition and categorization of CSR agree on distinguishing economic, social and environmental implications (Dahlsrud, 2008). Furthermore, when performing empirical research on this phenomenon, it is common to focus particularly on its social and environmental facets (e.g. Castka et al., 2004; Farooq et al., 2014).

In line with that set out above, this study develops a theoretical framework that takes into account and distinguishes those two specific dimensions set by the academic consensus; i.e. environmental and social. The aim is to test for the differential effects of such dimensions on innovation performance as measured through two different indicators, in particular, the generation of technological product and process innovations.

Another gap noted by the previous literature concerning the implications of the CSR innovation relationship refers to the need to provide empirical evidence regarding the underlying aspects of the said relationship (Ratajczak & Szutowski, 2016). To address this gap, this research examines how and under which circumstances CSR might contribute to the generation of innovation outcomes; in particular, this research explores the role of organizational innovation in leveraging the effect of adopting a CSR orientation. As noted before, sustainable business practices require time and effort to yield firm performance. When considering innovation outcomes that are aligned with environmental objectives, several studies show that introducing ways to coordinate different operational units and decentralizing decision-making processes helps firms attain said innovative

performance (e.g. Bendell & Huvaj, 2020; García-Marco et al., 2020). That is, the integration of a social and environmental CSR perspective that permeates the organizational culture requires changes based on the autonomy and participation of all members and communication among different departments or business units (Podgorodnichenko et al., 2021). Additionally, when considering that socially responsible firms tend to facilitate the generation of tacit knowledge (Gangi et al., 2019) – the effective socialization of said knowledge fostered through pertinent organizational innovation practices – becomes an important success factor for obtaining innovation outcomes.

In summary, the research questions presented in this study could be expressed in the following terms: How can firms make the best from the beneficial effect of CSR orientation on innovative performance? How might organizational innovation foster this beneficial effect depending on the type of CSR dimension addressed and the type of innovation pursued?

Consequently, the insight provided by the results of the present study makes relevant contributions to the CSR innovation literature (e.g. Bocquet et al., 2013; Mishra, 2017). First, this study considers the multidimensional nature of the CSR construct and follows the steps of the relevant literature on the phenomenon (e.g. Bocquet & Mothe, 2011; Wu et al., 2018; Yang et al., 2018) by testing separately the effects of social and environmental facets. Furthermore, the analysis accounts for product and process innovations rather than focusing on only one measure of innovation performance, thereby providing a deeper understanding of why and how the effect of distinct CSR dimensions manifests differently on each innovation outcome. Second, this work provides a contingency perspective on the understanding of said effect, as it tests the moderating role of organizational innovation practices on the relationship between CSR and innovation performance, thus contributing to a better understanding of the underlying factors arising within this relationship.

The rest of the paper is structured as follows. Section “[Theoretical Background and Hypotheses](#)” establishes the theoretical background and presents the research hypotheses. Section “[Methodology](#)” details the methodology used, while the results and discussions are shown in Sect “[Results](#)”. Conclusions are presented in Sect “[Conclusion and Discussion](#)”.

## Theoretical Background and Hypotheses

Looking back to the origins of the analyses regarding the importance and implications of CSR, there is one essential question that has spurred academic, managerial, societal and institutional interest in this phenomenon: What are corporations responsible for? To whom are they responsible? Discussions on the definition of this responsibility have evolved

over the years, giving birth to contributions offering an ever-growing list of activities and areas worth considering in the CSR phenomenon and offering diverse categorizations for CSR types (i.e. Carroll, 1979; Wood, 1991).

In this line, the seminal publication by Elkington (1997) introduced the triple bottom-line notion, which establishes that companies should report their performance against economic, environmental and social criteria (European Commission, 2001:36). The understanding of the multidimensional nature of CSR from considering environmental and social facets has benefited from academic consensus (e.g. Castka et al., 2004; Farooq et al., 2014). This work presents a theoretical framework in line with this categorization.

Thus, the research aims to unveil how the propensity of firms towards each of these CSR dimensions<sup>1</sup> – addressed throughout the paper as ‘social CSR orientation’ and environmental CSR orientation’ – affects innovative performance, measured as both the generation of product and process innovations.

## CSR Orientation and Innovative Performance

The influence of CSR on firm performance has been widely analysed; however, most studies on the matter focus on general economic performance, while many other specific benefits are worth examining (González-Masip et al., 2019), such as the one addressed here. In any case, it is also true that previous literature makes efforts to explain the relationship between CSR and innovation phenomena. Empirical works published after the literature review confirm this positive effect of CSR on innovation (Bendell & Huvaj, 2020; Martínez-Conesa et al., 2017). Indeed, Ratajczak and Szutowski (2016) state that forthcoming studies should focus on both developing an acceptable theory addressing the implications underlying this relationship and providing empirical evidence on the assumed positive effect of CSR on innovation that unveils the understanding of these aspects. Additionally, the authors highlight the need to consider CSR as a broad multidimensional concept, decomposing the construct (thus not restricting the study to environmental and obligatory aspects) when examining its effect on innovation. In the same vein, Bendell and Huvaj (2020) posit that the social and environmental dimensions of CSR each influence innovation in its unique way.

On another note, some authors claim that research should take into account the different outcomes derived from CSR

<sup>1</sup> This work focuses only on the internal aspects of CSR in accordance with the taxonomy established by the Green Paper (European Commission, 2001:8), which posits that internal social CSR ‘*primarily involve[s] employees*’, and that internal environmental CSR ‘*relate[s] mainly to the management of natural resources used in the production*’

strategies (Halme & Laurila, 2009). More specifically, Bocquet et al. (2013) address the importance of distinguishing between the two main types of technological innovation outcomes (i.e. product and process innovations), as each represents particular ways of affecting firm performance and of being affected by CSR strategies. For instance, product innovation could be derived from certain social or environmentally responsible practices implemented by the firm and generally impacts incomes, and process innovation arising from CSR concerns improves the firm's efficiency.

Thus, this work explicitly addresses the potential particularities of the effects of CSR orientation on both product and process innovation outcomes. It does so by considering the multidimensional nature of CSR, as explained above. The study also aims to offer a comprehensive view of the relationship between CSR and innovation by focusing on the underlying aspects of causality. In particular, the theoretical framework introduces organizational innovation practices as a moderator for the effect of CSR orientation on innovation performance.

### Environmental CSR Orientation and Innovative Performance

As previously stated, CSR is held to be relevant to enhancing firms' innovativeness. This is also true when focusing in particular on the environmental dimension of CSR (Forcadell et al., 2020). Specifically, environmental CSR can enhance innovative performance for the following reasons.

First, and in reference to the Porter hypothesis (Ambec & Barla, 2006), it is now commonly accepted that well-designed environmental regulations can provide an opportunity to improve firm performance through innovation. The main reasoning behind this hypothesis relies on the idea that firms facing regulatory requirements devote efforts to finding new ways to optimize their resources and guarantee that their product meets high quality standards (Porter & van der Linde, 1995). Many studies have since corroborated this rationale empirically, demonstrating a positive impact of environmental policies on the generation of technological innovations (e.g. Ford et al., 2014; Rubashkina et al., 2015; Zhang et al., 2018).

Second, considering the discretionary aspect of CSR, the literature expands on the Porter hypothesis to focus on environmentally responsible practices carried out by firms on a more voluntary basis. Empirical research shows that engaging in CSR to improve efficiency and reduce the negative impact on the environment can allow firms to maximize their value creation (Crifo et al., 2016) and ultimately obtain the beneficial effects on innovation (Nidumolu et al., 2009). Indeed, firms committed to the stewardship of the environment through the adoption of environmentally responsible

standards beyond legal requirements, such as emission-reducing technologies and energy efficiency, may promote investments in R&D that in turn can produce both process and product innovations (Bocquet et al., 2013; Broadstock et al., 2020; McWilliams & Siegel, 2001). As explained by Forcadell et al. (2021), environmental CSR can generate slack resources, on the one hand, because environmentally friendly procedures tend to reduce the use of inputs and thus lead to cost savings and because environmental CSR, although discretionary, is usually aligned with regulatory incentive schemes such as tax deductions or subsidies. Additionally, environmental CSR enhances firms' reputations and improves stakeholders' trust, thereby facilitating networking that in turn helps obtain resources that are otherwise unavailable and usually reduces risk and shortens time and costs. The authors argue that the resources liberated by firms engaging in environmental CSR may prompt R&D investments.

Third, the generation of said innovations in the context of an environmental CSR orientation might become part of a continuous cycle of innovativeness and place firms in the invaluable position of pursuing feedback and securing customer loyalty. Trying to offer a sound argumentation for the existence of a precise level of CSR engagement, McWilliams and Siegel (2001) frame their reasoning within a market perspective. In this vein, they argue that CSR might be a prominent way to develop a product differentiation strategy and consider both the *inputs* (e.g. R&D investments) and the *outputs* (i.e. product and process innovations) at play. These outputs are welcomed by the demand side of the market because consumers value either the new products invested in with certain socially responsible attributes or products produced in a new, socially responsible way.

This perspective undoubtedly echoes the logics of the demand-pull driven innovation approach, a model that emerged in the 1960s, flourished the following decade and suffered from severe criticism in the 1980s (Godin & Lane, 2013). However, subsequent literature retrieves this approach and contributes to unveiling the importance of demand as a source of innovation and understanding its role in a comprehensive, balanced framework for the different foundations of innovation (Di Stefano et al., 2012). In this vein, McWilliams and Siegel (2001) explain how firms can be encouraged to improve their production processes and innovate with new products once the adoption of environmentally friendly standards has succeeded in increasing customer loyalty. In other words, the feedback provided by satisfied, loyal customers, including their specific demands, can aid firms in identifying opportunities for innovation (Wu et al., 2020).

Considering the arguments above, we enunciate the following hypothesis.

**H1** Environmental CSR orientation has a positive effect on technological innovative performance.

### Social CSR Orientation and Innovation Performance

Social CSR is related to employees' needs, such as training, career, betterment of working conditions (Story & Castanheira, 2019), safety, work-life balance and fair treatment and labour rights (De Roeck et al., 2014; Golob & Podnar, 2021). Meeting these needs encourages positive work attitudes in the workplace, boosts employees (Santos-Jaén et al., 2021) and positively influences their satisfaction with work and the organization itself (Golob & Podnar, 2021).

In this regard, internal social CSR enhances employees' wellbeing, commitment and loyalty within the workplace (Celma et al., 2018). This turns out to be very effective in building the firm's reputation as a good employer and in attracting and retaining talent (Bhattacharya et al., 2008). The resulting workforce, according to the argumentation provided by D'Este et al. (2016), is therefore motivated and equipped with learning capabilities and thus well positioned to deal with challenges and engage in novel projects, which ultimately fosters the propensity to develop significant innovations.

Furthermore, employees who feel that the actions of their organization match their own values and contribute to their wellbeing are more likely to perform better (Story & Castanheira, 2019). This overall propensity to improve performance can have a specific manifestation in innovativeness. Suto and Takehara (2022) rely on the intrinsic motivation literature to explain how social CSR fosters innovation. Indeed, intrinsic motivation includes aspects such as the development of employees' capabilities and the betterment of safety and health conditions, which drives curiosity, enjoyment and a personal sense of challenge, thus affecting creativity and the propensity to obtain innovation outcomes (Suto & Takehara, 2022; Tu et al., 2019). Additionally, considering that tacit knowledge is characteristically the type of knowledge required to carry out innovation activities, the climate of trust and communion fostered by social CSR can impact innovation performance because the tacit knowledge existing within the members of such organizations is more easily socialized and shared (Gangi et al., 2019).

Finally, the role of demand in the consolidation of a virtuous cycle of innovativeness explained above also applies here. Indeed, consumers might also be attracted to firms with a reputation to treat their workers fairly and appreciate goods and services with novel attributes that signal said corporate concern with employee welfare (Ahn et al., 2020; Mandhachitara & Poolthong, 2011). These satisfied customers thus develop loyalty with to this kind of firm and become a committed, valuable source of information for subsequent product and process innovations. In summary,

the argumentation provided here indicates that seeking out to improve employees' welfare and workplace safety might have a positive impact on generating technological innovations; therefore, we propose the following hypothesis.

**H2** Social CSR orientation has a positive effect on technological innovative performance.

### Organizational Innovation Practices as a Moderator for the Effect of CSR on Technological Innovative Performance

To fully understand the relationship between CSR and innovative performance, this work taps into the organizational innovation phenomenon and proposes that the implementation of organizational practices might help to effectively generate profits from internal CSR within the organization.

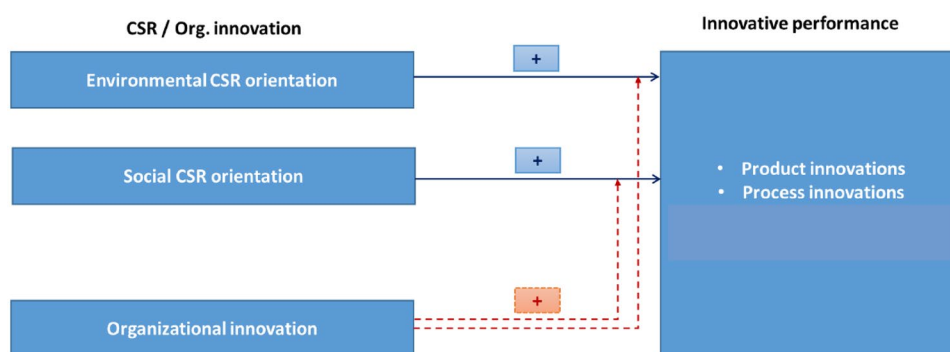
The third edition of the Oslo Manual introduces organizational innovation along with the traditional concepts of product and process innovations and thus provides the widest known definition of the construct. It reads, *'the introduction of a new organizational method in the business practices, the organization of the workplace or the external relations of the firm'*. For an organizational change to be considered an innovation, it must involve the introduction of an organizational method *'that has not been used before in the firm and is the result of a strategic decision taken by management'* (OECD/Eurostat, 2005:51).

This work relies on the notion of organizational innovation presented above and considers the implementation of organizational practices included within the concept, that is, the implementation of new organizational methods or new ways of organizing the workplace<sup>2</sup>. Accordingly, the measurement of this phenomenon relies on the identification of whether firms have adopted novel practices regarding either the first or the second aspect listed before as is explained in the methodological section.

The study also relies on the widely acknowledged complementarities between different forms of innovation, specifically between organizational and technological innovations (Anzola-Román et al., 2018; Kimberly & Evanisko, 1981; Tidd et al., 2005). Therefore, the theoretical framework presented here includes the premise of this causal relationship between organizational and technological innovation and advances yet another linkage in how the former affects the latter. In particular, this study proposes that organizational

<sup>2</sup> The consideration of these two particular aspects of the organizational innovation construct is aligned with the CSR perspective adopted in this theoretical framework in the sense that the study focuses on the internal facet of both kinds of phenomena.

Fig. 1 Theoretical framework



innovation enhances the positive impact of environmental and social CSR on the generation of innovation outcomes.

Focusing on environmental CSR orientation, its potential beneficial effect on innovation requires effort, organizational routines and an adaptation of firms' procedures to certain requirements (García-Marco et al., 2020; Ketata et al., 2015). In this regard, Bendell and Huvaj (2020) show that the impact of environmental CSR on innovation is conditioned by the orchestrated efforts of different operational and specialized units within the corporation. In addition, García-Marco et al. (2020) point out that practices related to organizational innovation, such as decentralization in decision making or changes in production methods, help firms achieve innovations that match specific environmental objectives. Indeed, practices related to changes in production organization (e.g. autonomous or semiautonomous teams and quality cycles) and labour organization (e.g. job rotation, increased worker responsibility) are a fundamental resource with the potential to sustain and direct absorptive capacity and thus impact the firm's innovation performance (Antonelli et al., 2013).

Building on the above discussion, the following research hypothesis is proposed.

**H3** Organizational innovation practices enhance the positive effect of environmental CSR orientation on technological innovative performance.

On another note, the literature highlights the need to implement learning practices, decision-making processes and social integration to aid the full deployment of human capital within organizations and thus foster the development of complex innovation processes (Zouaghi et al., 2020). From this point of view, changes within organizations' work processes, procedures, or workplace can increase employees' involvement, awareness, and commitment, thereby enhancing innovation performance and facilitating the achievement of social goals (Damanpour, 1991; Zhang et al., 2016). Specifically, individual tacit knowledge fostered and absorbed thanks to the prevalence of a social CSR orientation needs

to be shared and leveraged at the firm level to become valuable input in the innovation process. In this vein, organizational innovation practices can strategically reinforce how employees enact and share their knowledge (Gangi et al., 2019; González-Masip et al., 2019) and become a prominent moderator for the effect of social CSR on the successful generation of product and process innovations.

Therefore, we enunciate the fourth and last hypotheses for this research.

**H4** Organizational innovation practices enhance the positive effect of social CSR orientation on technological innovative performance.

Figure 1 summarizes the conceptualization of the theoretical framework presented above.

## Methodology

### Database

This study relies on data from the Spanish Panel of Technological Innovation database (PITEC) that were collected via the procedure established within the Community Innovation Survey (CIS) project. PITEC is a renowned statistical tool for the analysis of R&D&I development at a firm level in Spain. It is a secondary panel-type data source based on a survey undertaken by the Spanish Institute of Statistics (INE), whose sampling methodology follows the procedure addressed in the aforementioned Oslo Manual (OECD/Eurostat, HYPERLINK "sps:refid::bib63|bib64" ), which is widely acknowledged at an international level and thus allows for comparison and international standardization.

After filtering the dataset to include only manufacturing firms, the sample adds up to 24,189 observations from 2009 to 2015. However, the use of a 2-year lag in the estimates, as will be addressed later, implies that the final sample is reduced to 14,313 pertaining to 3713 different firms. The

**Table 1** Sample descriptive statistics

	Number of observations	Mean	Std. Dev
Number of employees			
Less than 50	5935	0.415	0.383
Between 50 and 249	5820	0.407	0.491
250 and more	2558	0.178	0.492
Sector			
High technology	4137	0.289	0.453
Medium- technology	3909	0.273	0.445
Low-technology firms	6267	0.438	0.496
Year			
2011	3367	0.235	0.424
2012	3052	0.213	0.409
2013	2793	0.195	0.396
2014	2610	0.182	0.386
2015	2491	0.174	0.379

following table provides the main features of the sample (See Table 1).

## Variables

The set of dependent variables (*Inn\_perf*) captures innovative performance in two different ways. Specifically, it addresses the success of the firm in generating technological (i.e. product or process) innovation outcomes. For this purpose, the variables **ProdInn** and **ProcInn** are used based on the PITEC survey questions regarding having or not having achieved product or process innovation outcomes, respectively, during the reference period and the two preceding years.

As noted previously, the PITEC project follows the framework established in the Oslo Manual (OECD/Eurostat, 2005). This also applies to the definitions and measures of the taxonomy of the innovation construct. Thus, this work relies on understanding the dependent variables in the following terms:

- Product innovation: the introduction of a new (or significantly improved) good or service.
- Process innovation: the implementation of a new (or significantly improved) production or delivery method.

For the explanatory variables, specifically, the two dimensions of CSR studied in this work, the PITEC survey includes several questions about the importance of different objectives when carrying out innovative activities. Respondents report whether the importance of each objective is null, low, medium or high.

For the construction of the variable **EnvironCSR**, the following items or objectives were taken into account:

- Importance of reducing material use per unit of output.
- Importance of reducing energy use per unit of output.
- Importance of reducing environmental impact.
- Importance of complying with environmental, health and safety normative requirements.

The variable **SocialCSR**, for its part, was constructed based on the responses to these items:

- Importance of improving employees' health and safety.
- Importance of increasing total employment.
- Importance of increasing qualified employment.
- Importance of maintaining employment.

To construct both variables, dummy variables were first created for each of these items to reflect the importance reported by the firm of a particular objective with respect to the importance reported by its technological sector (i.e. the dummy variable takes the value of 1 when the firm reported a level of importance higher than the average of its sector). **EnvironCSR** and **SocialCSR** variables were created by adding the values of their four respective dummies; thus, each ranged from 0 (no CSR orientation) to 4 (maximum CSR orientation).

The other explanatory variable of the model is **OrgInn** (organizational innovation), and once more its construction relies on the definitions and measures of innovation provided by the third edition of the Oslo Manual (OECD/Eurostat, 2005). As explained previously, the Manual defines organizational innovation as the implementation of a new method in the firm's business practices, workplace organization or external relations. Accordingly, in the PITEC survey, firms are asked whether they have implemented each subtype of organizational innovation during the reference year and the two preceding years. In this study, as explained previously, only the first subtypes are taken into account; thus, the variable **OrgInn** is dichotomous and takes the value of 1 if the firm has engaged in any of the first two types of organizational innovation and 0 if it has not.

Regarding the measurement of the moderating effect of organizational innovation on CSR orientation, the model includes the multiplicative variables combining the indicators, i.e. **EnvironCSRxOrgInn** and **SocialCSRxOrgInn**.

Finally, to avoid biases in the estimation of the coefficients of the preceding explanatory variables, which could pose the risk of misattributing causal effects, the model includes several control variables. Thus, the study introduces a measure of firm innovativeness (**R&DInt**), which is constructed based on responses by the intensity of the firm's

**Table 2** Variables

Variable	Label	Description
Dependent variable		
Product innovation	ProdInn	Dichotomic variables for whether or not each kind of innovation was achieved in years t-2 to t. Values: 0, 1
Process innovation	ProcInn	
Independent variables		
Environmental CSR	EnvironCSR	Proactivity or orientation towards environmental CSR in years t-2 to t. Values: 0–4
Social CSR	SocialCSR	Proactivity or orientation towards social CSR in years t-2 to t. Values: 0–4
Organizational innovation	OrgInn	Introduction of organizational innovation in years t-2 to t. Values: 0, 1
Environmental CSR x Organizational Innovation	EnvironCSRxOrgInn	Multiplicative variable
Social CSR x Organizational innovation	SocialCSRxOrgInn	Multiplicative variable
R&D intensity	R&DInt	Intensity of internal R&D practices carried out in period n. Values: 0–2
Firm sector		
	Sector_hightech	Dichotomic dummy
	Sector_mediumtech	Dichotomic dummy
Firm size		
	Size_large	Dichotomic dummy
	Size_medium	Dichotomic dummy
Years	Year:20xx	Dichotomic dummies for years 2012 to 2015

internal R&D activity in the reference period. Therefore, the variable captures whether the firm did not innovate internally, did so occasionally or performed internal innovations at a constant pace. In addition, traditional dummy variables were introduced to control for the effect of firm size, the technological intensity of the industry sector and the years of the database.

Table 2 summarizes up the variables used in the analysis and explains their construction.

### Model and Estimators

Taking into account the longitudinal nature of the sample, the conceptualization of the theoretical model established in the previous section can be formulated as follows<sup>3</sup>:

$$\begin{aligned}
 \text{Inn\_perf}_{it} = & \alpha + \beta_1 * \text{EnvironCSR}_{it-2} + \beta_2 * \text{SocialCSR}_{it-2} + \beta_3 * \text{OrgInn}_{it-2} \\
 & + \beta_4 * \text{EnvironCSRxOrgInn}_{it-2} + \beta_5 * \text{SocialCSRxOrgInn}_{it-2} \\
 & + \beta_6 * \text{R\&DInt}_{it-2} + \beta_7 * \text{Sector\_hightech}_{it-2} + \beta_8 * \text{Sector\_mediumtech}_{it-2} \\
 & + \beta_9 * \text{Size\_large}_{it-2} + \beta_{10} * \text{Size\_medium}_{it-2} + \beta_{11} * \text{Year2012}_i + \beta_{12} * \text{Year2013}_i \\
 & + \beta_{13} * \text{Year2014}_i + \beta_{14} * \text{Year2014}_i + \beta_{15} * \text{Year2015}_i + v_i + \varepsilon_{it}.
 \end{aligned}$$

$v_i$  accounting for individual specific, time-invariant effects.

Assuming the existence of these effects, this study estimates the causal models through panel data techniques. In particular, the analysis involves the estimation of two

random-effects probit models, one for each type of innovation outcome (i.e. product and process innovations).

Also worth noting is that all independent variables are lagged by two periods to avoid endogeneity, simultaneity and reverse causality problems, which are quite common when using CIS data (Mairesse & Mohnen, 2010). Lagged variable models have been shown to possess superior predictive validity, particularly when measuring innovative outcomes (Bradley et al., 2010). The lagged nature of the model reduced the final sample to 14,313 observations and 3713 firms.

Finally, worth noting is that this paper relies on the estimated average marginal effects (henceforward, AMEs) of the explicative variables for interpreting the results. Taking into account the nonlinear nature of the models estimated

here and considering that the study has a prominent focus on moderating or complementary effects, basing the interpretation solely on the estimated coefficients might be misleading (Hoetker, 2007). Therefore, this study accounts for the AMEs calculated using a method favoured by current practices (Anzola-Román et al., 2018; Wooldridge, 2010); that is, first, the marginal effect of a given variable is calculated by setting the rest of the explanatory variables at the values

<sup>3</sup> Innovative performance is measured in two ways: generation of product innovations and generation of process innovations.



**Table 3** Descriptive statistics, correlations and VIFs

Variables	Mean	Sd	1	2	3	4	5	6	7	8	9	10
1.ProdInn	0.679	0.466	1									
2.ProcInn	0.621	0.485	0.054*	1								
3.EnvironCSR	2.243	1.563	0.110*	0.168*	1							
4.SocialCSR	2.237	1.547	0.123*	0.150*	0.632*	1						
5.OrgInn	0.533	0.498	0.132*	0.252*	0.255*	0.231*	1					
6. R&DInt	1.447	0.810	0.228*	0.005	0.216*	0.216*	0.142*	1				
7. Sector_hightech	0.288	0.453	0.067*	-0.067*	0.048*	-0.090*	0.026*	0.184*	1			
8.Sector_mediumtech	0.272	0.445	0.036*	-0.033*	-0.018*	-0.024*	-0.005	-0.033*	-0.389*	1		
9. Size_large	0.184	0.387	0.051*	0.132*	0.141*	0.083*	0.147*	0.072*	-0.05*	0.001	1	
10.Size_medium	0.403	0.490	0.030*	0.056*	0.036*	0.025*	0.007	0.067*	-0.048*	0.007	-0.390*	1
VIF			1.33	1.32	1.18	1.18	1.32	1.31	1.27	1.29	1.28	1.29

$N=14,313$

\*  $p < 0.01$ ; *S. D* standard deviation, *Vif* Variance Inflation Factor

obtained for each of the responses in the sample, and then the results are averaged for that given variable.

## Results

### Descriptive Analysis

The following table shows the descriptive statistics and pairwise correlation coefficients (including significance level) of the variables in the model. This information was used to test for multicollinearity in the sample (See Table 3).

As shown above, the pairwise correlation values between the covariates are lower than the problematic level of 0.75 (Tsui et al., 1995), with the highest correlation adding up to a coefficient of 0.63 (between the two CSR variables), thus suggesting low multicollinearity risks. This is confirmed by an analysis of the variance of inflation factors (VIF). The maximum VIF value is 1.32, pertains to the variable organizational innovation, and is below the rule of thumb cut-off of 10 (Neter et al., 1996), which again indicates that there are no serious multicollinearity problems in the model.

### Results of the Random-Effects Probit Models

Table 4 shows the estimations for the random-effects probit models, displayed as hierarchical models adding covariates progressively, from a model with only the control variables as predictors (Models 1.1 and 2.1) to the complete models proposed before (Models 1.3 and 2.3). The values for the Wald chi2 and log pseudolikelihood indicators reported confirm the overall fit of the models and suggest that the progression in the introduction of the variables yields a better performance. In particular, both indicators obtain higher values when ascending in the hierarchy of the models, and

the Wald test estimator is significantly different from zero in all cases, with  $p$  values under 0.000.

Focusing first on the results concerning the control variables, size is significantly and positively related to both product and process innovation; however, sector seems to play a very specific role depending on the type of technological innovation obtained. Indeed, performing in high- and medium-tech industries is a factor that positively influences the likelihood of achieving product innovations but negatively affects the achievement of innovations in process. This indicates that product innovation is more likely to be obtained in high-tech sectors, while process innovation is more likely to occur in low-tech industries. This last result is in line with the findings obtained by Anzola-Román et al. (2018). Regarding R&D activities, the variable is positively related to product innovations but appears either as not significant or negatively related to process innovations. In this sense, Parisi et al. (2006) point out that there are intriguing differences regarding how the efforts that firms devote to developing R&D practices are related to the probability of obtaining product versus process innovation. Specifically, R&D spending is strongly directly associated with the introduction of a new product but is not a necessary condition for the introduction of a new process.

Turning to the research objective of this study, the estimated coefficients of the simple variables in Models 1.2 and 2.2 hint of the effects of both types of CSR orientation and organizational innovation on the generation of technological innovations. A focus on the model predicting product innovations shows a positive and significant estimation for the SocialCSR and OrgInn variables and that the EnvironCSR variable yields a parameter not significantly different from zero. This finding points to the existence of a positive effect of both social CSR orientation and organizational innovation on the generation of product innovations. When focusing on

**Table 4** Estimations for the random-effects probit models

	Model 1.1	Model 1.2	Model 1.3
Dependent variable #1			
Prodinn			
Independent variables			
EnvironCSR		0.008	0.004
SocialCSR		0.064**	0.027
OrgInn		0.182***	− 0.017
EnvironCSRxOrgInn			0.013
SocialCSRxOrgInn			0.081**
R&Dint	0.396***	0.360***	0.361***
Sector_hightech	0.454***	0.480***	0.482***
Sector_mediumtech	0.417***	0.436***	0.434***
Size_large	0.412***	0.348***	0.342***
Size_medium	0.276***	0.255***	0.256***
Year dummies	Negative coeff. ****	Negative coeff. ****	Negative coeff. ****
Constant	− 0.016	− 0.220**	− 0.152*
Wald Test	288.39***	322.91***	333.62*
Log pseudolikelihood	− 6,842.296	− 6.817.559	− 6,811.2327
Number of observations	14,313	14,313	14,313
	Model 2.1	Model 2.2	Model 2.3
Dependent variable #2			
procinn			
Independent variables			
EnvironCSR		0.043**	0.051**
SocialCSR		0.064**	0.034
OrgInn		0.497***	0.390***
EnvironCSRxOrgInn			− 0.013
SocialCSRxOrgInn			0.063*
R&Dint	− 0.014	− 0.80**	− 0.079**
Sector_hightech	− 0.435***	− 0.402***	− 0.402***
Sector_mediumtech	− 0.328***	− 0.295***	− 0.297***
Size_large	1.138***	0.962***	0.960**
Size_medium	0.541***	0.482***	0.482***
Year dummies	Negative coeff. ***	Negative coeff. ***	Negative coeff. ***
Constant	0.691***	0.286***	0.321***
Wald Test	236.84***	404.72***	406.82***
Log pseudolikelihood	− 7,130.556	− 7.028.213	− 7,025.77
Number of observations	14,313	14,313	14,313

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.001$ 

process innovations, however, all three estimated coefficients of the explanatory variables are positive and significant, thus suggesting that the three aspects depicted in the theoretical framework have an unconditionally positive effect on the generation of process innovation. This interpretation is confirmed by the results of the estimation of the AMEs of these variables and their confidence intervals. As shown in Fig. 2, the confidence intervals of the AMEs for all of the explanatory variables, except for EnvironCSR in the case of product innovations, are above zero.

That is, the effects advanced in Hypothesis 2 are confirmed by the results presented here, taking into account the generation of technological innovation as a measure for innovative performance, and Hypothesis 1 is only partially supported because there is no evidence to affirm that an environmental CSR orientation has any effect on the generation of product innovations.

Regarding the moderating effect of organizational innovation on the influence of CSR orientation on the generation of technological innovations, AMEs are calculated for

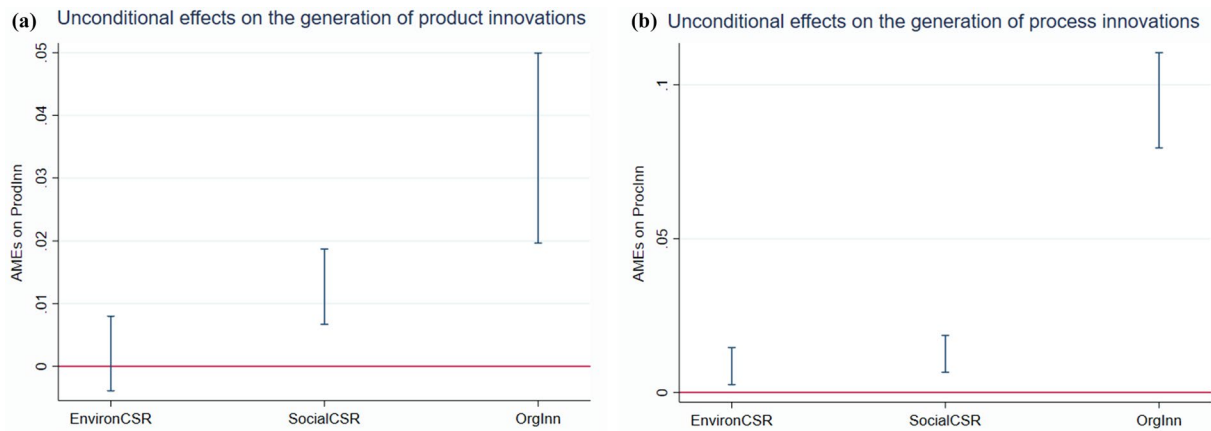


Fig. 2 Average effects on the generation of technological innovations

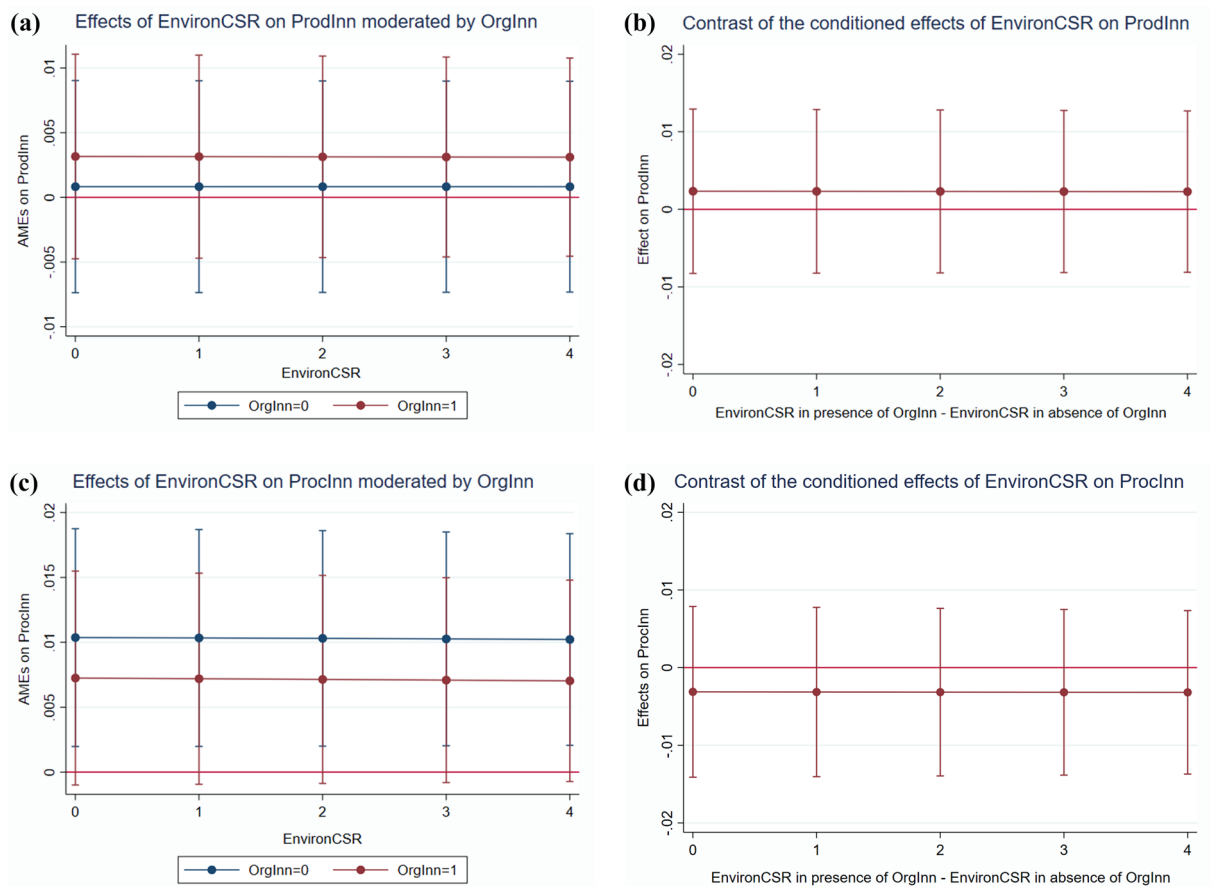
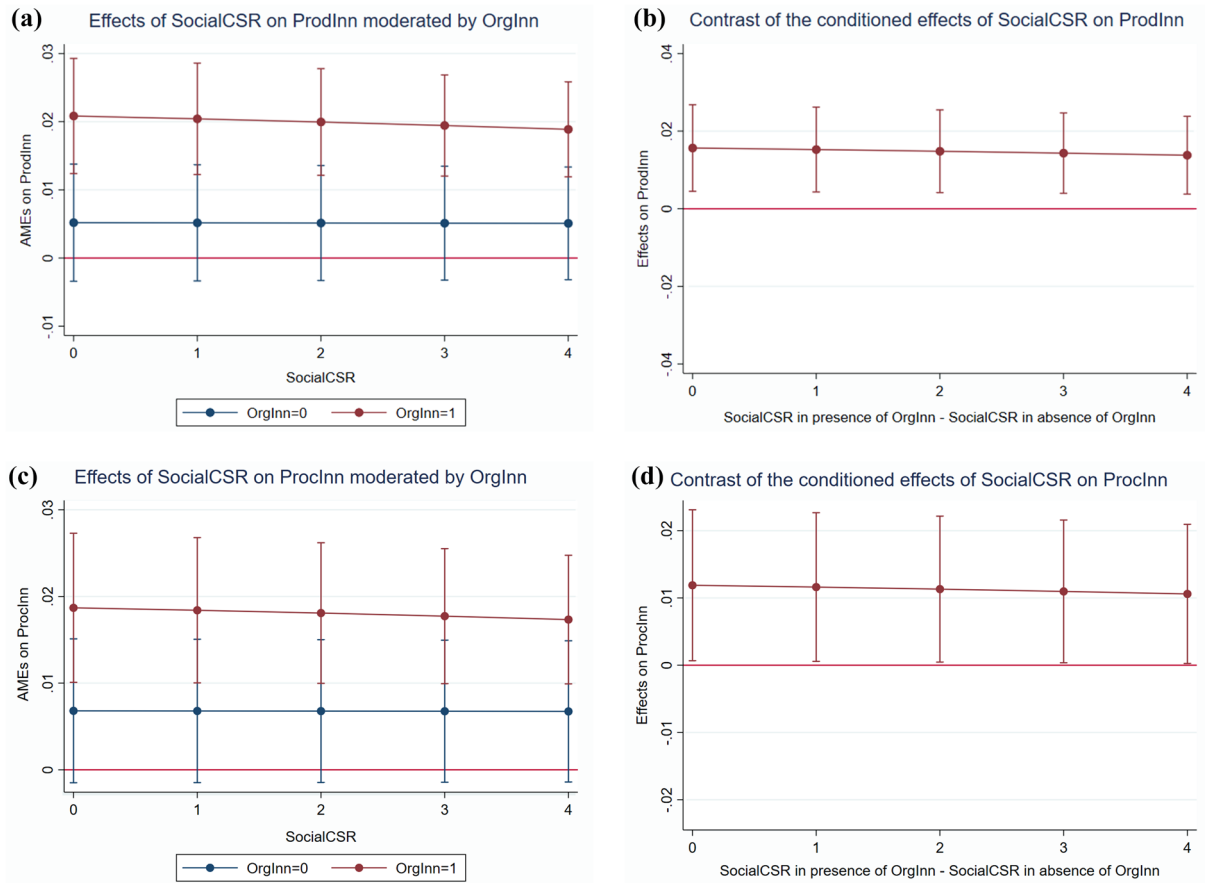


Fig. 3 Effects on the generation of technological innovations of environmental CSR conditioned to the implementation of organizational innovation

both EnvironCSR and SocialCSR, contrasting the difference of said AMEs between the presence and absence of organizational innovation.

Figure 3 portrays the contrast for environmental CSR orientation, while Fig. 4 does so for social CSR orientation.



**Fig. 4** Effects on the generation of technological innovations of social CSR conditioned to the implementation of organizational innovation

As seen, both the results derived from the estimation of the coefficient of the multiplicative variable in Models 1.3 and 2.3 and the estimated AMEs depicted above show no evidence of a complementary effect of environmental CSR orientation and organizational innovation on the generation of product or process innovations; thus, Hypothesis 3 is not supported by the results of the analysis.

However, with respect to the joint effect of social CSR orientation and organizational innovation, Fig. 4 shows how the former yields a positive effect for the generation of technological innovations only when some type of organizational innovation has been implemented. This interpretation aligns with the information derived from the estimated coefficient of the multiplicative variable in Models 1.3 and 2.3, in both cases positive and significant. Thus, these results support Hypothesis 4 of the theoretical framework, as there is empirical evidence confirming that organizational innovation enhances – or, more likely, enables – the effect of social CSR orientation on the generation of both product and process innovations.

The results of these models reinforce the idea that three main variables of the framework have, in general terms

– save for environmental CSR in the case of product innovations – a positive unconditional effect on the generation of technological innovations. When tackling potential complementarities between the variables, organizational innovation is needed so that social CSR might positively influence the generation of product and process innovations.

Summing up the results of the analysis (see Table 4 below), hypotheses regarding the unconditional effects of CSR orientation on innovation performance are partially sustained (fully corroborated in the case of Hypothesis 2). Notwithstanding the differences among the different types of indicators for this performance, it can be stated that adopting a CSR orientation is generally beneficial when intending to obtain successful innovations (See Table 5).

**Table 5** Results

	Unconditional effects	Complementary effects
InnProd	SocialCSR (+) [H2]	SocialCSR * OrgInn (+)[H4]
InnProc	EnvironCSR (+) [H1] SocialCSR (+) [H2]	SocialCSR * OrgInn (+)[H4]

Furthermore, the findings provide insights into the potential existence of a complementary effect between CSR orientation and organizational innovation. Although no evidence was found for the moderating effect of organizational innovation on environmental CSR, the results point to the existence of a positive joint effect of social CSR and organizational innovation when pursuing the generation of technological innovations, thereby confirming Hypothesis 4.

In general, terms, worth highlighting is that the results confirm the need to address both CSR and innovation phenomena in their multidimensional nature. The two measures for innovation performance taken into account in the study are impacted differently by CSR variables (in line with Bocquet et al., 2013). Furthermore, the environmental and social dimensions of CSR affect each innovation outcome in their own way (as posited by Bendell & Huvaj, 2020).

Thus, having an environmental CSR orientation proves to be (unconditionally) beneficial for the generation of process innovation. The effect on process innovation is easily understandable, as environmental CSR is heavily linked to efficiency strategies, such as savings in energy and raw materials, allowing firms to maximize their value creation (Crifo et al., 2016) and favouring process innovation via a decrease in cost. Furthermore, environmental practices allow firms to achieve differentiation advantages over their rivals through superior customer appreciation because firms that embed sustainability in their processes are generally well valued by their customers and place firms in an invaluable position of securing customer loyalty (McWilliams & Siegel, 2001), which can help them enter new markets and reach new target consumers (Yuan et al., 2020).

Social CSR orientation benefits the generation of both kinds of technological innovations. More importantly, social CSR appears to be relevant for the generation of product and process innovations only when internal organizational practices are implemented. That is, the results point to the idea that organizational innovation enables the beneficial effect of social CSR on innovative performance.

### Robustness Check

To test the robustness of our results from the baseline analysis, further analyses were performed. First, different lag year periods are conducted to test the impact of both environmental CSR and social CSR on firm innovative performance at periods t-1, t-2, t-3, t-4 and t-5. The results show that the positive impact effect of CSR on innovation is still significantly positive in periods t-1, t-2 and t-3.

Second, the instrumental variables (IV) approach is applied following prior studies (e.g. Alam et al., 2019; Liang et al., 2022) to address the endogenous relationship

between environmental CSR and social CSR and outcome variables. A valid instrument must satisfy two conditions (Alam et al., 2019). First, the instrumental variable IV should be positively associated with key explanatory variables. Second, the instrumental variable should meet some relevant tests to check its validity and strength. To control for possible endogeneity, a two-stage least squares estimation (2SLS) is performed. We use two exogenous instruments to estimate the 2SLS regression, the first being the share of females in R&D as one of the instrumental variables. Earlier research demonstrates that gender diversity can enhance overall innovation related to environmental performance, and women are more concerned with stakeholder welfare than are men regarding obtaining support from influential stakeholders and gaining access to critical resources to pursue sustainable environmental practices (Konadu et al., 2022). The second variable, subsidies, is a continuous variable indicating whether the firm has received any public financial support from local authorities, the national government or European Union institutions. Some studies confirm that firms that have access to financial support via grants, subsidized loans, and loan guarantees might be more open to implementing social and environmental practices (Peiró-Signes et al., 2022).

In the first stage, the endogenous variables are regressed on the instrument(s) and control variables. In the second stage, the resulting fitted value from the first regression is used in the second stage. We conducted F statistics, Sargan statistics and Basman's tests to assess the validity and relevance of the instrumental variables used.

The results of the 2SLS estimates are presented in Table 6. The p value of the F test is 0, rejecting the null hypothesis that the instruments are jointly zero. The p values of the Sargan and Basman's tests are greater than 0.1, failing to reject the null hypothesis that all instrumental variables are exogenous and suggesting that the instrumental variables are valid.

The estimation results for 2SLS show a statistically significant positive relationship between social CSR and product innovation and a positive relationship between both environmental CSR and social CSR and innovation performance<sup>4</sup>.

<sup>4</sup> Finally, Sobel tests and bootstrapped confidence intervals were used to estimate the fit of a potential mediation model. The findings suggest the existence of an indirect effect of organizational innovation practices on the relationship between social CSR and technological innovation performance (evidence was found for both product and process innovations), and on the relationship environmental CSR and process innovations. Full results of the mediation analysis are available on request.

**Table 6** Robustness test results

	First stage		Second stage			
	Environmental CSR	Social CSR	ProdInn	ProdInn	ProcInn	ProcInn
Share of Females in R&D	0.003*** (0.001)	0.003*** (0.000)				
Subsidies	0.065*** (0.017)	0.166*** (0.016)				
Environmental CSR			0.254*** (0.194)	0.249 (0.194)	0.443** (0.199)	0.435** (0.198)
Social CSR			1.159*** (0.191)	1.133*** (0.190)	0.461*** (0.197)	0.443** (0.197)
OrgInn			0.204*** (0.049)	− 0.063 (0.074)	0.537*** (0.048)	0.256*** (0.074)
Environ CSR xOrgInn				0.015 (0.025)		0.029 (0.025)
SocialCSRxOrgInn				0.099*** (0.025)		0.090*** (0.025)
R&Dint	0.340*** (0.017)	0.394*** (0.017)	− 0.198** (0.082)	− 0.201** (0.082)	− 0.401*** (0.084)	− 0.406*** (0.084)
Sector_hightech	0.059* (0.030)	− 0.573*** (0.030)	1.071*** (0.141)	1.084*** (0.141)	− 0.212 (0.143)	− 0.199 (0.142)
Sector_mediumtech	0.010(0.031)	− 0.260*** (0.037)	0.747*** (0.095)	0.750*** (0.095)	− 0.178* (0.096)	− 0.176* (0.095)
Size_large	0.617*** (0.035)	0.206*** (0.035)	− 0.100 (0.146)	− 0.111 (0.145)	0.594*** (0.148)	0.581*** (0.147)
Size_medium	0.265*** (0.028)	0.065*** (0.027)	0.080 (0.084)	0.081 (0.084)	0.328*** (0.084)	0.326*** (0.084)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.163*** (0.038)	1.640*** (0.038)	− 2.451*** (0.312)	− 2.397*** (0.311)	− 0.981*** (80.320)	
Observations	14,313	14,313	14,313	14,313	14,313	
F test (p value)	107.42 (0.000)	125.41				
Sargan test (p value)	1.466 (0.225)	1.700 (0.192)				
Basmann's test (p value)	1.465 (0.226)	1.699 (0.192)				

## Conclusions and Discussion

CSR researchers need to analyse what is socially responsible in corporate actions and, more specifically, critically assess the social impact derived from the adoption of CSR (Du et al., 2022) to provide sound criteria based on principles of ethics when evaluating and prescribing the role of firms in society (Islan and Greenwood, 2021, p. 1).

In this sense, the aim of this study was to develop a deeper understanding of how a propensity towards internal CSR is related to innovation success and whether the implementation of organizational innovation practices affects this relationship. The findings corroborate the body of literature initiated by Porter and van der Linde (1995) and Hart and Milstein (1999), indicating that CSR can lead to better performance, higher quality products and lower product costs. Companies can create a competitive advantage by offering new products that meet the expectations of their customers, which can allow them to charge a premium price. On the other hand, the efficient utilization of resources, the reuse or replacement of toxic materials,

lower energy consumption during the production process and reduced material storage can increase firms' net margin by reducing costs. Dangelico and Pujari (2010) highlight several benefits that can emerge from integrating sustainability issues into firms' operations, such as improvement in reputation and corporate image or saving costs by increasing efficiency when using resources. For instance, developing waste reduction strategies helps the company achieve higher levels of earnings and improves shareholder added value. The resource-based theory suggests that resources and capabilities are the most important components to achieving a competitive advantage. If the resources of the company are valuable, rare and not easily imitated or substituted by others, then the company can enjoy a sustainable competitive advantage. Engaging in CSR is an effective way for companies to develop resources and capabilities that can lead to a competitive advantage (Yuan et al., 2020).

When firms seek to build on their competitive advantages, they tend to work on increasing their efficiency and improving their processes through cost-cutting practices. However,

as shown by this study, devoting efforts to other areas that might not result in direct cost savings but instead imply an investment aligned with CSR philosophy, such as a reduction in the environmental impact of internal processes or the betterment of working conditions, might prove to be an effective strategy to boost innovation performance. In this regard, this study extends past the CSR research by showing that environmental and social CSR dimensions constitute an important antecedent of a competitive advantage based on firms' innovativeness.

Thus, the study contributes to the literature that jointly analyses CSR and innovation (Bocquet et al., 2019; García-Piqueres and García-Ramos, 2020) to provide a fine-grained analysis of the effects of the environmental and social CSR dimensions on innovation. Indeed, its results confirm that the effects of the different CSR facets vary depending on the type of technological innovation, as pointed out by Bendell and Huvaj, (2020). These results suggest that while adopting a CSR orientation is generally beneficial for innovative performance, some differences appeared among the different types of indicators for such performance.

In particular, the study's findings indicate that firms engaging in environmental CSR are much more likely to develop process innovation. This suggests that a firm's competitive advantage linked to environmental CSR is more geared towards the efficiency of the process rather than the introduction of new products. Furthermore, social CSR dimensions prove to have a beneficial effect on both product and process innovations.

Social CSR can promote innovation because socially responsible behaviour leads to motivated employees and stimulates their innovative potential (Liu et al., 2021). The implementation of CSR makes employees perceive their companies as a supporter of their wellbeing, which might help in the development of several positive employee behavioural outcomes. This perception of wellbeing causes employees to feel more valued and motivates them to reciprocate this feeling (Hur et al., 2019) and promote technological innovation.

In line with this, worth highlighting is that one of the main strengths of this work is its reliance precisely on taking into account the underlying aspects of the relationship between CSR and innovation, a gap pointed out by Ratajczak and Szutowski, (2016). To address this and building on organizational innovation research, this study explores the moderating effect of organizational innovation practices on the relationship between CSR practices and innovative performance. As previously explained, the development of an organizational environment focused on learning practices, decision-making processes and social integration can generate stronger cohesion between employees (Barrena-Martinez et al., 2019) that can help firms propagate the use of more

CSR practices within the organization. Thus, the results confirmed the existence of a positive moderating effect of organizational innovation on the relationship between social CSR innovation and the generation of technological innovations in both product and process. More importantly, the analysis suggests that the implementation of internal organizational innovation practices is indeed needed when seeking to benefit from the positive effect of social CSR on innovative performance. Therefore, this study provides new insights into the complex relationship between CSR and innovation success, stressing the role of organizational innovation in moderating this relationship.

This study's empirical findings have implications for managers since encouraging CSR initiatives could benefit firm performance. In this sense, CSR should be integrated voluntarily into a business' corporate strategy because environmentally and socially responsible firms may obtain a substantial competitive advantage by increasing their innovative capability. In this sense, the analysis presented in this work reinforces the idea that CSR is not solely a philanthropic activity but has a strong strategic aspect, thus aligning ethical standards and objectives with business practices.

Indeed, companies play an important role in economic growth, and their operations can govern the progress of whole communities (Rodrigo and Arenas, 2008; p270). They need to be aware of the effect of their actions on society and the environment, making their operations sustainable and developing ecofriendly products. This, in turn, can place a company at an advantage compared to its rivals. Thus, managerial decisions aimed at increasing social and environmental care initiatives constitute a means to build or scale up a firm's innovativeness. In short, managers should understand and spread the conviction that a good path towards innovativeness includes CSR strategies. Managers frequently view CSR as an additional cost of firms without taking into account the advantages associated with this investment, which can stimulate innovation and improve firm competitiveness. Thus, managers aiming to improve their firm's innovation performance should devote resources to CSR and should integrate both social and environmental issues into their business strategies.

Furthermore, since the effect of CSR depends on both the particular dimension of CSR favoured and the innovation type pursued, managers should design their CSR strategies very carefully to find the most suitable way to stimulate innovation performance according to the firm's specific objectives. Finally, managers should pay attention to these objectives and the particularities of CSR dimensions and innovation type when considering the implementation of internal organizational innovation practices if they want to make the most of the potential of the relationship between CSR and innovation. Finally, the results suggest a complementarity effect of organizational innovation practices and

socially responsible practices to enhance firm performance; managers should make efforts to invest in management practices in their internal organizational structure if they want to create more value from their CSR strategy.

Future research could be extended by examining the impact of CSR dimensions on innovation success by differentiating between complex innovators – when the firm carries out both product and process innovations – and single innovators – when the firm carries out only one type of technological innovation, whether product or process – following the research line by Le Bas and Poussing (2014), who identify a clear difference between the determinants of the two types of innovations. These differences might help develop more general empirical evidence through future research directions.

**Acknowledgements** The authors gratefully acknowledge the funding received through the PID2020-115018RB-C31 (AEI/ FEDER, UE), PID2020-114460GB-C32 (AEI/ FEDER, UE) and RTI2018-093791-B-C21 (AEI/ FEDER, UE) research projects financed by the Spanish Ministry of Science, Innovation and Universities and the European Regional Development Funds.

**Funding** Open Access funding provided by Universidad Pública de Navarra.

**Data availability** Database is placed at the disposal of researchers on the INE (Instituto Nacional de Estadística) also available at <https://www.ine.es>.

## Declarations

**Conflict of Interest** The authors have no conflict of interest to declare that is relevant to the content of this article.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

Ahn, J., Wong, M. L., & Kwon, J. (2020). Different role of hotel CSR activities in the formation of customers' brand loyalty. *International Journal of Quality and Service Sciences*, 12(3), 337–353.

Alam, M. S., Atif, M., Chien-Chi, C., & Soytaş, U. (2019). Does corporate R&D investment affect firm environmental performance? Evidence from G-6 countries. *Energy Economics*, 78, 401–411.

Ambec, S., & Barla, P. (2006). Can environmental regulations be good for business? An assessment of the Porter hypothesis. *Energy Studies Review*, 14, 42–62.

Antonelli, C., Crespi, F., & Scellato, G. (2013). Internal and external factors in innovation persistence. *Economics of Innovation and New Technology*, 22(3), 256–280.

Anzola-Román, P., Bayona-Sáez, C., & García-Marco, T. (2018). Organizational innovation, internal R&D and externally sourced innovation practices: Effects on technological innovation outcomes. *Journal of Business Research*, 91, 233–247.

Barrena-Martinez, J., López-Fernández, M., & Romero-Fernández, P. M. (2019). The link between socially responsible human resource management and intellectual capital. *Corporate Social Responsibility and Environmental Management*, 26(1), 71–81.

Bendell, B. L. (2017). I don't want to be green: Prosocial motivation effects on firm environmental innovation rejection decisions. *Journal of Business Ethics*, 143(2), 277–288.

Bendell, B. L., & Huvaj, M. N. (2020). Does stakeholder engagement through corporate social and environmental behaviors affect innovation? *Journal of Business Research*, 119, 685–696.

Bhattacharya, C. B., Sen, S., & Korschun, D. (2008). Using Corporate Social Responsibility to Win the War for Talent. *MIT Sloan Management Review*, 49(2), 37–34.

Bocquet, R., Le Bas, C., Mothe, C., & Poussing, N. (2013). Are firms with different CSR profiles equally innovative? Empirical analysis with survey data. *European Management Journal*, 31(6), 642–654.

Bocquet, R., Le Bas, C., Mothe, C., & Poussing, N. (2019). Strategic CSR for innovation in SMEs: Does diversity matter? *Long Range Planning*, 52(6), 101913.

Bocquet, R., & Mothe, C. (2011). Exploring the relationship between CSR and innovation: A comparison between small and large-sized French companies. *Revue Sciences De Gestion*, 80, 101–119.

Boschma, R. (2005). Proximity and innovation: A critical assessment. *Regional Studies*, 39(1), 61–74.

Bradley, S. W., Wiklund, J., & Shepherd, D. A. (2010). Swinging a double-edged sword: The effect of slack on entrepreneurial management and growth. *Journal of Business Venturing*, 26(5), 537–554.

Broadstock, D. C., Matousek, R., Meyer, M., & Tzeremes, N. G. (2020). Does corporate social responsibility impact firms' innovation capacity? The indirect link between environmental & social governance implementation and innovation performance. *Journal of Business Research*, 119, 99–110.

Carroll, A. B. (1979). A three-dimensional conceptual model of corporate performance. *Academy of Management Review*, 4, 497–505.

Castka, P., Balzarova, M. A., Bamber, C. J., & Sharp, J. M. (2004). How can SMEs effectively implement the CSR agenda? A UK case study perspective. *Corporate Social Responsibility and Environmental Management*, 11(3), 140–149.

Celma, D., Martínez-García, E., & Raya, J. M. (2018). Socially responsible HR practices and their effects on employees' wellbeing: Empirical evidence from Catalonia, Spain. *European Research on Management and Business Economics*, 24(2), 82–89.

Cochran, P. L. (2007). The evolution of corporate social responsibility. *Business Horizons*, 50(6), 449–454.

European Commission. (2005). *The new SME definition*. Enterprise and Industry Publications. Luxembourg: European Commission.

Commission, E. (2001). *Green Paper*. Promoting a European framework for Corporate Social Responsibility.

Crifo, P., Marc-Arthur, D., & Sanja, P. (2016). CSR related management practices and firm performance: An empirical analysis of the quantity–quality trade-off on French data. *International Journal of Production Economics*, 171, 405–416.

Cruz-Cázares, C., Bayona-Sáez, C., & García-Marco, T. (2013). You can't manage right what you can't measure well: Technological innovation efficiency. *Research Policy*, 42(6–7), 1239–1250.



- Dahlsrud, A. (2008). How corporate social responsibility is defined: An analysis of 37 definitions. *Corporate Social Responsibility and Environmental Management*, 15(1), 1–13.
- Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *In Academy of Management Journal*, 34(3), 555–590.
- Damanpour, F. (1996). Organizational complexity and innovation: Developing and testing multiple contingency models. *Management Science*, 42(5), 693–716.
- Dangelico, R. M., & Pujari, D. (2010). Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. *Journal of Business Ethics*, 95(3), 471–486.
- De Roeck, K., Marique, G., Stinglhamber, F., & Swaen, V. (2014). Understanding employees' responses to corporate social responsibility: Mediating roles of overall justice and organisational identification. *The International Journal of Human Resource Management*, 25(1), 91–112.
- D'Este, P., Amara, N., & Olmos-Peñuela, J. (2016). Fostering novelty while reducing failure: Balancing the twin challenges of product innovation. *Technological Forecasting and Social Change*, 113, 280–292.
- Di Stefano, G., Gambardella, A., & Verona, G. (2012). Technology push and demand pull perspectives in innovation studies: Current findings and future research directions. *Research Policy*, 41(8), 1283–1295.
- Du, S., El Akremi, A., & Jia, M. (2022). Quantitative research on corporate social responsibility: A quest for relevance and rigor in a quickly evolving, turbulent world. *Journal of Business Ethics*. <https://doi.org/10.1007/s10551-022-05297-6>
- Elkington, J. (1997). *Cannibals with Forks*. Capstone.
- Farooq, O., Payaud, M., Merunka, D., & Valette-Florence, P. (2014). The Impact of Corporate Social Responsibility on Organizational Commitment: Exploring Multiple Mediation Mechanisms. *Journal of Business Ethics*, 125(4), 563–580.
- Forcadell, F. J., Aracil, E., & Ubeda, F. (2020). Using reputation for corporate sustainability to tackle banks digitalization challenges. *Business Strategy and the Environment*, 29(6), 2181–2193.
- Forcadell, F. J., Ubeda, F., & Aracil, E. (2021). Effects of environmental corporate social responsibility on innovativeness of Spanish industrial SMEs. *Technological Forecasting and Social Change*, 162, 120355.
- Ford, J. A., Steen, J., & Verreynne, M. L. (2014). How environmental regulations affect innovation in the Australian oil and gas industry: Going beyond the Porter Hypothesis. *Journal of Cleaner Production*, 84, 204–213.
- Gangi, F., Mustilli, M., & Varrone, N. (2019). The impact of corporate social responsibility (CSR) knowledge on corporate financial performance: evidence from the European banking industry. *Journal of Knowledge Management*, 23(1), 110–134.
- García-Marco, T., Zouaghi, F., & Sánchez, M. (2020). Do firms with different levels of environmental regulatory pressure behave differently regarding complementarity among innovation practices? *Business Strategy and the Environment*, 29(4), 1684–1694.
- García-Piqueres, G., & García-Ramos, R. (2020). Is the corporate social responsibility–innovation link homogeneous?: Looking for sustainable innovation in the Spanish context. *Corporate Social Responsibility and Environmental Management*, 27(2), 803–814.
- Godin, B., & Lane, J. P. (2013). Pushes and Pulls: Hi(S)tory of the Demand Pull Model of Innovation. *Science, Technology, & Human Values*, 38(5), 621–654.
- Golebiowski, T., & Lewandowska, M. (2015). Is CSR embedded in the system of corporate innovation objectives? Evidence from Poland. *Journal of Economics & Management*, 22, 32–35.
- Golob, U., & Podnar, K. (2021). Corporate marketing and the role of internal CSR in employees' life satisfaction: Exploring the relationship between work and non-work domains. *Journal of Business Research*, 131, 664–672.
- González-Masip, J., Martín-de Castro, G., & Hernández, A. (2019). Inter-organisational knowledge spillovers: Attracting talent in science and technology parks and corporate social responsibility practices. *Journal of Knowledge Management*, 23(5), 975–997.
- Halme, M., & Laurila, J. (2009). Philanthropy, integration or innovation? Exploring the financial and societal outcomes of different types of corporate responsibility. *Journal of Business Ethics*, 84(3), 325–339.
- Hoetker, G. (2007). The use of logit and probit models in strategic management research: Critical issues. *Strategic Management Journal*, 28(4), 331–343.
- Hur, W. M., Moon, T. W., & Choi, W. H. (2019). When are internal and external corporate social responsibility initiatives amplified? Employee engagement in corporate social responsibility initiatives on prosocial and proactive behaviors. *Corporate Social Responsibility and Environmental Management*, 26(4), 849–858.
- Islam, G., & Greenwood, M. (2021). Reconnecting to the Social in Business Ethics. *Journal of Business Ethics*, 170, 1–4.
- Johannessen, J. A. (2008). Organisational innovation as part of knowledge management. *International Journal of Information Management*, 28(5), 403–412.
- Ketata, I., Sofka, W., & Grimpe, C. (2015). The role of internal capabilities and firms' environment for sustainable innovation: Evidence for Germany. *R&D Management*, 45(1), 60–75.
- Kimberly, J. R., & Evanisko, M. (1981). Organizational innovation: The influence of individual, organizational, and contextual factors on hospital adoption of technological and administrative innovations. *Academy of Management Journal*, 24, 689–713.
- Konadu, R., Ahinful, G. S., Boakye, D. J., & Elbardan, H. (2022). Board gender diversity, environmental innovation and corporate carbon emissions. *Technological Forecasting and Social Change*, 174, 121–279.
- Le Bas, C., & Poussing, N. (2014). Are Complex Innovators More Persistent than Single Innovators? An Empirical Analysis of Innovation Persistence Drivers. *International Journal of Innovation Management*, 18(1), 1450008.
- Liang, T., Zhang, Y. J., & Qiang, W. (2022). Does technological innovation benefit energy firms' environmental performance? The moderating effect of government subsidies and media coverage. *Technological Forecasting and Social Change*, 180, 121–128.
- Liu, Y., Liu, S., Zhang, Q., & Hu, L. (2021). Does perceived corporate social responsibility motivate hotel employees to voice? The role of felt obligation and positive emotions. *Journal of Hospitality and Tourism Management*, 48, 182–190.
- Luo, X., & Du, S. (2015). Exploring the relationship between corporate social responsibility and firm innovation. *Marketing Letters*, 26(4), 703–714.
- Mairesse, J., & Mohnen, P. (2010). Using innovations surveys for econometric analysis. In B. H. Hall & N. Rosenber (Eds.), *Handbook of the Economics of Innovation* (pp. 1129–1155). Elsevier B.V.
- Mandhachitara, R., & Poolthong, Y. (2011). A model of customer loyalty and corporate social responsibility. *Journal of Services Marketing*, 25(2), 122–133.
- Martínez-Conesa, I., Soto-Acosta, P., & Palacios-Manzano, M. (2017). Corporate social responsibility and its effect on innovation and firm performance: An empirical research in SMEs. *Journal of Cleaner Production*, 142(4), 2374–2383.
- McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review*, 26(1), 117–127.
- Mishra, D. R. (2017). Post-innovation CSR performance and firm value. *Journal of Business Ethics*, 140(2), 285–306.

- Neter, J., Kutner, M., Nachtsheim, C. J., & Wasserman, W. (1996). *Applied linear statistical models* (4th ed.). Irwin/McGraw-Hill. (Chapter 1).
- Nidumolu, R., Prahalad, C., & Rangaswami, M. (2009). Why sustainability is now the key driver of innovation. *Harvard Business Review*, 87(9), 56–64.
- OECD/Eurostat. (2005). *Oslo manual – the measurement of scientific and technological activities: Proposed guidelines for collecting and interpreting technological innovation data*.
- Parisi, M. L., Schiantarelli, F., & Sembenelli, A. (2006). Productivity, innovation and R&D: Micro evidence for Italy. *European Economic Review*, 50(8), 2037–2061.
- Peiró-Signes, Á., Segarra-Oña, M., Trull-Domínguez, Ó., & Sánchez-Planelles, J. (2022). Exposing the ideal combination of endogenous–exogenous drivers for companies' eco innovative orientation: Results from machine-learning methods. *Socio-Economic Planning Sciences*, 79, 101–145.
- Podgorodnichenko, N., Edgar, F., Akmal, A., & McAndrew, I. (2021). Sustainability through sensemaking: Human resource professionals' engagement and enactment of corporate social responsibility. *Journal of Cleaner Production*, 293, 126150.
- Porter, M. E., & van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*, 9(4), 97–118.
- Ratajczak, P., & Szutowski, D. (2016). Exploring the relationship between CSR and innovation. *Sustainability Accounting, Management and Policy Journal*, 7(2), 295–318.
- Rubashkina, Y., Galeotti, M., & Verdolini, E. (2015). Environmental regulation and competitiveness: Empirical evidence on the porter hypothesis from European manufacturing sectors. *Energy Policy*, 83, 288–300.
- Santos-Jaén, J. M., Madrid-Guijarro, A., & García-Pérez-de-Lema, D. (2021). The impact of corporate social responsibility on innovation in small and medium-sized enterprise s: The mediating role of debt terms and human capital. *Management. Corporate Social Responsibility and Environmental*, 28(4), 1200–1215.
- Stolz, J., Molina, H., Ramírez, J., & Mohr, N. (2013). Consumers' perception of the environmental performance in retail stores: An analysis of the German and the Spanish consumer. *International Journal of Consumer Studies*, 37(4), 394–399.
- Story, J. S., & Castanheira, F. (2019). Corporate social responsibility and employee performance: Mediation role of job satisfaction and affective commitment. *Corporate Social Responsibility and Environmental Management*, 26(6), 1361–1370.
- Surroca, J., Tribò, J., & Waddock, S. (2010). Corporate responsibility and financial performance: The role of intangible resources. *Strategic Management. Journal*, 31(5), 463–490.
- Suto, M., & Takehara, H. (2022). Employee-oriented corporate social responsibility, innovation, and firm value. *Corporate Social Responsibility and Environmental Management*. <https://doi.org/10.1002/csr.2232>
- Tidd, J., Pavitt, J., & Bessant, K. (2005). *Managing innovation: Integrating technological, market and organizational change* (3rd ed.). Wiley & Sons.
- Tsui, A. S., Ashford, S. J., Clair, S. T. L., & Xin, K. R. (1995). Dealing with discrepant expectations: Response strategies and managerial effectiveness. *Academy of Management Journal*, 38(6), 1515–1543.
- Tu, Y., Lu, X., Choi, J. N., & Guo, W. (2019). Ethical leadership and team-level creativity: Mediation of psychological safety climate and moderation of supervisor support for creativity. *Journal of Business Ethics*, 159, 551–565.
- Wood, D. J. (1991). Corporate social performance revisited. *Academy of Management Review*, 16(4), 691–718.
- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT Press.
- Wu, W., Liang, Z., & Zhang, Q. (2020). Effects of corporate environmental responsibility strength and concern on innovation performance: The moderating role of firm visibility. *Corporate Social Responsibility and Environmental Management*, 27(3), 1487–1497.
- Wu, W., Liu, Y., Chin, T., & Zhu, W. (2018). Will green CSR enhance innovation? A perspective of public visibility and firm transparency. *International Journal of Environmental Research and Public Health*, 15(2), 268–282.
- Yang, D., Wang, A. X., Zhou, K. Z., & Jiang, W. (2018). Environmental strategy, institutional force, and innovation capability: A managerial cognition perspective. *Journal of Business Ethics*, 159, 1–15.
- Yuan, Y., Lu, L. Y., Tian, G., & Yu, Y. (2020). Business strategy and corporate social responsibility. *Journal of Business Ethics*, 162(2), 359–377.
- Zhang, J. A., Edgar, F., Geare, A., & O'Kane, C. (2016). The interactive effects of entrepreneurial orientation and capability-based HRM on firm performance: The mediating role of innovation ambidexterity. *Industrial Marketing Management*, 59, 131–143.
- Zhang, Y., Wang, J., Xue, Y., & Yang, J. (2018). Impact of environmental regulations on green technological innovative behavior: An empirical study in China. *Journal of Cleaner Production*, 188, 763–773.
- Zhong, X., Ren, L., & Song, T. (2022). Beyond market strategies: How multiple decision-maker groups jointly influence underperforming firms' corporate social (Ir)responsibility. *Journal of Business Ethics*, 178, 1–19.
- Zouaghi, F., Garcia-Marco, T., & Martinez, M. G. (2020). The link between R&D team diversity and innovative performance: A mediated moderation model. *Technological Forecasting and Social Change*, 161, 120325.

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.