The impact of stakeholder orientation on innovation: an empirical investigation on firm patenting activity

Received
15th February 2022
Revised
22nd February 2023
Accepted
7th August 2023

Stefano Romito - Clodia Vurro - Mario Benassi

Abstract

Framing of the research. *The paper provides novel insights on how firms can boost innovation output by developing a corporatewide orientation towards stakeholders. It investigates the patenting activities of a sample of U.S. firms using a panel dataset.*

Purpose of the paper. *The aim of the paper is to analyze the effect of firm stakeholder orientation, defined as the adoption of policies and management processes to identify, understand, and integrate the interest of stakeholders in firms' decision making, on innovation output.*

Methodology*. We validate our hypotheses using a panel dataset of 5.608 unique firm-year observation on firms' patenting activity over the period 2002-2012.*

Results*. We find support for our baseline hypothesis on the positive impact of increasing degrees of stakeholder orientation on the quantity of firms' innovation output. Moreover, the degree of stakeholder orientation has a positive impact on innovation radicalness and originality, will decreasing the level of innovation generality.*

Research limitations*. Our work contributes to an emerging debate on the innovation potential of stakeholder orientation. It is based on a direct measure of stakeholder orientation and, based on its methodology, it is not possible to exclude biases related to unobservable managerial preferences. Moreover, we use patents as a proxy for innovation output being aware of its limitation.*

Managerial implications. *Our results suggest the importance of nurturing stakeholder relations to foster knowledge exchange and reciprocal learning, which are crucial for firms' innovativeness. Moreover, our study highlights the importance of stakeholder orientation in the pursuit of radical and original technological trajectories.*

Originality of the paper. *Studies on the innovation impact of stakeholder orientation are still limited and mostly focused on exogenous determinants in limited timeframe. Our study introduces the degree of stakeholder orientation as a key construct to predict innovation that accounts for heterogeneity across firms and stakeholder categories.*

Key words: stakeholder orientation; innovation output; patenting activity; stakeholder management

1. Introduction

As firms increasingly decide to adopt policies and management processes to identify, understand and integrate the interest of stakeholders in their decision making (Harrison *et al.*, 2010), research has started to investigate such stakeholder orientation as a driver of value creation. Previous studies have largely documented that firms that relies on continuous knowledge exchange with stakeholders in a stakeholder network tend to behave differently from less stakeholder-oriented one, in terms of corporate development activities such as acquisition (Tong *et al.*, 2019) or divestiture (Bettinazzi and Feldman, 2020), thus turning into higher chances for survival (Vurro *et al.*, 2021). Results of these studies tend to suggest that stakeholder orientation is an important trigger for the development of innovative capabilities, while predisposing firms in a better position to coping with uncertainty and interpret and integrate external stimuli (Cheng, 2020).

Heeding the call for a deeper understanding of the organizational implications of stakeholder orientation (Barney and Harrison, 2020), scholars have started to investigate the innovation consequences of developing a proactive stance towards the integration of stakeholder dialogue in a firm's strategic and operational activities (Li *et al.*, 2018; Markovic and Bagherzadeh, 2018). Considering stakeholder orientation as a source of new knowledge and confidence in the viability of long-term investments, previous studies have advanced the idea that close stakeholder relationships can contribute to successful innovation strategies, driving technological investments, employee innovativeness (Flammer and Kacperczyk, 2016; Jiang *et al.*, 2019), and new product development decisions (Aschehoug *et al.*, 2012; Markovic and Bagherzadeh, 2018). Similarly, scholars have recently acknowledge the innovation potential of strategic alliances that span traditional firm-to-firm boundaries and involve unusual stakeholders such as local communities or nonprofit organizations (Cheng, 2020; Niesten and Jolink, 2020). Accordingly, by strengthening the nexus with stakeholders, firms are expected to anticipate changes in the business environment or emerging societal expectations that turn into the discovery of opportunities (Adams *et al.*, 2016; Romito *et al.*, 2021).

Elaborating on how stakeholder orientation can provide appropriate incentives or discourage firms to pursue innovation, empirical studies have examined and supported the causal association between corporate attention to nonfinancial stakeholders and the amount and characteristics of technology investments (Conti and Novelli, 2022; Flammer and Kacperczyk, 2016). Yet, previous research has mostly assumed the development of an orientation towards stakeholders as deriving from an exogenous shock, that is, the U.S. states' enactment of constituency statutes allowing firms to acknowledge the interest of stakeholders when making decisions (Flammer, 2018). Despite valuable in predicting causality and control for endogeneity, such approach has several limitations. First, it does not allow to differentiate between degrees of stakeholder orientation across firms and across stakeholders. Rather, it refers to a

general increase of stakeholder orientation as a result of a policy change in the external environment without directly measuring the stakeholder orientation construct across stakeholder categories (Bettinazzi and Zollo, 2017; Greenley and Foxall, 1997). Second, the constituency statutes were enacted by 34 U.S. states mainly during the period 1976-2000, with the only exception of Texas in which the law has been approved in 2006. Thus, investigations are mostly limited to that timeframe and hardly account for the impact of time on the propensity of firms to develop their orientation towards stakeholders as well as on the performance consequences of such behavior (Jain *et al.*, 2017; Shin *et al.*, 2021).

We aim to advance this stream of research by arguing that the degree of stakeholder orientation a firm develops over time matters in predicting its innovation output, in terms of quantity and quality of patents. Accordingly, we elaborate on and test the impact of developing a corporatewide orientation towards stakeholder on the quantity, radicalness, originality, and generality of patents. To better uncover the innovation potential of heterogeneity in stakeholder orientation, we also investigate the impact of firms' orientation towards specific stakeholder categories. More specifically, we focus on those non-financial stakeholders that directly contribute to a firm's value creation capacity, that is, employees, customers, suppliers, and communities. These categories have been conventionally referred to as primary stakeholders (Clarkson, 1995), given their crucial impact on business continuity and survival (Boaventura *et al.*, 2020; Vurro *et al.*, 2021). We also predicted the innovation impact of a firm's orientation towards the protection of the natural environment, as previous studies have identified environmental responsibility as conducive to green product innovation (Schiederig *et al.*, 2012).

We test our hypotheses using a comprehensive panel dataset of 5.608 unique firm-year observations drawn from 843 U.S. listed firms over the period 2002-2012. We found support for the expected impact of heterogeneity in stakeholder orientation and firms patenting activities. According to our results, higher degrees of stakeholder orientation are associated with higher number of patent applications, especially when firms develop a stronger orientation towards employees, customers, and the natural environment. By developing an orientation towards stakeholder, firms can also improve the quality of their innovation output. Our results supported a positive impact of stakeholder orientation on patent radicalness and originality. In accordance with previous literature, we found a negative significant impact of stakeholder orientation on patent generality as the more firms commit to stakeholders the less their incentive in investing in general technology which improves flexibility and might lead the committed stakeholders to expect opportunism (Hampel *et al.*, 2020).

The reminder of the paper is structured as it follows. First, theory and empirical studies predicting a positive impact of stakeholder orientation on innovation are reviewed and systematized, with the aim of developing hypotheses. These sections are followed by the methodology and empirical analysis. Finally, the findings and contributions are discussed together with the limitations and opportunities for future research.

2. Literature review and hypotheses

Literature has long debated the impact of adopting processes and actions aimed at interacting with stakeholders on a continuative basis on the emergence of capabilities to better manage internal change and organizational innovation (Aragón-Correa and Sharma, 2003; Perrini *et al.*, 2011). In fact, by interacting with stakeholders, firms have better chances to obtain knowledge and resources while cultivating their ability to interpret external stimuli and anticipate change in the external environment (Jones *et al.*, 2018).

By favoring communication across a plurality of voices, stakeholder interaction has emerged as a valuable source of reciprocal learning, as it exposes participants to alternative perspectives (Aschehoug *et al.*, 2012). Knowledge transfer and mutual learning help firms to recombine knowledge and acquire relational resources turning into faster reactions to changes and adaptation to demand for innovation (Li *et al.*, 2018; Yang *et al.*, 2019).

Finally, stakeholder-oriented firms have emerged as more prone to cope with complexity and uncertainty as a consequence of their more frequent engagement in open-ended, informal contracts, which implies higher risks of moral hazards (Gibbons and Henderson, 2012; Romito *et al.*, 2021; Russo *et al.*, 2018). Similarly, previous studies have highlighted how stakeholder orientation fosters firms' tolerance for embracing initiatives that would generate results over longer time horizons (Pinkse and Kolk, 2010).

The growing awareness of the implications of stakeholder orientation on the development of firms' innovative capabilities has fostered theory building on the mechanisms linking stakeholders and innovation. In this regard, Ayuso *et al.* (2006) identified stakeholder dialogue and stakeholder knowledge integration as the capabilities to combine stakeholder insights into a firm's innovative process. Openness to dialogue, reciprocal interaction and proximity to stakeholders have emerged as crucial in driving new product development, thus suggesting the importance of building a corporatewide orientation towards stakeholders to foster innovation. Similarly, the adoption of forms of collaborative governance has been associated to business development and innovation when paired with a stronger openness to stakeholder participation and stakeholder influence on decision making (Spitzeck and Hansen, 2010). More recently, research as pointed out to the beneficial impact of stakeholder orientation in countering learning inertia as firms age (Adams *et al.*, 2016). Preliminary evidence shows that stakeholder interactions foster resource reallocation and improve adaptability, responsiveness, corporate entrepreneurship and renewal (Ahn and Park, 2018; García-Sánchez *et al.*, 2018). Especially when firms grow older, stakeholder orientation stimulate flexibility and adaptive capabilities, thus countering inertia and improving survival rates (Vurro *et al.*, 2021).

Despite such emerging findings, the direct impact of stakeholder orientation on innovation has been mostly assumed rather than empirically tested. For example, Ayuso *et al.* (2006) contended a positive impact of

developing capabilities to manage internal and external stakeholder on the innovation orientation of firms based on a cross-case comparison of large firms. On a partly related side, studies have focused on the innovation potential of promoting an orientation towards employees and stimulate their commitment (Azoulay *et al.*, 2011; Sharma *et al.*, 2021).

More recently, research attention has been addressed to empirically test the causal relation between stakeholder orientation and innovation. Flammer and Kacperczyk (2016) have analyzed how the enactment of constituency statutes in the U.S., which provided directors with a legally enforceable mechanism to consider stakeholders' interest during the decision-making process, influenced innovative output. Based on their findings, they concluded that firms incorporated in states having enacted a constituency statute were incentivized to generate more patents and receive more citations per patents. Stakeholder orientation indeed fosters innovation by encouraging experimentation and tolerance for failure. Based on the same methodology, Conti and Novelli (2022) made a step further and pointed out to the role of stakeholder orientation in predicting technology trajectory. According to their results, they found how stakeholder-oriented firms are more likely to invest in less general technological assets to reduce stakeholder opposition and concerns.

With the exception of such studies and their valuable insights into causality between stakeholder orientation and innovation output, very little is still know about the impact of heterogeneity in stakeholder orientation on innovation (Bettinazzi and Feldman, 2020). As firms develop their attitudes to stakeholder, thy expand that set of value-creating exchanges beyond market transactions (Hillman and Keim, 2001). The more firms engage with stakeholders, expanding their stakeholder orientation, the higher the likelihood of benefiting from interdependencies, knowledge exchanges and learning opportunities, thus increasing the quantity of their innovative output. Therefore, we hypothesize:

Hypothesis 1: The more stakeholder-oriented a firm is, the higher its innovation output

As mentioned before, heterogeneity in stakeholder orientation is not only due to the overall corporate disposition towards stakeholders but also to the extent to which firms develop an orientation towards each stakeholder category. Previous studies have related the innovation impact of stakeholder orientation to exogenous sources such as the enactment of state-level constituency statutes (Flammer and Kacperczyk, 2016). Therefore, the impact of variation at the corporate level and with regards to each stakeholder category remains an open question.

Along with the growing importance of intangibles for firm success, including creation, management and transfer of knowledge, the development of an orientation towards employees has started to be considered a critical source of competitiveness when it turns into improved human resource management practices (Perrini *et al.*, 2011). Employees are directly involved in the innovation process, with their capabilities and orientation being conducive to the development and deployment

of innovation. Previous research has pointed out to the impact of work satisfaction in the R&D process, when firms attempt to create new knowledge (Janz and Prasarnphanich, 2003). Employee-oriented firms are those investing on employees' well-being, while providing fair treatment and opportunities for involvement in decision making (Ketata *et al.*, 2015; Liu *et al.*, 2014). Employee-orientation is thus expected to improve worker satisfaction and openness to knowledge dissemination within the firms, which can be considered vital for innovation. Thus, we hypothesize:

Hypothesis 1a: The more employee-oriented a firm is, the higher its innovation output.

Cooperation with suppliers is as important to foster innovation as employee orientation. Research has long acknowledged the benefits related to long-term buyer-supplier relationships based on knowledge and competence sharing among partners (Vurro *et al.*, 2009). Accordingly, the development of an orientation aimed at integrating suppliers' interests facilitates knowledge transfer, fosters coordination and turns into higher innovation potential (Cheng, 2020). Recent studies have investigated the innovative outcomes of integrating social and environmental consideration in the selection, monitoring, and managing of buyer-supplier relationships (Adams *et al.*, 2016). Based on this evidence, as firms develop their capabilities to select and cooperate with suppliers beyond arms-length relationships we can expect better innovation outputs. Thus, we hypothesize:

Hypothesis 1b: The more supplier-oriented a firm is, the higher its innovation output.

If integrated in firms' decision making, the customers can become advocates for the firms and provide valuable feedbacks to stimulate innovation (Danso *et al.*, 2020; Hillman and Keim, 2001). An orientation towards customers allows firms to better understand their customer needs through open dialogue and transparent interaction, thus improving customer-specific knowledge and stimulating innovation. Hence, we can expect that:

Hypothesis 1c: The more customer-oriented a firm is, the higher its innovation output.

The capabilities to manage the relationships with the local communities, non-governmental actors, and the wider society have been widely acknowledged as strengthening a firm's legitimacy and license to operate (Van Tulder *et al.*, 2016). In face of a growing demand for firm responsibility and engagement in social and environmental issues, partnerships and community-related programs are considered among the mainstays of stakeholder orientation (Bowen *et al.*, 2010). Accordingly, participation in community-development projects or cross-sector collaborations with institutional actors and nonprofit organizations has been considered a

driver of innovation by means of fostering a proactive attitude towards the context and helping firms to foresee dynamics of change and risky challenges (Pedersen *et al.*, 2021). Additionally, the development of an orientation towards community actors can support firms in embracing longer-term targets thus extending their tolerance for embracing initiatives that are not expected to generate short-term impacts (Slawinski *et al.*, 2017). Based on this emerging evidence, we hypothesize:

Hypothesis 1d: The more community-oriented a firm is, the higher its innovation output.

The competitive impacts associated to the development of an orientation towards the natural environment are well established in the literature (Porter and Van der Linde, 1995). The adoption of pollution prevention policies and other environmental protection strategies fosters product and process innovations, especially when paired with market demand for greener products (Jay Polonsky and Ottman, 1998; Pilkington, 2004). In fact, the achievement of such results requires adaptation of production processes and renewed product design. On a partly related side, tighten environmental regulation increases production costs, thus providing incentives for efficiency gains and improvement of firms' environmental footprint. Scholars have found a significant positive relationship between pollution abatement expenditures following stricter regulation in U.S. and environmental patents in manufacturing industries (Brunnermeier and Cohen, 2003). Similarly, the eco-design directive in Europe has triggered the diffusion of energy-efficient products and popularized ecological innovations (Clausen and Fichter, 2019). Thus, we hypothesize:

Hypothesis 1e: The more environmental-oriented a firm is, the higher its innovation output.

In our discussion about the effect of stakeholder orientation on innovativeness we focused our attention on the innovation output. Previous studies, however, have largely emphasized the importance of complementing research with an analysis of the quality of the innovation generated by the firm (Valentini, 2012). In predicting the effect of stakeholder orientation on the quality of innovation output, two potentially conflicting views emerge. On the one hand, research points to a negative effect of stakeholder orientation on the quality of innovation output as a results of the potential resistance to change of certain stakeholder categories. Minoja *et al.* (2010) argued that at higher level of stakeholder orientation, stakeholder cohesion, defined as the alignment among stakeholder categories and with managers, increases. When this happens, cohesion might prevent radicalness in searching for innovative solutions. Similarly, stakeholder could oppose a firm's investment in innovation when such investments offset relation-specific investments, thus threatening the stability of the relationship (Conti and Novelli, 2022; Hoskisson *et al.*, 2018). On the other hand, the stronger involvement of stakeholder oriented firms in frequent interactions and joint problem solving with stakeholders (Vurro *et al.*, 2021) might results in learning and higher exposure to new

perspectives and ideas for innovative, breakthrough solutions. It has been posed, in fact, that stakeholder oriented firms develop a stronger ability to leverage stakeholder knowledge and insights in order to generate high quality new products or services (Jiang *et al.*, 2019). It worth noticing that, when an innovation is generated by leveraging the knowledge of one or more stakeholders, they are typically involved in the process of innovation development. Thus, such stakeholder(s) might actually promote, rather than hinder, the development of a radical innovation as it might strengthen the stability of the relationship with the focal firm. For these reasons we hypothesize a positive relationship between firm stakeholder orientation and the quality of its innovation output.

Hypothesis 2: The more stakeholder-oriented a firm is, the higher the quality of its innovation output, in terms of (2a) radicalness, (2b) originality and (2c) generality of its innovation output.

3. Methodology

3.1 Sample selection

To test our hypotheses, we merged databases on financial data, environmental, social, and governance indicators, and patenting activities of firms over the period 2002-2012. Following Bettinazzi and Zollo (2017) we collected data from Thompson Reuter Asset4 database, one of the most comprehensive databases on ESG (environmental, social and governance) factors for over 7,000 public companies since 2002. Asset4 relies on data collected from multiple public sources to maximize data quality and triangulation (Eccles *et al.*, 2014) and it is considered a valuable source of data for studies on corporate sustainability strategies (Vurro *et al.*, 2021), stakeholder orientation and inter-organizational relationships (Ioannou *et al.*, 2016). After having identified the US firms whose ESG commitments has been assessed by Asset4, we merged the sample with financial data collected from Compustat database. Based on the Bureau van Dijk ID number, we obtained patent data from the Orbis IP database covering all patent publications of firms according to the European Patent Organization (EPO). Only patents registered in the EPO and the United States Patent and Trademark Office (USPTO) were considered. Additionally, duplicated cases due to an amended specification or correction were discarded; and if two firms applied together, the patent was assigned to each firm separately. Later, the dataset was matched with a larger one taken from the worldwide Patent Statistical Database, PATSTAT, to get the ID number, which is a point of reference. With it, the patent dataset was merged with the OECD Patent Quality Indicators database which contains the quality indicators of EPO and USPTO patents. We obtained 801,209 patent observations. Firm-based and patent-based datasets were thus merged. Grouping by year of application and firm ID, the yearly average of quality indicator and the total sum of patents were consolidated at firm-year level and complemented with financial data. Due to missing data, the final sample resulted in 843 firms and 5,608 firm-year observations.

3.2 Dependent variables

Innovation output: According to previous literature innovative output was proxied with patenting activity (McGahan and Silverman, 2001; Trajtenberg *et al.*, 1997). In particular, the yearly patent count was used as a measure of quantity of innovation output (Flammer and Kacperczyk, 2016). The indicator counts the number of applications filed by each firm in a year. The choice to rely on patent application rather than granted patents in a year is since applications tend to be closer to the time of innovation (Hall and Kerr, 2003).

Quality of innovation output: To track the quality of patent applications we relied on data collected by the OECD based on recent literature. In particular, we used three quality indicators: radicalness and originality based on backword citations and generality of the innovation output based on forward citations (Valentini, 2012). Radicalness refer to the number of cited patents in classes other than the one a citing patent is, that is, the extent to which a patent differs from the predecessors it relies upon. Originality refers to the breadth of the technology fields on which each patent relies and can be considered an indicator of knowledge diversification which is supposed to lead to more original results than concentrated knowledge structures. Different from originality, generality is measured based on the number and distribution of citations received by each patent and spanning across different technology classes. Higher levels of generality are associated to patents cited by subsequent patents that belongs to a wide range of technology fields. If this is the case, the invention can be considered as generalist or relevant for a number of later inventions in more or less related technology classes. According to Squicciarini *et al.* (2013) these variables are normalized to have values between zero and one, dividing the results by the maximum score obtained by any patent in the same year and technology field. This approach makes the indicators comparable between USPTO and EPO patents and over time. It is worth noticing that generality suffer from the usual limitations of indicators relying on forward citation, that is, truncation especially for recent patents that risk to have a reduced number of mentions compared to older one. To reduce the timeliness effect, we used a five-year time window to count forward citations.

3.3 Independent variables

Stakeholder orientation: Following Bettinazzi and Zollo (Bettinazzi and Zollo, 2017) and later studies (Vurro *et al.*, 2021), we operationalized a firm's degree of stakeholder orientation using the equally-weighted average of orientation across the five stakeholder categories on which this study focus (i.e., employees, customers, suppliers, local community and the natural environment). The resulting variable ranges between 0 and 100, with high scores indicating openness, fairness, trust and justice in stakeholder relationships. Consistently with previous operationalizations, we assessed the orientation towards a stakeholder group based on category-specific items. Employee orientation is assessed as the average of four Asset4 macro- categories: diversity and opportunity, employment quality,

health and safety, and training and development. With those categories, the database measures a firm's management commitment to increase workers' loyalty and productivity by promoting work-life balance, distributing fair employment benefits, focusing on long-term employment growth, and developing employees' skills and competences. Supplier orientation does not have a macro-category in Asset4 database. Therefore, based on previous literature, we relied upon different items that can be associated to a firm treating suppliers as key business partners. Specifically, the orientation is computed as the sum of sixteen dummy (zero, one) items, included in different macro-categories of Asset4, such as the presence of a code of conduct for suppliers, selecting and monitoring suppliers on human rights compliance, extending their workforce policies to the supply chain, or having managerial practices to improve the interaction with suppliers by setting objectives to be achieved on the quality of the relations. The sum of these variables was later divided by the maximum possible value (sixteen) and multiplied by one hundred. Customer orientation works with Asset4's Client Loyalty value, which measures the company's effectiveness for generating sustainable growth while maintaining a loyal client base. This macro-category tracks, for example, if the company has set policies to monitor and improve customer satisfaction, promotes transparency when interacting with customers or on the contrary has been under the spotlight due to complaints for its products. Community orientation is equivalent to Asset4's Society/Community macro-variable which measures management commitment to maintaining the firm's reputation within its community of reference, by being a good citizen and respecting business ethics, for sustaining the consent to operate. Environmental orientation refers to Asset4's Environmental pillar and results from three different macro-categories measuring management commitment and effectiveness towards reducing waste emission (e.g., greenhouse gases or water discharges), developing eco-efficient products and services, and increasing efficiency in the use of natural resources. This variable indicates the extent of environmental management practices to minimize the firm's operation ecological footprint and attentiveness to eco-efficient opportunities.

Table 1 reports an in-depth description of each variable used to assess a firm degree of orientation towards its stakeholders.

Tab. 1: Description of the variables used to operationalize stakeholder orientation

Variable	Description
Employee Orientation	The variables measure a company's management commitment and effectiveness towards (a) maintaining diversity and equal opportunities in its workforce; (b) providing high-quality employment benefits and job conditions; (c) providing a healthy and safe workplace; and (d) providing training and development (education) for its workforce
Supplier Orientation	The variables measure a company's management commitment and effectiveness towards treating suppliers and contractors as key business partners, implementing concrete actions to improve the partnership process with suppliers and contractors,
Customer Orientation	The variable measures a company's management commitment and effectiveness towards generating sustainable and long-term revenue growth. It reflects a company's capacity to grow, while maintaining a loyal client base through satisfaction programmes and avoiding anti-competitive behaviours and price fixing.
Community Orientation	The variable measures a company's management commitment and effectiveness towards maintaining the company's reputation within the general community. It reflects a company's capacity to maintain its license to operate by being a good citizen, protecting public health, and respecting business ethics.
Natural Environment Orientation	The variable measures a company's impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value.

Source: Own elaboration based on Asset4 variables description

3.4 Controls

A number of controls were included in the analysis to account for factors that affect innovation activities. First, we controlled for the level of R&D intensity, which is considered conducive to the development of innovation processes and drive innovation outcomes (Hu and Jefferson, 2009). Research has reported a positive impact of R&D intensity on firms outcomes and innovative ability, specifically due to the positive relationships between R&D spending and the number of patents (Trajtenberg, 1990). R&D intensity was measured as the ratio between of R&D expenses and total revenues As firms age and mature they can be trapped in path-dependent trajectories and learning traps (Ahuja and Morris Lampert, 2001). To account for potential heterogeneity based on experience, we included firm age as a control for the analysis, measured as the natural logarithm of the difference between the observation year and the foundation year. We also controlled for firm size to account for the impact of firm dimension on patenting activity. Previous research has submitted that large corporations are likely to patent their innovation as they more likely rely on slack resources (McGahan and Silverman, 2001). Firm size is measured as the natural logarithm of total employees (Benassi *et al.*, 2022). In addition, we controlled for the debt-to-equity, the log-transformation of intangibles book value which measures assets such as acquired patents, trademarks, and brands, and for firm performance using return on equity (ROE). Finally, to account for temporal dynamics within sectors we included a year * sector fixed effect the regression models aimed at testing the first set of hypotheses submitted, while in the models aimed at testing the second hypotheses we included firm and year fixed effects.

3.5 Model specification

To estimate the effect of firm stakeholder orientation on the quantity of innovation output we used a Poisson regression model, due to the patent count non-negative integer nature (Hu and Jefferson, 2009). To test our second set of hypotheses aimed at investigating the effect of stakeholder orientation on the quality indicator of innovation output we used fixed effect regression models. Consistently with innovation management literature, the dependent variables, patent counts and patent quality indicators, are lagged by 1 year. Flammer and Kacperczyk (2016) found that an increase of stakeholder orientation turns into higher innovative output after 12 months. Similarly, Brunnermeier and Cohen (2003) that innovation outputs follow R&D expenditures with a 1 year lag.

Table 2 reports the summary statistics and Table 3 shows the pairwise correlations. There is considerable variation across firms regarding their patent activity. On average, firms submit 95 applications per year, but patent applications change dramatically across time and across industries. On average, the firms in the sample employ 36.59 thousand employees, and R&D expenses are around 4% of total revenues. In terms of stakeholder orientation, firms have a higher customer and community orientation than towards the employees, the environment and the suppliers. Additionally, the correlation matrix does not show a high correlation among variables. Not surprisingly, there is a high correlation between the aggregated indicators (i.e., stakeholder orientation and quality indicators) with their respective components. Additionally, some types of orientation have a moderate correlation with other ones, such as employee and environmental orientation, ranging from 0.27 to 0.72. Therefore, and following the various hypotheses, the aggregated stakeholder orientation measure will be analyzed independently as well as the impact of each orientation on the different innovation outputs.

Tab. 2: Summary statistics

	N	Mean	Std. Dev.	Min	Max
Patents	5608	95.01	384.43	0.00	1693.00
Radicalness	3386	0.42	0.15	0.00	1.00
Originality	3386	0.77	0.10	0.00	0.98
Generality	3386	0.45	0.18	0.00	0.92
Stakeholder orientation	5608	42.74	20.78	5.31	95.09
Employee orientation	5608	47.79	22.23	6.49	97.62
Supplier orientation	5608	17.75	23.15	0.00	100.00
Customer orientation	5608	52.66	26.27	1.39	98.20
Community orientation	5608	51.70	30.24	2.68	97.36
Environmental orientation	5608	43.82	31.73	8.32	97.29
Size	5608	9.40	1.53	3.09	14.60
Intangibles (ln)	5608	8.63	2.65	0.00	14.12
R&D intensity	5608	0.04	0.13	0.00	5.40
ROE	5608	14.53	13.63	-15.18	44.74
Debt-to-equity	5608	0.89	0.99	0.00	3.81
Age (ln)	5608	3.15	1.00	0.00	5.31

Source: Own elaboration

Tab. 3: Pairwise correlations

	Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	Patents	-							
2	Radicalness	-0.05	-						
3	Originality	-0.04	0.50	-					
4	Generality	0.06	0.31	0.35	-				
5	Stakeholder Or.	0.33	0.01	0.02	0.02	-			
6	Empl. Or.	0.30	0.00	0.03	0.01	0.85	-		
7	Supplier Or.	0.28	0.01	0.02	0.02	0.69	0.54	-	
8	Customer Or.	0.22	-0.01	0.00	0.01	0.66	0.43	0.27	-
9	Community Or.	0.16	0.01	0.01	-0.02	0.81	0.65	0.37	0.46
10	Environ. Or.	.0.34	0.03	0.02	0.04	0.86	0.72	0.59	0.39
11	Size	0.29	-0.02	-0.01	0.00	0.54	0.46	0.41	0.35
12	Intangibles (ln)	0.26	-0.02	0.04	0.03	0.24	0.23	0.23	0.10
13	R&D expenses	0.14	-0.06	0.02	0.07	-0.03	-0.01	-0.01	-0.02
14	ROE	0.01	-0.01	0.00	-0.01	0.03	0.03	0.03	0.05
15	Debt-to-equity	-0.08	0.01	0.00	-0.05	0.03	0.03	-0.03	-0.01
16	Age (ln)	0.11	-0.02	0.00	0.03	0.22	0.21	0.14	0.13
	Variables	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
9	Community Or.	-							
10	Environ. Or.	0.59	-						
11	Size	0.42	0.46	-					
12	Intangibles (ln)	0.16	0.23	0.37	-				
13	R&D expenses	-0.06	0.00	-0.13	-0.02	-			
14	ROE	0.02	0.01	0.02	-0.01	-0.04	-		
15	Debt-to-equity	0.07	0.03	0.05	0.10	-0.12	0.07	-	
16	Age (ln)	0.17	0.19	0.23	0.04	-0.04	-0.01	0.05	-

Source: Own elaboration

4. Results

Table 4 reports the regression models used to test hypothesis 1 on the impact of stakeholder orientation and stakeholder-specific orientation on the quantity of innovation output. All the results are reported with robust standard errors to control for heteroskedasticity (Torres-Reyna, 2007).

In the baseline model we reported the regression including only control variables. According to Hypothesis 1, the overall stakeholder orientation is associated to a higher number of patent applications. Results, confirm our hypotheses, the coefficient estimates associate to stakeholder orientation is positive and statistically significant ($\beta = 0.81$; $p < 0.05$). Hypothesis 1a considered the influence of employee orientation, which was one of the three orientations supported ($\beta = 0.55$; $p < 0.05$). In Hypothesis 1b, we tested the impact of supplier orientation on the innovative activity. The coefficient estimates associated to supplier orientation is positive and significant ($\beta = 0.91$; $p < 0.001$), providing support for our prediction. Hypothesis 1c indicated an increase of patents applied in a year with a higher customer orientation, and the outcome was positive but the results

are not statistically different from zero (β = 0.19; p >0.1). Similarly, the results related to the regression aimed at analyzing the relationship between community orientation and the volume of innovation generated did not provide support for hypothesis H1c (β = -0.02; p > 0.1). Finally, hypothesis 1e studied the environmental orientation impact on innovation output, obtaining a positive and significant coefficient that supported the premises (β = 0.46; p < 0.05).

Tab. 4: Results of the main analyses on the quantity of innovation output

	Baseline	Hp1	Hp1a	Hp1b	Hp1c	Hp1d	Hp1e
Stakeholder orientation		0.81**					
		(0.39)					
Employee orientation			0.55**				
			(0.27)				
Supplier orientation				0.91**			
				(0.41)			
Customer orientation					0.19		
					(0.15)		
Community orientation						-0.02	
						(0.13)	
Environment orientation							0.46**
							(0.23)
Size	52.99***	48.46***	49.91***	49.73***	52.19***	52.96***	49.23***
	(12.36)	(11.61)	(11.89)	(11.85)	(12.11)	(12.38)	(11.92)
Intangibles (ln)	4.01*	3.88*	3.81*	4.15*	3.99*	4.02*	3.96*
	(2.30)	(2.26)	(2.25)	(2.28)	(2.29)	(2.30)	(2.27)
R&D intensity	46.50	47.87	46.23	45.51	48.63	46.53	46.20
	(48.84)	(48.75)	(48.44)	(48.59)	(49.57)	(48.86)	(48.29)
ROE	0.64*	0.59*	0.61*	0.65*	0.61*	0.64*	0.62*
	(0.35)	(0.34)	(0.35)	(0.34)	(0.34)	(0.34)	(0.35)
Debt-to-equity	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age (ln)	-3.07	-4.53	-3.87	-2.07	-3.42	-2.80	-3.77
	(7.11)	(7.05)	(7.13)	(6.96)	(7.08)	(7.05)	(6.99)
Constant	-53.55***	-45.51***	-46.90***	-46.59***	-47.15***	-48.06***	-47.25***
	(12.12)	(10.42)	(10.70)	(10.65)	(10.62)	(10.90)	(10.71)
Sector fixed effects included Year effects included Sector * Year effects included Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1							

Source: Own elaboration

The results of the fixed effect models, aiming to analyze the impact on the quality of innovation output, are detailed in table 5. Results were estimated with robust standard errors.

Tab. 5: Results of the main analyses on the quantity of innovation output

	Hp2a	Hp2b	Hp2c
Stakeholder orientation	0.07***	0.04***	-0.05*
	(0.02)	(0.01)	(0.03)
Size	-0.97	-0.50	1.60
	(0.90)	(0.97)	(1.27)
Intangibles	-0.01	-0.06	-0.44
	(0.33)	(0.30)	(0.34)
R&D expenses	1.19	0.22	-0.77
	(1.78)	(0.79)	(1.33)
ROE	0.01	-0.01	-0.04*
	(0.02)	(0.02)	(0.02)
Current ratio	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)
Age (ln)	0.53	-0.10	-0.95
	(1.15)	(1.02)	(1.33)
Constant	46.54***	81.21***	40.02***
	(7.86)	(7.50)	(10.65)
Firm fixed effects included Year effects included Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Source: Own elaboration

According to the Hypothesis 2, we predicted the impact of stakeholder orientation on radicalness, originality and generality of the innovation output. In terms of radicalness, the model supports a positive, significant impact of stakeholder orientation ($\beta = 0.07$; $p < 0.01$). Additionally, the direction of the relationship between originality and stakeholder orientation goes as predicted in Hypothesis 2 ($\beta = 0.04$; $p < 0.01$). Different from what hypothesized, the generality variable showed a negative significant relationship with the independent variable at a 10% significance level ($\beta = -0.05$; $p < 0.1$).

We used patent applications as a proxy for innovation. This approach is widespread because patents are a relevant component of R&D activities (Klevorick *et al.*, 1995). Nevertheless, due to relevant variations across firms in term of patenting, scholars have suggested to complement patent counts with other indicators of innovation output (Hoenig and Henkel, 2015). To check is a firm's patenting activity can potentially lead to subsequent innovations, we relied on forward citations (i.e., the number of times each patent is cited in subsequent patents) as a an alternative measure for the amount of innovative output (Trajtenberg, 1990). As a robustness, we used forward citations from US patents given their high level of comparability, as a subset of total forward citations. In fact, previous research suggests that the USPTO and the EPO's patent examination practices differ substantially (Alcacer and Gittelman, 2006). Results were consistent with the hypothesized relationship between stakeholder orientation and quantity of innovation output measured with patent counts. Stakeholder orientation

maintained a positive, significant relationships with innovation, as well as employee, environmental and supplier orientation remained positively related to the firm's innovative activity.

5. Discussion and conclusion

Our study aimed at theorizing and testing the relationship between heterogeneity in stakeholder orientation and innovation, in terms of quality and quantity of innovation output. According to our review of the literature and previous empirical findings we submitted that stakeholder-oriented firms have better chances to get access to diversified streams of knowledge, anticipate changes in the wider society, learn from stakeholders and counter inertial behavior. Based on our results we found the existence of a positive innovation return on investments in the development of a relational approaches to stakeholders. Firms with higher degrees of stakeholder orientation also applied for more patents as compared with firms with lower levels of stakeholder orientation. We thus confirmed and extended previous findings (Flammer and Kacperczyk, 2016) by showing that heterogeneity in stakeholder orientation across firms and stakeholders matters in predicting quality and quantity of innovation outputs. We relied on more recent data and direct measures of stakeholder orientation to test our hypotheses and contributed to theory on the role of stakeholder relationships as a source of intangible assets to build competitiveness (Perrini *et al.*, 2011).

Among the different stakeholder categories, we showed that employee orientation plays a major role in driving innovation output. The development of human capital by investing in quality relationships with employees is crucial to obtain and disseminate knowledge (Luk *et al.*, 2005). Being defined as the management commitment to increase loyalty and productivity by promoting work-life balance, long-term employment, competence development and favorable internal climate, employee orientation had the most significant impact on the quantity of innovation output (Janz and Prasarnphanich, 2003). Similarly, results confirm the notion that development of an orientation aimed at integrating suppliers' interests facilitates knowledge transfer and fosters coordination among partners, resulting in increased innovative outputs for the focal firm. Additionally, innovation resulted to be driven by an orientation towards the natural environment through the implementation of environmental management practices. The more firms act proactively towards environmental management the greater the possibilities to generate social consensus and accumulate trust and reputation, while opening new markets in response to the growing interest in green public and private purchasing and the need to avoid costly litigations and fines.

Our results also supported emerging theory on the need to move beyond the amount of innovation output to deeply understand the impact of stakeholder orientation. Not all innovations are the same and stakeholders could be attracted by or support specific types of innovation rather than other (Conti and Novelli, 2022). We found that stakeholder

relationships can be a source for more radical and original innovations. The more firms orient their decision making towards the integration of stakeholder interests the higher the chances to avoid competence traps and learning inertia. Similar to the findings according to which firms exposed to novel technologies increase the radicalness of the output (Ahuja and Morris Lampert, 2001), a higher stakeholder orientation can uncover new knowledge streams and stimuli that are absorbed into the innovation process. Our study supports the importance for manager to think outside-in, that is, understanding stakeholder perspectives to discover new opportunities. Firms with higher degrees of stakeholder orientations were also those able to generate technologies relying on distant technological fields and diversified knowledge trajectories. Therefore, we argued that being more open to a heterogeneous set of perceptions is conducive to higher innovation potential. Contrary to what hypothesized, a negative relationship was found between stakeholder orientation and generality of the innovation output. While higher levels of stakeholder orientation help firms to include new and diversified perspective into the innovation process, these turns into innovations that have limited applications. Indeed, it seems that stakeholders favor relationship-specific investments. Yet, forward citations increase with a higher stakeholder orientation although in narrower technological fields.

Our findings have important implications for practice, suggesting the importance to develop appropriate strategies for communicating with stakeholders and integrating their needs to remain innovative and renew firms' competitive advantage. It is by listening to stakeholders and understanding their needs that firms can come up with new ways of satisfying them (Harrison *et al.*, 2010). Stakeholder orientation is an important source of legitimacy and reputation, but can also stimulate the quantity and quality of technological trajectories (Jiang *et al.*, 2019). Although some stakeholders have a stronger impact of innovation than other, our study confirms the importance of developing a corporate-level attitude towards stakeholders, a relational attitude towards the entire set of interests to which firms are espoused.

In order to gain these benefits, our findings points out to the importance of creating organizational structures and processes designed to support the flow of relevant information between firms and stakeholders, at the same time integrating this knowledge into corporate development processes (Markovic and Bagherzadeh, 2018). Multiple communication channels provide an opportunity to get access to diverse expertise and improve the firm's stakeholder dialogue capabilities (Ayuso *et al.*, 2006). Having these mechanisms in place, firms can develop collaborative approaches to research and development, as well as increase stakeholder awareness of their role in the innovation process. Involving external and internal stakeholders with different perspectives and diverse knowledge bases has the potential to increase a firm's capabilities to absorb new sources of innovation but also foster creativity, even when the output of the innovation activity has a narrower application.

By involving stakeholders, firms can bring in new ideas and overcome restraints. Yet, this is not an easy task as firms need to transform their

internal processes to accomplish this task being aware that stakeholder demands can be unbalanced or misaligned. Aligning internal and external groups to innovate is challenging, can lead to inertia if too complex to be managed, or internal conflict. Thus, our results open new opportunities for research in the direction of investigating the innovation impact of balanced versus unbalanced stakeholder orientations (Hawn and Ioannou, 2016). Additionally, we focused on patenting activity as a measure of innovation performance being aware of the limits and the existence of alternative indicators. Future studies could further contribute to understanding how stakeholder orientation unlock innovation potential by investigating its impact at different stages of the innovation process and with reference to different innovation outputs. Additionally, researchers, relying on primary data, might shed further light on the involvement of stakeholders in the innovation process, providing additional insights on the quality of innovation generated by stakeholder oriented firms. Finally, we theorized about the existence of a positive relationship between the degree of stakeholder orientation and innovation. Yet, preliminary evidence shows that stakeholders can affect the quality of innovation or represents sources of inertia when their requests are too complex of the organizational structure of the firm is not appropriately equipped. Future studies could dig deeper on this point and uncover the managerial, organizational, or institutional contingencies behind the downside of stakeholder orientation.

References

AADAMS R., JEANRENAUD S., BESSANT J., DENYER D., OVERY P. (2016), "Sustainability-Oriented Innovation: A Systematic Review", *International Journal of Management Reviews*, vol. 18, n. 2, pp. 180-205.

AHN S.Y., PARK D.J. (2018), "Corporate Social Responsibility and Corporate Longevity: The Mediating Role of Social Capital and Moral Legitimacy in Korea", *Journal of Business Ethics*, vol. 150, n. 1, pp. 117-134.

AHUJA G., MORRIS LAMPERT C. (2001), "Entrepreneurship in the Large Corporation: A Longitudinal Study of How Established Firms Create Breakthrough Inventions", *Strategic Management Journal*, vol. 22, n. 6-7, pp. 521-543.

ALCACER J., GITTELMAN M. (2006), "Patent Citations as a Measure of Knowledge Flows: The Influence of Examiner Citations", *The Review of Economics and Statistics*, vol. 88, n. 4, pp. 774-779.

ARAGÓN-CORREA J.A., SHARMA S. (2003), "A Contingent Resource-Based View of Proactive Corporate Environmental Strategy", *Academy of Management Review*, vol. 28, n. 1, pp. 71-88.

ASCHEHOUG S.H., BOKS C., STØREN S. (2012), "Environmental Information from Stakeholders Supporting Product Development", *Journal of Cleaner Production*, vol. 31, n. 1, pp. 1-13.

AYUSO S., RODRÍGUEZ M.Á., RICART J.E. (2006), "Using Stakeholder Dialogue as a Source for New Ideas: A Dynamic Capability Underlying Sustainable Innovation", *Corporate Governance: The International Journal of Business in Society*, vol. 6, n. 4, pp. 475-490.

AZOULAY P., GRAFF ZIVIN J.S., MANSO G. (2011), "Incentives and Creativity: Evidence from the Academic Life Sciences", *The RAND Journal of Economics*, vol. 42, n. 3, pp. 527-554.

BARNEY J.B., HARRISON J.S. (2020), *Stakeholder Theory at the Crossroads,* vol. 59, n. Issue, pp. 203-212, SAGE Publications Sage CA: Los Angeles, CA.

BENASSI M., GRINZA E., RENTOCCHINI F., RONDI L. (2022), "Patenting in 4ir Technologies and Firm Performance", *Industrial and Corporate Change*, vol. 31, n. 1, pp. 112-136.

BETTINAZZI E.L., FELDMAN E.R. (2020), "Stakeholder Orientation and Divestiture Activity", *Academy of Management Journal*, vol. 64, n. 4, pp 1078-1096.

BETTINAZZI E.L.M., ZOLLO M. (2017), "Stakeholder Orientation and Acquisition Performance", *Strategic Management Journal*, vol. 38, n. 12, pp. 2465-2485.

BOAVENTURA J.M.G., BOSSE D.A., DE MASCENA K.M.C., SARTURI G. (2020), "Value Distribution to Stakeholders: The Influence of Stakeholder Power and Strategic Importance in Public Firms", *Long Range Planning*, vol. 53, n. 2, pp. 101883.

BOWEN F., NEWENHAM-KAHINDI A., HERREMANS I. (2010), "When Suits Meet Roots: The Antecedents and Consequences of Community Engagement Strategy", *Journal of Business Ethics*, vol. 95, n. 2, pp. 297-318.

BRUNNERMEIER S.B., COHEN M.A. (2003), "Determinants of Environmental Innovation in Us Manufacturing Industries", *Journal of Environmental Economics and Management*, vol. 45, n. 2, pp. 278-293.

CHENG C.C. (2020), "Sustainability Orientation, Green Supplier Involvement, and Green Innovation Performance: Evidence from Diversifying Green Entrants", *Journal of Business Ethics*, vol. 161, n. 2, pp. 393-414.

CLARKSON M.E. (1995), "A Stakeholder Framework for Analyzing and Evaluating Corporate Social Performance", *Academy of Management Review*, vol. 20, n. 1, pp. 92-117.

CLAUSEN J., FICHTER K. (2019), "The Diffusion of Environmental Product and Service Innovations: Driving and Inhibiting Factors", E*nvironmental Innovation and Societal Transitions*, vol. 31, n. 1, pp. 64-95.

CONTI R., NOVELLI E. (2022), "Not All Technologies Are Created Equal for Stakeholders: Constituency Statutes, Firm Stakeholder Orientation and Investments in Technology Generality", *Research Policy*, vol. 51, n. 3, pp. 104470.

DANSO A., ADOMAKO S., LARTEY T., AMANKWAH-AMOAH J., OWUSU-YIRENKYI D. (2020), "Stakeholder Integration, Environmental Sustainability Orientation and Financial Performance", *Journal of Business Research*, vol. 119, n., pp. 652-662.

ECCLES R.G., IOANNOU I., SERAFEIM G. (2014), "The Impact of Corporate Sustainability on Organizational Processes and Performance", *Management Science*, vol. 60, n. 11, pp. 2835-2857.

FLAMMER C. (2018), "Competing for Government Procurement Contracts: The Role of Corporate Social Responsibility", *Strategic Management Journal*, vol. 39, n. 5, pp. 1299-1324.

FLAMMER C., KACPERCZYK A. (2016), "The Impact of Stakeholder Orientation on Innovation: Evidence from a Natural Experiment", *Management Science*, vol. 62, n. 7, pp. 1982-2001.

GARCÍA-SÁNCHEZ E., GARCÍA-MORALES V.J., MARTÍN-ROJAS R. (2018), "Analysis of the Influence of the Environment, Stakeholder Integration Capability, Absorptive Capacity, and Technological Skills on Organizational Performance through Corporate Entrepreneurship", *International Entrepreneurship and Management Journal*, vol. 14, n. 2, pp. 345-377.

GIBBONS R., HENDERSON R. (2012), "Relational Contracts and Organizational Capabilities", *Organization Science*, vol. 23, n. 5, pp. 1350-1364.

GREENLEY G.E., FOXALL G.R. (1997), "Multiple Stakeholder Orientation in Uk Companies and the Implications for Company Performance", *Journal of Management Studies*, vol. 34, n. 2, pp. 259-284.

HALL J., KERR R. (2003), "Innovation Dynamics and Environmental Technologies: The Emergence of Fuel Cell Technology", *Journal of Cleaner Production*, vol. 11, n. 4, pp. 459-471.

HAMPEL C.E., TRACEY P., WEBER K. (2020), "The Art of the Pivot: How New Ventures Manage Identification Relationships with Stakeholders as They Change Direction", *Academy of Management Journal*, vol. 63, n. 2, pp. 440-471.

HARRISON J.S., BOSSE D.A., PHILLIPS R.A. (2010), "Managing for Stakeholders, Stakeholder Utility Functions, and Competitive Advantage", *Strategic Management Journal*, vol. 31, n. 1, pp. 58-74.

HAWN O., IOANNOU I. (2016), "Mind the Gap: The Interplay between External and Internal Actions in the Case of Corporate Social Responsibility", *Strategic Management Journal*, vol. 37, n. 13, pp. 2569-2588.

HILLMAN A.J., KEIM G.D. (2001), "Shareholder Value, Stakeholder Management, and Social Issues: What's the Bottom Line?", *Strategic Management Journal*, vol. 22, n. 2, pp. 125-139.

HOENIG D., HENKEL J. (2015), "Quality Signals? The Role of Patents, Alliances, and Team Experience in Venture Capital Financing", *Research Policy*, vol. 44, n. 5, pp. 1049-1064.

HOSKISSON R.E., GAMBETA E., GREEN C.D., LI T.X. (2018), "Is My Firm-Specific Investment Protected? Overcoming the Stakeholder Investment Dilemma in the Resource-Based View", *Academy of Management Review*, vol. 43, n. 2, pp. 284-306.

HU A.G., JEFFERSON G.H. (2009), "A Great Wall of Patents: What Is Behind China's Recent Patent Explosion?", *Journal of Development Economics*, vol. 90, n. 1, pp. 57-68.

IOANNOU I., LI S.X., SERAFEIM G. (2016), "The Effect of Target Difficulty on Target Completion: The Case of Reducing Carbon Emissions", T*he Accounting Review*, vol. 91, n. 5, pp. 1467-1492.

JAIN T., AGUILERA R.V., JAMALI D. (2017), "Corporate Stakeholder Orientation in an Emerging Country Context: A Longitudinal Cross Industry Analysis", *Journal of Business Ethics*, vol. 143, n. 4, pp. 701-719.

JANZ B.D., PRASARNPHANICH P. (2003), "Understanding the Antecedents of Effective Knowledge Management: The Importance of a Knowledge-Centered Culture", *Decision Sciences*, vol. 34, n. 2, pp. 351-384.

JAY POLONSKY M., OTTMAN J. (1998), "Stakeholders' Contribution to the Green New Product Development Process", *Journal of Marketing Management*, vol. 14, n. 6, pp. 533-557.

JIANG W., WANG A.X., ZHOU K.Z., ZHANG C. (2019), "Stakeholder Relationship Capability and Firm Innovation: A Contingent Analysis", *Journal of Business Ethics*, vol.167, n.1, pp. 111-125.

JONES T.M., HARRISON J.S., FELPS W. (2018), "How Applying Instrumental Stakeholder Theory Can Provide Sustainable Competitive Advantage", *Academy of Management Review*, vol. 43, n. 3, pp. 371-391.

KETATA I., SOFKA W., GRIMPE C. (2015), "The Role of Internal Capabilities and Firms' Environment for Sustainable Innovation: Evidence for Germany", *R&D Management*, vol. 45, n. 1, pp. 60-75.

KLEVORICK A.K., LEVIN R.C., NELSON R.R., WINTER S.G. (1995), "On the Sources and Significance of Interindustry Differences in Technological Opportunities", *Research Policy*, vol. 24, n. 2, pp. 185-205.

LI J., XIA J., ZAJAC E.J. (2018), "On the Duality of Political and Economic Stakeholder Influence on Firm Innovation Performance: Theory and Evidence from Chinese Firms", *Strategic Management Journal*, vol. 39, n. 1, pp. 193-216.

LIU Z., LI J., ZHU H., CAI Z., WANG L. (2014), "Chinese Firms' Sustainable Development-the Role of Future Orientation, Environmental Commitment, and Employee Training", *Asia Pacific Journal of Management,* vol. 31, n. 1, pp. 195-213.

LUK C.L., YAU O.H., TSE A.C., SIN L.Y., CHOW R.P. (2005), "Stakeholder Orientation and Business Performance: The Case of Service Companies in China", *Journal of International Marketing*, vol. 13, n. 1, pp. 89-110.

MARKOVIC S., BAGHERZADEH M. (2018), "How Does Breadth of External Stakeholder Co-Creation Influence Innovation Performance? Analyzing the Mediating Roles of Knowledge Sharing and Product Innovation", *Journal of Business Research*, vol. 88, n.1, pp. 173-186.

MCGAHAN A.M., SILVERMAN B.S. (2001), "How Does Innovative Activity Change as Industries Mature?", *International Journal of Industrial Organization*, vol. 19, n. 7, pp. 1141-1160.

MINOJA M., ZOLLO M., CODA V. (2010), "Stakeholder Cohesion, Innovation, and Competitive Advantage", *Corporate Governance: The International Journal of Business in Society*, vol. 10, n. 4, pp. 395-405.

NIESTEN E., JOLINK A. (2020), "Motivations for Environmental Alliances: Generating and Internalizing Environmental and Knowledge Value", *International Journal of Management Reviews*, vol. 22, n. 4, pp. 356-377.

PEDERSEN E.R.G., LÜDEKE-FREUND F., HENRIQUES I., SEITANIDI M.M. (2021), "Toward Collaborative Cross-Sector Business Models for Sustainability", *Business and Society*, vol. 60, n. 5, pp. 1039-1058.

PERRINI F., RUSSO A., TENCATI A., VURRO C. (2011), "Deconstructing the Relationship between Social and Financial Performance", *Journal of Business Ethics*, vol. 102, n. 1, pp. 59-76.

PILKINGTON A. (2004), "Inventive Concentration in the Production of Green Technology: A Comparative Analysis of Fuel Cell Patents", *Science and Public Policy*, vol. 31, n. 1, pp. 15-25.

PINKSE J., KOLK A. (2010), "Challenges and Trade-Offs in Corporate Innovation for Climate Change", *Business Strategy and the Environment*, vol. 19, n. 4, pp. 261-272.

PORTER M.E., VAN DER LINDE C. (1995), "Green and Competitive: Ending the Stalemate", *Harvard Business Review*, vol. 73, n. 15, pp. 120-134.

ROMITO S., RUSSO A., VURRO C. (2021), "The Impact of Sustainability Orientation on Firm Propensity to Ally", *Sinergie Italian Journal of Management,* vol. 39, n. 2, pp. 37-56.

RUSSO A., VASTOLA V., VURRO C. (2018), "To Be or Not to Be Sustainable? Solving the Dilemma During the Acquisition Process", *Sinergie Italian Journal of Management,* vol. 36, n. 106 pp. 127-140.

SCHIEDERIG T., TIETZE F., HERSTATT C. (2012), "Green Innovation in Technology and Innovation Management-an Exploratory Literature Review", *R&D Management*, vol. 42, n. 2, pp. 180-192.

SHARMA S., PRAKASH G., KUMAR A., MUSSADA E.K., ANTONY J., LUTHRA S. (2021), "Analysing the Relationship of Adaption of Green Culture, Innovation, Green Performance for Achieving Sustainability: Mediating Role of Employee Commitment", *Journal of Cleaner Production*, vol. 303, n.1, pp. 127039.

SHIN S., LEE J., BANSAL P. (2021), "From a Shareholder to Stakeholder Orientation: Evidence from the Analyses of Ceo Dismissal in Large Us Firms", *Strategic Management Journal*, in press, pp 1-25.

SLAWINSKI N., PINKSE J., BUSCH T., BANERJEE S.B. (2017), "The Role of Short-Termism and Uncertainty Avoidance in Organizational Inaction on Climate Change: A Multi-Level Framework", *Business and Society*, vol. 56, n. 2, pp. 253-282.

SPITZECK H., HANSEN E.G. (2010), "Stakeholder Governance: How Stakeholders Influence Corporate Decision Making", *Corporate Governance: The International Journal of Business in Society*, vol. 10, n. 4, pp. 378-391.

SQUICCIARINI M., DERNIS H., CRISCUOLO C. (2013), "Measuring Patent Quality: Indicators of Technological and Economic Value", *OECD Science, Technology and Industry Working Papers,* vol. 03, n. OECD Publishing, pp. 1-69

TONG L., WANG H., XIA J. (2019), "Stakeholder Preservation or Appropriation? The Influence of Target Csr on Market Reactions to Acquisition Announcements", *Academy of Management Journal*, vol. 63, n. 1, pp. 1535-1560

TORRES-REYNA O. (2007), "Panel Data Analysis Fixed and Random Effects Using Stata (V. 4.2)", *Data & Statistical Services*, Priceton University, vol. 112, n. 1, pp. 1-40.

TRAJTENBERG M. (1990), "A Penny for Your Quotes: Patent Citations and the Value of Innovations", *The RAND Journal of Economics*, vol. 21, n. 1, pp. 172-187.

TRAJTENBERG M., HENDERSON R., JAFFE A. (1997), "University Versus Corporate Patents: A Window on the Basicness of Invention", E*conomics of Innovation and New Technology*, vol. 5, n. 1, pp. 19-50.

VALENTINI G. (2012), "Measuring the Effect of M&a on Patenting Quantity and Quality", *Strategic Management Journal*, vol. 33, n. 3, pp. 336-346.

VAN TULDER R., SEITANIDI M.M., CRANE A., BRAMMER S. (2016), "Enhancing the Impact of Cross-Sector Partnerships", *Journal of Business Ethics*, vol. 135, n. 1, pp. 1-17.

VURRO C., ROMITO S., BENASSI M. (2021), "Too Good to Say Goodbye? Effect of Stakeholder Orientation on the Survival of Large Firms", *Long Range Planning*, in press, pp 1-14..

VURRO C., RUSSO A., PERRINI F. (2009), "Shaping Sustainable Value Chains: Network Determinants of Supply Chain Governance Models", *Journal of Business Ethics*, vol. 90, n. Supplement 4, pp. 607-621.

YANG D., WANG A.X., ZHOU K.Z., JIANG W. (2019), "Environmental Strategy, Institutional Force, and Innovation Capability: A Managerial Cognition Perspective", *Journal of Business Ethics*, vol. 159, n. 4, pp. 1147-1161

Academic or professional positions and contacts

Stefano Romito
Assistant Professor of Management
University of Milan - Italy
e-mail: stefano.romito@unimi.it

Clodia Vurro
Associate Professor of Management
University of Milan - Italy
e-mail: clodia.vurro@unimi.it

Mario Benassi
Full Professor of Management
University of Milan - Italy
e-mail: mario.benassi@unimi.it

sinergie
italian journal of management

ISSN print 0393-5108
ISSN online 2785-549X
DOI 10.7433/s121.2023.09
pp. 177-199