



RESEARCH ARTICLE

Firm innovation as a business strategy of CEO power: Does national culture matter?

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Abstract

The influence of *chief executive officer* (CEO) power on innovation has only briefly been the subject of study thus far creating a need for further exploration. The purpose of this research is to provide more evidence of the impact of CEO power on innovation as a business strategy. We also address the moderating effect that national culture has on the relationship between CEO power and innovation. The Thomson Reuters database provided the data for this research. The cohort of firms represents different countries, specifically, a sample of firms from 37 countries. To estimate the model, we used the generalised method of moments (GMM) procedure, an estimator that allows the researcher to control for unobservable heterogeneity and endogeneity. GMM also attenuates estimation bias. Our findings reveal that CEO power has a positive effect on innovation. In turn, the dimensions of national culture used here do not have the same moderating effect on the relationship between CEO power and innovation. Power distance and uncertainty avoidance negatively moderate the positive association between CEO power and innovation; individualism and indulgence reinforce the positive effect of CEO power on innovation; masculinity and long-term orientation do not affect the relationship.

KEYWORDS

CEO power, innovation, national culture

1 | INTRODUCTION

A Chief executive officer's (CEO's) position may inform his/her power as one of the firm's most powerful posts. The position's importance is due to the fact that CEOs must marshal their firm to generate wealth and maximise future stakeholder opportunities. Thus, their responsibility may focus on value creation for shareholders, and at the same time, they might also create value for the workforce and the society in which the organisation operates.

According to Crossland et al. (2014), CEOs consider themselves of utmost significance for making decisions that affect a firm's long-term value, besides their involvement in the planning tasks for their firm's strategic innovation decisions (Berger et al., 2016). Scholars, such as Boyd (1994), see powerful CEOs in a position to deal quickly with changes arising in the market and to make timely decisions while creating value and undertaking innovations. In short, a CEO's power may benefit the firm (Sah & Stiglitz, 1986).

Previous studies examine the effect that CEO power has on firm performance and market value, and this research analyses its impact on innovation, of extreme importance because innovation is vital for a firm's long-term profitability, even its very survival (Aghion

Abbreviations: CEO, Chief executive officer; GMM, Generalised method of moments; R&D, Research and development; TRBC, Thomson Reuters business classification.

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et al., 2013). Furthermore, a firm relies on innovation to develop fresh ideas for obtaining new products and technologies, to raise the organisation's performance and prompt its growth. In fact, firms make major decisions with an eye on innovation issues (Lorca & de Andrés, 2019; Sattayaraksa & Boon-itt, 2018).

Therefore, the aim here is to provide more evidence of the role that CEO power plays in innovation, using a sample of international firms. In addition, we also analyse the moderating role of national culture on the association between CEO power and innovation, an effect not previously studied. Accordingly, as such scholars as Su (2006), Tsakumis (2007) and Richardson and Boyd (2005) report, national culture is important in business decision-making and may have an impact on organisational structure, directors' approach and firm performance. Management organisation theory is highly pertinent to analysing the relationship between powerful CEOs and firm innovation, explaining the effect that powerful CEOs have on innovation in their firm. We also consider institutional theory in analysing the moderating effect of national culture on the relationship between CEO power and firm innovation.

The results show that CEO power positively affects innovation. In turn, the dimensions of national culture used here do not have the same moderating effect on the relationship between CEO power and innovation. Power distance and uncertainty avoidance negatively moderate the positive association between CEO power and innovation, and individualism and indulgence reinforce the positive effect of CEO power on innovation, while masculinity and long-term orientation do not impact the relationship.

This research makes the following contributions. First, it extends the state-of-the-art on how CEO power affects business innovation, using a sample of firms spanning 37 countries. This meant extending the sample to several more countries than prior studies that focused on a single area or a specific country, such as the United States or Taiwan; we provide evidence for a larger cohort of firms operating in different countries. Second, regarding the theories we used, we based our analysis on management organisation theory and, at the same time, used institutional theory to study the moderating effect that national culture has on the relationship. Third, this research also helps to investigate a national culture's moderating effect on the relationship between CEO power and innovation, not previously addressed. Accordingly, some of our predictions regarding a national culture's moderating effect on the relationship between CEO power and firm innovation are unfulfilled. Specifically, we predicted that power distance would positively moderate the effect of CEO power on innovation, yet the result reveals a negative relationship. We also expected the dimension of masculinity to positively moderate the effect of CEO power on innovation, yet we found no impact. This means that while powerful CEOs are not concerned about undertaking innovative activities in masculine societies, which has no significant impact on the relationship between CEO power and innovation activities, they will avoid innovative activities in power distance societies. These findings contradict the theoretical arguments prompted by institutional theory for the cultural dimensions of power distance

and masculinity. Finally, a further contribution stems from CEO power's positive impact on innovation. According to management organisational theory, powerful CEOs may significantly impact decision-making because boards have less power to rein them in, enabling them to proceed independently with their own interests, such as innovation activities.

The paper is arranged into the following sections. Section 2 describes the theoretical framework for the relationship between CEO power and innovation. Section 3 formulates the various working hypotheses, analysing the relationship between CEO power and innovation, with national culture as a moderating variable. Section 4 describes the sample, methodology and variables. Section 5 presents an analysis of the results. Finally, section 6 covers our conclusions and the implications of our findings.

2 | THEORETICAL FRAMEWORK

Such scholars as Fiegenger et al. (2000) consider CEO power the ability to determine board composition and influence business decisions. Along these lines, Dalton and Kesner (1987) indicate that a powerful CEO may affect board decisions, ultimately diminishing the board's very efficacy (Boyd, 1994). The reason is that powerful CEOs can influence board decisions and occupy a unique position of power over a firm's operations and results, which, in turn, determine a firm's probability of success (Haynes & Hillman, 2010; Pathan, 2009). Furthermore, Finkelstein and D'Aveni (1994) consider powerful CEOs able to dominate the strategic agenda at board meetings, reduce the potential for conflicts and take command of firms, thereby leading to faster strategic responses (Combs et al., 2007).

CEOs have a broad scope of discretion in their strategic decisions and their subsequent decision-making, based on their power. Power is defined here as 'the capacity of individual actors to exert their will' as a means of achieving their goals (Finkelstein, 1992, p. 506). This may be because CEOs often have power over members of the board, thanks to structural and socio-psychological mechanisms with a significant influence on decision-making processes at the board level (Van Essen et al., 2015). This CEO power may arise from numerous sources (Jackling & Johl, 2009), such as CEO duality or family CEO status.

A firm uses innovation in its quest to improve existing products or discover new ones. Without innovation, firms would have to depend on strategic alliances, mergers and acquisitions or other arrangements to keep up with their competitors. Baregheh et al. (2009) suggest that innovation is designed to generate new ideas through a multistage process, aiming to transform ideas into new products or processes. Rujirawanich et al. (2011) argue that innovation is important because it enables firms to develop ideas and convert them into new products or services, technologies, plans and programmes, to raise the organisation's performance and expand its growth. Therefore, firms rely on innovation to create new technology or improve one already in place, constituting an essential part of

today's business world (Hoholm & Strønen, 2011; Mohnen & Hall, 2013). Indeed, firms consider issues of innovation in making their major decisions (Lorca & de Andrés, 2019).

Similarly, Conner (1991) reasons that innovation is of the utmost significance for helping firms to be strategically competitive and produce more valuable and differentiated products. Crossan and Apaydin (2010) also consider innovation pertinent for firms as a strategic tool for strengthening their competitive position. According to Damanpour and Aravind (2011), innovation is a multifaceted construct encompassing generation, development and implementation of an idea or behaviour new to the adopting organisation. During the innovation process, ideas are transformed into new products or services, new process technologies, new organisational structures or new managerial approaches (Damanpour & Aravind, 2011). Innovation activities have been recognised as the most essential tasks for a firm to stay competitive and profitable. A firm's innovation relies largely on its stock of knowledge that is accumulated through knowledge flows embedded in various activities within the firm (Vithessonthi & Racela, 2016).

To measure innovation, Raymond and St-Pierre (2010) propose investment in R&D as one of the most frequently indicators of technological innovation used. This is hardly surprising because the term innovation is 'predominantly linked to the research and development (R&D) associated with creating new products' (Armbruster et al., 2008, p. 644). According to Lorca and de Andrés (2019), R&D is related to obtaining new knowledge applicable to the company's business needs, which eventually will result in new or improved products, processes, systems or services that can increase the company's sales and profits.

Regarding the relationship between CEO power and innovation, several studies, such as those by Hambrick (2007) and Tang et al. (2011), find that a CEO's attributes underpin strategic investments, changes in organisational structure and cultural values. This means that CEO power—the CEO's ability to influence other stakeholders (Finkelstein, 1992)—determines how firms respond to the evaluation of results achievement, explaining the extent to which problem-solving manifests in decisions relating to the search for innovation. We stress that power provides CEOs with opportunities and also involves responsibilities (Williams, 2014).

This explanation of the relationship between CEO power and innovation is based on management organisation theory, which argues that powerful CEOs are more confident about performing difficult tasks (Griffin & Tversky, 1992). This is because firms give these CEOs enough breathing space to follow their own criteria when making major investment and financing decisions (Malmendier & Tate, 2008). Thus, such scholars as Hirshleifer et al. (2012) posit one explanation for this approach as overconfidence that may benefit shareholders by increasing investment in risky projects. Therefore, these scholars expect powerful CEOs to be particularly receptive to ventures that are risky, challenging and sensitive to talent, with a different viewpoint that enables them to invest more in innovative projects and achieve greater innovation, suggesting a positive relationship between CEO power and innovation.

3 | RESEARCH HYPOTHESES

3.1 | CEO power as a determinant of innovation

A paucity of empirical studies exists on the effect that CEO power has on innovation in firms. Chen (2014) conducted one of the few and considers that when powerful CEOs are in office, directors devote more efforts to providing valuable strategic advice and resources, thereby supporting investment in research and development (R&D) to improve a firm's innovation performance. Chen's study focuses on 271 firms in the electronics sector, listed on the Taiwan stock exchange. The results reveal that a board of directors is more likely to support innovation projects in the presence of a powerful CEO.

Sariol and Abebe (2017) conducted their research on US corporations, considering the importance of the role of CEO power in organisational innovation, given that CEOs occupy a core structural position in the firm's upper echelons. This enables CEOs to play a key part in strategic decisions, and the board expects them to adopt an active and aggressive approach to strategy formulation, as the main architects of the firm's innovation agenda. These scholars use a sample of firms from the Fortune 500 and Standard and Poor 500 indices, specifically 150 US corporations. The results reveal a significant and positive relationship between CEO power and explorative organisational innovation.

Other scholars, such as Galasso and Simcoe (2010) and Hirshleifer et al. (2012), also analyse the effect of CEO power on firm innovation. The first finds a positive relationship between powerful CEOs and patents. The second group of scholars also finds that powerful CEOs obtain more patents and citations for a given level of R&D expenditure. These two studies find that firms with powerful CEOs innovate more successfully, as the number of both patents and patent citations shows. Greater innovation success remains after controlling for possible increases in R&D expenditure. Both Galasso and Simcoe (2010) and Hirshleifer et al. (2012) argue that the innovation results that powerful CEOs achieve could explain the enigma of why so many companies seek to hire this type of CEO.

Sheikh (2018) also conducted a study using the NBER, ExecuComp, Compustat and ISS databases for building a sample of firms, finding that CEO power is positively linked to innovation. The empirical evidence shows that powerful CEOs outperform others in recording more patents and citations. Nevertheless, competition for products on the market boosts the positive relationship between CEO power and innovation in a firm, as this power has a positive and significant effect on innovation in competitive markets.

In the context of the arguments above and management organisation theory, we assert that powerful CEOs are more confident about their performance of difficult tasks (Griffin & Tversky, 1992) and, therefore, tend to invest more in innovative projects and introduce more and better innovations. Powerful CEOs have access to valuable resources and are usually more optimistic about their success (Finkelstein, 1992; Gupta et al., 2016). This means they are likely to be more confident about problem-solving, have broader perspectives and intensify the search for an innovative process, with better results

(Blagoeva et al., 2020). This line of reasoning suggests a positive relationship between CEO power and innovation. Therefore, we formulate the following hypothesis:

Hypothesis 1. (H1): There is a positive association between CEO power and innovation.

3.2 | National culture as a moderating variable

A culture may be of strong relevance to strategic decisions in organisations and evaluation of their results. In fact, institutional theory propounds the notion that cultural aspects influence organisations (Scott, 2008) that are not detached from their environment but interact with it through their workforce, customers and suppliers. As for the meaning of culture, scholars Parboteeah and Cullen (2003, p. 138) state that 'Culture represents the historically determined set of implicit and explicit abstract notions and beliefs (i.e., what is good, right, and desirable) shared by a group of individuals who have undergone a common historical experience'. Su (2006), Tsakumis (2007) and Richardson and Boyd (2005) contend that national culture is important in business decision-making and may influence organisational structure, directors' behaviour and firm performance.

The dimensions proposed in Hofstede (2001), Hofstede and Hofstede (2005) and Hofstede et al. (2010) tend to function as measures of a culture's impact. They provide a theoretical framework for analysing a national culture, extremely useful for a clearer view of how individuals can better understand the nature of an organisation, the coordination of the different activities within it and the relationships among its members (Hoecklin, 1996).

Hofstede (2001) based his study on a sample of IBM employees who had to answer a series of questions on such matters as workplace conditions, health and safety, free time, their skills and capabilities and the opportunities they were given to learn. The initial cohort consisted of 40 countries, although this figure increased to 76 in subsequent years. Much of the prior research in different knowledge areas, such as economics, sociology, corporate responsibility or administration, applied Hofstede's cultural model (the initial classification outlined by Hofstede encompasses power distance, individualism, masculinity and uncertainty avoidance) (Baskerville, 2003); it is applied in this research to analyse its moderating effect between CEO power and innovation and rarely analysed in prior studies. The inclusion of only four dimensions is due to the fact that they describe characteristics of different nations, most of which could be identified as socio-economic in origin. Additionally, many socio-economic data may reflect the social organisation mechanisms, strengths and opportunism of different nations, which may be epiphenomenal to historical origins (Baskerville, 2003).

In addition, the choice of Hofstede's (Hofstede, 1980) national culture model over others such as the GLOBE or the Schwartz models is due to three factors. First, the Hofstede data allow us to include a larger sample of countries than other data sets. Second, the number of dimensions originally used by Hofstede (1980) is smaller compared

with Schwartz (1994). GLOBE has nine dimensions, but high intercorrelations between them have been reported, and therefore, multicollinearity problems may arise when all are used in the same model (Laskovaia et al., 2017). Third, many researchers have replicated the Hofstede dimensions, and the replicates show no loss of validity, indicating that the cultural differences that their dimensions describe are basic and enduring.

Power distance is one of the cultural dimensions that Hofstede (2001) establishes. Organisations in countries with great power distance often feature centralised decision-making structures, authority and the use of formal rules. Accordingly, Hofstede (2001) finds that societies with a power distance culture lack communication between people on different hierarchical levels. This finding confirms what other scholars, such as Shane (1993), have noted about information sharing between supervisors and reports in vertical societies, namely, a lack of communication between individuals on different levels. Furthermore, Shane (1993) also suggests that CEOs are reluctant to accept changes in the distribution of power, which might compromise their freedom to undertake innovation activities.

Hofstede (2001) also finds that CEOs in organisations in a power distance culture are unwilling to accept changes in power sharing. Other scholars, such as Salzmann and Soypak (2017) and Urban (2019), find that power distance boosts CEO power, increasing the scope for major shareholders to gain private benefits. This means that powerful CEOs will acquire even more power and choose the decisions to make, including innovation decisions. Oishi et al. (1999, p. 609) share the same view: 'CEOs in high power distance society can enjoy having more power and they could choose to "wait out" more so as they wish, since followers tend to follow superiors and expect them to give order'.

She et al. (2020), using a sample of Chinese firms, find that CEOs with higher power distance are more willing to accept investment in innovation and to obtain more patents. By contrast, CEOs with lower power distance tend to be less ready to invest in innovation. In the same vein, Hirshleifer et al. (2012) carry out a study based on a US sample obtained from different databases: Execucomp, Compustat, CRSP and the NBER patent database. These authors reveal that CEOs with high power distance have greater return volatility and achieve greater innovative success for given research and development expenditures.

In light of these arguments, we predict that great power distance improves the relationship between the powerful CEO and strategic innovation decision-making. If power distance increases, powerful CEOs will support innovation decisions. We expect that powerful CEOs operating in power distance cultures would have greater power, due to a lack of communication among individuals from different hierarchical levels and managers' unwillingness to accept changes in the distribution of power. This will lead to performing more innovation activities. We therefore formulate our next hypothesis as follows:

Hypothesis 2. (H2): Power distance reinforces the positive relationship between CEO power and innovation.

Individualistic cultures prioritise personal interests over collectivist ones. In an individualistic culture, people are more prone to make decisions independently, in search of their own goals and achievements (Gallego-Álvarez & Pucheta-Martínez, 2021). Therefore, we assume that an individualistic culture encourages risk-taking and rewards enterprising behaviour (Allred & Swan, 2004). Moreover, according to Erez and Nouri (2010) and Desmarchelier and Fang (2016), individuals in this type of culture have a greater tendency to generate original and creative ideas and promote innovation.

Allred and Swan (2004) contend that the more freedom an individual has to explore and express opinions, the greater the likelihood of this leading to new ideas, in line with greater creativity and, therefore, greater innovation. Li et al. (2013) claim that since managers in individualistic societies tend to be too optimistic, they underestimate uncertainty and become involved in risky projects.

Hofstede (2001) finds that workers in individualistic societies are freer to develop new products than their counterparts in collectivist societies, and the former grant more patents than the latter. Furthermore, other studies, such as Lynn and Gelb's (Lynn & Gelb, 1996), find a positive relationship between individualism and innovation. Shane (1993) also found a positive relationship between patents, national levels of innovation and individualism. Similarly, Jones and Teegen (2001) report that there is a positive correlation between individualism and foreign investment in R&D.

CEOs in individualistic countries tend to be overoptimistic and underestimate uncertainty, becoming involved in risky innovation projects (Breuer et al., 2014). Likewise, Galasso and Simcoe (2010) and Hirshleifer et al. (2012) claim that the presence of CEOs at the forefront of firms can facilitate corporate innovation. In individualistic societies, individual interests prevail over collective ones. This is due to the fact that people tend to have more confidence in risky and ambitious projects, and executive directors are more enthusiastic about innovative projects that can lead to corporate innovation. Hence, individualism as the type of national culture is expected to facilitate corporate innovation.

Therefore, affirming that individualism reinforces the positive relationship between CEO power and innovation seems plausible. Thus, we expect powerful CEOs in individualistic cultures to have more incentives to make risky decisions than powerful CEOs in less individualistic contexts (Chui et al., 2010). Powerful CEOs in individualistic societies will be more independent, autonomous and able to use their leadership to make decisions consistent with their individual criteria and tendencies, such as those concerning innovation activities. Although these activities are riskier than others are, the strong individualism of CEOs in individualistic cultures leads them to minimise the uncertainty and support riskier decisions, perhaps due to the CEO's overconfidence that individualistic cultures inspire. In other words, the positive relationship between CEO power and innovation is likely to be more pronounced in individualistic cultures. This leads to the next hypothesis:

Hypothesis 3. (H3): Individualism reinforces the positive relationship between CEO power and innovation.

A further dimension that Hofstede (2001) considers involves analysing the role that men play in society, referred to as masculinity. Masculine societies tend to be positive and show greater interest in firm performance and less concern for personal feelings. Societies deemed to be masculine describe men as ambitious, competitive and materialistic, paying less attention to cooperative behaviour.

Masculinity for Orij (2010) means the opposite of society's social focus. At the same time, Peng and Lin (2009) report that cultures with a high level of masculinity have always given more importance to such values as a professional career and business success. What is more, such societies give precedence to money and material things, rewarding excellence and personal achievements.

Mihet (2013) expects that high-masculinity countries will run more risks when deciding innovation policies. The typical masculine society that Hofstede describes emphasises achievements and competition, a focus on money and assets (owning, possessing and performing well) and usually siding with strong and successful winners. It might also encourage more risk-taking in innovation policies. Efrat (2014) reports that people in a masculine society are more self-assured, positive, ready to take on challenges and have a strong sense of initiative and assertiveness; thus, they are more likely to take a more innovative approach. Therefore, the higher the level of masculinity in a culture, the greater the level of innovation in new products (Rhyne et al., 2002). In the same vein, Jones and Davis (2000) claim that masculinity is associated with incremental innovation and, therefore, with R&D efforts.

CEOs in these societies in which masculinity prevails receive remuneration that is an indicator of their power. A higher degree of values related to masculine stereotypes (e.g. dominance or aggressiveness) prevalent in masculine cultures leads to greater CEO power, resulting in more innovation activities because these societies are more likely to have more sex-differentiated occupational structures. A CEO earning more in a masculine society means having more power and, therefore, supporting innovation decisions to a greater degree than a CEO who earns less and will not support those decisions that would involve accepting risk. According to Urban (2019), CEOs in countries where masculinity predominates attach greater relevance to innovation-related operations. In these countries, innovation tasks flow more easily and will have lower rejection rates by other managers of the firm, since they will adhere to the decisions made by the CEOs.

This informs our next hypothesis:

Hypothesis 4. (H4): Masculinity reinforces the positive relationship between CEO power and innovation.

According to Sully de Luque and Javidan (2004), uncertainty avoidance is the extent to which the members of a society feel threatened by uncertainty and ambiguity (p. 602). What is more, these members also strive to mitigate the uncertainty and unpredictability of future events, based on social norms, rituals and bureaucratic practices. Societies with uncertainty avoidance impose more rules and regulations on people and are less tolerant of change and innovation (De Mooij & Hofstede, 2010).

Hofstede (2001) indicates that people in cultures with high uncertainty avoidance feel more anxious and, therefore, tend to take immediate measures to reduce the level of ambiguity. One of the characteristics of members of these kinds of societies is that they generally manifest such traits as a reluctance to innovate. Furthermore, in cultures of this nature, risk aversion approaches mean that firms do not take unnecessary risks and adopt innovations solely when their market value has already been proved.

Managers in cultures with a high level of uncertainty avoidance tend to steer clear of unpredictability and ambiguity in innovation projects, calling for higher discount rates (Li & Zahra, 2012), while those in cultures with low uncertainty avoidance are comfortable with unpredictability and ambiguity (Li et al., 2013).

According to Gaspay et al. (2008), cultures with high levels of uncertainty avoidance are unwilling to take risks, which hinders the emergence of new ideas and the implementation of innovative practices. This view is also shared by Tian et al. (2018), who believe that as uncertainty avoidance grows, the positive effect of technological innovation on market share becomes weaker, and therefore, low uncertainty avoidance is beneficial for innovation. Likewise, Chen et al. (2017) consider that since innovation projects are full of uncertainty, there are high chances of failure, and they require longer planning horizons. Hence, firms located in countries with high levels of uncertainty avoidance are expected to be less innovative as compared with those located in countries with low levels of uncertainty avoidance.

Regarding CEO power and innovation, Zheng et al. (2012) postulate that uncertainty avoidance mediates the relationship between CEO power and innovation since CEOs with high uncertainty avoidance feel anxious when dealing with unpredictability. Accordingly, it is reasonable to posit uncertainty avoidance generating more incentives for CEOs to take fewer risks in innovation activities. Although CEOs with more power may make risky decisions, such as innovation activities, they may feel more risk aversion in uncertainty-avoidant societies, making their behaviour towards these activities more conservative and discouraging. These uncertainties may lead to unsuccessful innovation activities; therefore, powerful CEOs may not support these activities. Uncertainty-avoidance cultures do not seem to motivate powerful CEOs to take risks with decisions such as innovation activities since facing uncertain conditions may concern them. Based on the impact of the interaction between culture and CEO power and its effect on innovation, we propose the following hypothesis:

Hypothesis 5. (H5): Uncertainty avoidance attenuates the positive relationship between CEO power and innovation.

Another of the dimensions proposed by Hofstede refers to long-term orientation. This dimension refers to the importance that society attaches to future events and captures the degree to which a society engages in 'planning, preparing and investing for the future' (Gupta & House, 2004, 22).

Individuals who belong to societies with these characteristics have a strong propensity to save and invest, standing out for their cunning and perseverance (Hofstede et al., 2010). Authors such as Van Everdingen and Waarts (2003) show that this type of culture has values such as the adjustment of traditions to new circumstances, personal adaptability and the feeling that the most important events in life will take place in the future.

Considering that most technological developments require long-term planning and investment, the characteristics normally associated with the long-term orientation dimension should correspond to higher levels of innovation (Jones & Davis, 2000). Rujirawanich et al. (2011) find that long-term orientation is positively related to business innovations.

For Zheng et al. (2012), strategic decisions with a long-term orientation are conducive to firm innovation. These authors argue that long-term orientation plays a mediating role in the relationship between CEO power values and business innovation. According to Hambrick and Mason (1984), CEO power values contribute to CEOs' individualised constructions regarding innovation, infusing strategic decisions with a long-term orientation at the organisational level.

Thus, long-term orientation derives mainly from strategies as canals that channel the preferences and values of top managers (Finkelstein et al., 2009) and that implement vertically corporate policies (Floyd & Wooldridge, 2000). This suggests that CEO power values may not have a direct effect on business innovation but influence business innovation through the long-term orientation of companies. With this hypothesis, we try to fill an existing gap, and we will observe how CEO power affects innovation through the mediation of long-term orientation at the organisational level. By considering this hypothesis, we provide a new perspective to understand how managers are important in business innovation, thus enriching the literature on innovation. Thus, we propose the following hypothesis:

Hypothesis 6. (H6): Long-term orientation reinforces the positive relationship between CEO power and innovation.

Another of the dimensions proposed by Hofstede refers to indulgence. This is the last dimension within Hofstede's cultural framework (Hofstede et al., 2010), and it is related to the gratification of basic human desires related to the enjoyment of life. Indulgent societies are more permissive in relation to natural human desires for life's pleasures and fun, tend to appreciate more leisure, value highly freedom of expression and a large percentage of their populations say they are very happy. In this regard, as Ismail and Lu (2014, p. 45) state that 'people in indulgent societies prefer happiness and tend to create a perception of freedom, health, and control over life'.

Regarding the relationship between indulgence and innovation, there are still few studies. Griffith and Rubera (2014) analyse how indulgence affects the relationship between technology and innovation in terms of market share. Their findings show a positive effect of innovation on market share, which increases along with a greater

TABLE 1 Number of firms and observations by country.

Country	Firms	Observations	Percentage
Australia	129	803	6.3%
Austria	5	41	0.3%
Belgium	11	95	0.7%
Bermuda	2	15	0.1%
Brazil	40	246	1.9%
Canada	166	1132	8.8%
Chile	20	110	0.9%
China	50	333	2.6%
Czech Republic	1	8	0.1%
Denmark	14	112	0.9%
Egypt	4	22	0.2%
Finland	14	142	1.1%
France	66	555	4.3%
Germany	49	404	3.2%
Greece	1	7	0.1%
Hong Kong	15	128	1.0%
India	25	171	1.3%
Ireland	19	174	1.4%
Israel	3	12	0.1%
Italy	14	126	1.0%
Japan	183	1757	13.7%
Jersey	2	20	0.2%
Luxembourg	6	65	0.5%
Mexico	23	124	1.0%
Netherlands	24	216	1.7%
New Zealand	6	51	0.4%
Norway	7	70	0.5%
Papua New Guinea	1	7	0.1%
Portugal	3	29	0.2%
Russia	25	189	1.5%
South Africa	13	78	0.6%
Spain	24	186	1.5%
Sweden	31	255	2.0%
Switzerland	44	391	3.1%
Thailand	22	94	0.7%
United Kingdom	125	1147	9.0%
United States	395	3,487	27.0%
Total	1582	12,802	100%

culture of indulgence. Along the same lines, Syed and Malik (2014) show, when analysing companies in Pakistan and the United States, that cultures with high levels of indulgence tend to adopt new technologies more easily than countries with low levels and argue that indulgent societies can encourage innovation as a way to continually satisfy people's urges for fun and enjoyment in life.

Authors such as Faber and Hesen (2004) consider that countries with higher levels of indulgence tend to promote creativity within organisations, due to a greater emphasis on the need for people to take risks and the importance of being creative and innovative to achieve the success. Since countries where indulgence is prevalent support the pursuit of new ideas, they are also 'more likely to expose more people within society to a greater variety of unusual ideas', leading to 'a greater openness and acceptance of new ideas' by managers and CEOs of companies (Hoegl et al., 2012, p. 572). This should enhance the consideration of the different views of powerful CEOs on innovative issues. In this regard, powerful CEOs will have attitudes prone to making more innovative decisions in a context of indulgence. Therefore, we propose the following hypothesis:

Hypothesis 7. (H7): Indulgence reinforces the positive relationship between CEO power and innovation.

4 | EMPIRICAL DESIGN

4.1 | Data collection

We collected the data for this research from the Thomson Reuters database. Our sample is composed of international firms operating in 37 countries spread across five continents: (1) America (Bermuda, Brazil, Canada, Chile, Jersey, Mexico and the United States), (2) Europe (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Russia, Spain, Sweden, Switzerland and the United Kingdom), (3) Africa (Egypt and South Africa), (4) Asia (China, Hong Kong, India, Israel, Japan and Thailand) and (5) Oceania (Australia, New Zealand and Papua New Guinea). Table 1 shows a representation of each country, as well as the number of firms and the number of firm-year observations by country.

The initial sample is 14,876 international firm-year observations from 2009 to 2019. However, we dropped from this initial sample all financial firms and all firms with data unavailable for all the variables in this research. Therefore, the final sample comprises 12,802 international firm-year observations from 1582 firms. We removed financial entities because they prepare their financial statements according to particular accounting standards, given their specific activities; therefore, comparing nonfinancial and financial annual statements makes arriving at consistent results much more difficult.

We based the classification sectorial in this paper on the Thomson Reuters Business Classification (TRBC) economic sector classification. Table 2 provides the industries in which the firms operate. The sectors we considered were basic metals, consumer cyclicals, consumer noncyclicals, energy, healthcare, industrials, technology and telecommunications services and utilities. Table 2 also shows the number of firms operating in each sector, as well as the number of firm-year observations by sector. Additionally, Table 3 exhibits the number of firm-year observations by sector and country.

TRBC economic sector name	Firms	Number of observations	Percentage
Basic materials	223	1835	14.3%
Consumer cyclical	289	2394	18.7%
Consumer noncyclical	160	1262	9.9%
Energy	158	1303	10.2%
Healthcare	129	1001	7.8%
Industrials	328	2714	21.2%
Technology	133	1018	8.0%
Telecommunications Services	63	480	3.7%
Utilities	99	795	6.2%
Total	1582	12,802	100%

Abbreviation: TRBC, Thomson Reuters business classification.

4.2 | Measures

4.2.1 | Dependent variable

We proxy our dependent variable, innovation, with R&D intensity, denoted by R&D_I and measured as the R&D expenditures over total firm sales. Like us, Van de Wal et al. (2020) measured R&D intensity as a firm's R&D expenditure divided by the number of employees.

This measure is consistent with preceding research focused on innovation (e.g. Franzen et al., 2007; Min & Smyth, 2016; Penghua et al., 2020; Xie et al., 2019). R&D intensity is an indicator of firms' R&D spending on tasks focused on expanding product and sector knowledge, technology and manufacturing—that is, firms spend on R&D to undertake activities to innovate and introduce new services and products in the market (Bart, 1993). Innovation tasks are independent of functional activities that firms undertake, and this type of activity precedes long-term benefits rather than short-term benefits or profitability. In this regard, Diéguez-Soto et al. (2018) suggest that investment in innovation activities is crucial for firms' success and survival, as well as for realising long-term benefits and increasing corporate performance. In this regard, innovation activities are a way of capturing firms' capability of innovating and advancing technologically. Thus, when R&D intensity improves, firms show an important effort towards undertaking innovation activities, while reductions in R&D intensity will signal less effort on these tasks.

4.2.2 | Independent variables

Our independent variable is CEO power (CEO_POW). As Finkelstein (1992) suggests, no individual measure is probably to successfully capture all possible dimensions of CEO power. In this regard, this variable has to be operationalised or constructed by considering several variables; that is, CEO power is a multidimensional concept and its measurement should be a calculation that takes several sources of power into account, consistent with Veprauskaite and Adams (2013) and Saidu's (Saidu, 2019) theoretical and conceptual rationales for constructing a CEO power index. There are different ways to operationalise

TABLE 2 Number of observations by activity sector.

CEO power. This paper will include, in accordance with preceding research (e.g. Combs et al., 2007) and taking into account data restrictions, a combination of different operationalisations of CEO power. Thus, the CEO power variable consists of four different sources of CEO power—CEO duality, CEO tenure and CEO directorship proxied by the Chairman of the board is the ex-CEO and by CEO board member—which are of the most researched and best supported in extant literature (e.g. see Combs et al., 2007; Hermalin & Weisbach, 1988; Liu & Jiraporn, 2010). Thus, we construct CEO power by aggregating four dichotomous variables focused on four sources of power consistent with past research (e.g. Sheikh, 2019): (1) CEO tenure, a dichotomous variable coded as 1 if CEO tenure is above the sample median and 0 otherwise. Hermalin and Weisbach (1988) and Combs et al. (2007) argue that CEOs with length tenure tend to be more powerful because tenure will provide more autonomy in the decision-making process. CEO tenure will be also related to a better understanding and knowledge of all issues of the company and to long-term relationships with important stakeholders, which will lead to relevant sources of informal power and a higher control over all firm's stakeholders (Greve & Mitsuhashi, 2007). Therefore, CEOs with longer tenures will be more likely to be powerful; (2) the chairman of the board is the ex-CEO, a dichotomous variable coded as 1 if the chairman of the board held the company CEO position before becoming chairman and 0 otherwise. When the ex-CEO chairs the board, firms are trying to retain the former CEO in boards because, in this way, boards are likely to benefit from the advice, experience, knowledge and external connections of the ex-CEO. Moreover, it is also probably that the chairperson (the former CEO) has to address the impact of (bad) decisions primarily made by her/him (Fernandes et al., 2021). In this regard, if the former CEO is the board's chairperson, it may incentive his/her supervisory role regarding managers and board members. Therefore, the chairperson will have the same control and power as the CEO and will be able to align board's members and chairperson opinions; (3) CEO duality, a dichotomous variable coded as 1 if the same person serves simultaneously as board chairman and CEO and 0 otherwise. According to previous research (Gul & Leung, 2004), CEOs being also chairs provokes a strong power base, and it can decrease the board's capacity to exercise effective control.

TABLE 3 Number of observations by country and sector.

Country	Sector										Total
	Basic materials	Consumer cyclicals	Consumer noncyclicals	Energy	Healthcare	Industrials	Technology	Telecommunications services	Utilities		
Australia	223	183	85	57	76	132	3	19	25	803	
Austria	20	0	0	10	0	10	1	0	0	41	
Belgium	20	0	30	0	10	21	0	14	0	95	
Bermuda	0	10	0	0	0	0	0	0	5	15	
Brazil	69	10	38	42	6	31	0	13	37	246	
Canada	305	104	89	311	11	127	52	61	72	1132	
Chile	21	13	17	13	0	6	1	5	34	110	
China	52	29	34	92	1	80	25	6	14	333	
Czech Rep	0	0	0	0	0	0	0	0	8	8	
Denmark	10	5	15	10	46	21	0	5	0	112	
Egypt	5	0	0	0	0	5	0	12	0	22	
Finland	22	20	10	10	10	30	20	10	10	142	
France	32	171	50	23	28	161	34	28	28	555	
Germany	89	87	20	0	56	96	19	17	20	404	
Greece	0	0	0	0	0	0	0	7	0	7	
Hong Kong	0	13	6	5	0	38	0	18	48	128	
India	14	30	15	20	24	20	25	9	14	171	
Ireland;	33	40	13	10	7	49	22	0	0	174	
Israel	0	5	0	0	0	0	7	0	0	12	
Italy	10	25	5	30	0	26	0	10	20	126	
Japan	249	343	137	24	96	634	196	33	45	1757	
Jersey	10	0	0	10	0	0	0	0	0	20	
Luxembourg	20	5	0	20	0	10	0	10	0	65	
Mexico	37	19	33	0	2	25	0	8	0	124	
Netherlands	22	0	34	40	20	70	22	8	0	216	
New Zealand	0	28	0	0	10	0	3	10	0	51	
Norway	20	10	20	10	0	0	0	10	0	70	
Papua New	0	0	0	7	0	0	0	0	0	7	
Portugal	0	0	10	9	0	0	0	0	10	29	
Russia	45	0	7	76	0	5	0	25	31	189	
South Africa	18	10	12	7	9	0	8	14	0	78	
Spain	14	21	0	35	9	33	16	10	48	186	

(Continues)

TABLE 3 (Continued)

Country	Sector										Total
	Basic materials	Consumer cyclicals	Consumer noncyclicals	Energy	Healthcare	Industrials	Technology	Telecommunications services	Utilities	Total	
Sweden	31	47	18	9	32	78	20	20	0	255	
Switzerland	76	55	44	15	67	82	41	11	0	391	
Thailand	12	14	10	34	4	13	1	1	5	94	
United Kingdom	138	301	148	47	56	323	48	38	48	1147	
United States	218	796	362	327	421	588	454	48	273	3487	
Total	1835	2394	1262	1303	1001	2714	1018	480	795	12,802	

Furthermore, when CEOs also serve as boards' chairperson, they tend to put their self-interest above the interests of shareholders and stakeholders and tend to use valuable resources because they consider themselves successful in their projects and expect to get good results. Thus, CEO duality will be related to more powerful CEOs; (4) CEO board member, a dichotomous variable coded as 1 if the CEO serves as a board member but not as the chair of the board and 0 otherwise. The CEO is also a board member who holds a position of great privilege, has an equal voice at the board, has higher credibility and authority with the board and may alienate other board members. Then, CEO becomes more powerful because the CEO will have more influence and authority over companies, their managers and their boards (Park et al., 2018). Additionally, CEOs being board members will be more likely to impose their criterion on firms. Accordingly, there is a lineal relationship between CEO board member and CEO power. Thus, the CEO power construct varies between 0 and 4.

4.2.3 | Moderators

The moderating variables in this research are relative to the national culture of all international firms composing our sample. Specifically, we base them on Hofstede's (Hofstede, 1980, 2001) model, focusing on six cultural dimensions: (1) power distance (PDI), (2) individualism versus collectivism (IND) and (3) masculinity versus femininity (MAS), uncertainty avoidance (UAI) and long-term orientation (L_ORIENT) and indulgence (INDUL). The six cultural dimensions vary between 0 and 100 (Hofstede et al., 2010), with 50 the midpoint (e.g. above 50 shows a high cultural score and below 50 a low cultural score). Hofstede's website provides the scores of all the cultural dimensions for each country.¹ The first cultural dimension, power distance, shows the degree to which a society admits that there is no equality of power within organisations. Members of societies with high levels of power distance are more likely to pursue formal codes of conduct, reluctant to go against what superiors say. Conversely, members of societies with low levels of power distance do not perceive great differences in position, status or power and tend to follow informal codes of conduct. The second cultural dimension, individualism versus collectivism, reflects whether people living together are more individualist or more collectivist. Members of individualist societies tend to be independent, look after themselves and value the achievement of personal goals rather than group interests, while individuals in collectivist cultures are more likely to respect tradition, be interested in everything relative to the group and tend to perceive themselves as members of an extended organisation. The cultural dimension of masculinity versus femininity relates to societies' predominately female or male values. In a masculine culture, members tend to value personal attainment, money and success and be more competitive and aggressive than in feminine cultures, where members tend to care for others, place greater importance on the quality of life and be more nurturing, modest and humble. The fourth cultural dimension, uncertainty

¹<https://www.hofstede-insights.com>.

avoidance, reflects individuals who feel threatened or uncomfortable in a context of uncertain circumstances; as a result, these members will try to achieve conformity through institutions and a belief system they create. In societies where uncertainty avoidance is high, members value security, place greater emphasis on written rules and consensus and do not tolerate deviations from the rule, while societies with low levels of uncertainty avoidance feel less need for written norms and tolerate deviations from the norm. The fifth cultural dimension is long-term orientation (L_ORIENTA). When this cultural dimension is close to 0, it represents a shorter-term orientation, while scores close to 100 represent a longer-term orientation. It refers to a culture's level of focus on the future or the present and past. Low values (0–49) account for societies with secondary school students performing poorly at mathematics, small savings, little money for investment or companies reporting quarterly results. Short-term orientation concentrates on the present, place values on the past and present, emphasis on quick results, respect for tradition, preservation of ‘face’ and pursuing timely pleasure rather than inner peace. High values (50–100) account for societies with secondary school students performing well at mathematics, large savings, funds available for investment or companies seeking market share and long-term profits. Long-term orientation tends to be characterised by a focus on the future, a focus on perseverance and delays in short-term gratification for future benefit. The sixth and final cultural dimension indulgence (INDUL) is defined as the extent to which people try to control their desires and impulses, based on the way they were raised. Relatively weak control is called indulgence, and relatively strong control is called restraint. Scores close to 0 represent a more restrained society, while scores close to 100 represent a more indulgent society. Low values (0–49) account for societies with lower crime rates, a larger police force, lower approval of foreign music and films or less obesity, while high values (50–100) account for societies with higher crime rates, a smaller police force, freedom of speech being rated as of very high importance or more obesity. A deeper description of these six culture dimensions appears in the paper by Blodgett et al. (2008). The six interactions are CEO_POW × PDI, CEO_POW × IND, CEO_POW × MAS, CEO_POW × UAI, CEO_POW × L_ORIENTA and CEO_POW × INDUL.

4.2.4 | Control variables

Factors that could potentially affect innovation must be controlled. The first is firm size (F_SIZE), calculated as the log of total assets (Azar & Drogendijk, 2016). Another is return on assets (ROA), measured as the operating income before interest and taxes over total assets (Zhang, 2011). The firm's leverage is also a control variable (LEV), calculated as debts over total assets (Min & Smyth, 2016). We also control for board size (BOD_SIZE), the number of board directors (Chouaibi et al., 2009) and board meetings (BOD_MEET) and the number of meetings the board holds each year (Chen, 2012). Furthermore, we considered whether firms operate in a civil-law country and labelled this variable CIVIL_LAW, a dichotomy variable coded as 1 if

firms operate in a civil-law country and 0 otherwise (AlHares et al., 2018). The firm's sector is also controlled; we used a set of dummy variables representing the nine sectors (SECTOR) in which firms in our sample operate. If the firm operates in the sector, it is coded as 1 and 0 otherwise. The nine sectors are basic material (BAS MAT), consumer noncyclical (CONS NON-CYC), energy (ENEN), industrial (INDUST), utilities (UTILITIES), consumer cyclical (CONS CYC), healthcare (HEALTHCARE), technology (TECHNOLOG) and telecommunication services (TELECOM SERVIC). Finally, we also considered year effects (Y_t) by including a set of dummy variables. Table 4 provides descriptions of all variables.

4.2.5 | Economic model

We check all the hypotheses by running the economic model as follows:

$$\begin{aligned}
 R\&D_I_{it} = & \beta_0 + \beta_1 CEO_POW_{it} + \beta_2 PDI_{it} + \beta_3 IND_{it} + \beta_4 MAS_{it} + \beta_5 UAI_{it} \\
 & + \beta_6 L_ORIENTA_{it} + \beta_7 INDUL_{it} + \beta_8 CEO_POW \times PDI_{it} \\
 & + \beta_9 CEO_POW \times IND_{it} + \beta_{10} CEO_POW \times MAS_{it} \\
 & + \beta_{11} CEO_POW \times UAI_{it} + \beta_{12} CEO_POW \times L_ORIENTA_{it} \\
 & + \beta_{13} CEO_POW \times INDUL_{it} + \beta_{14} F_SIZE_{it} + \beta_{15} ROA_{it} \\
 & + \beta_{16} LEV_{it} + \beta_{17} BOD_SIZE_{it} + \beta_{18} BOD_MEET_{it} \\
 & + \beta_{19} CIVIL_LW_{it} + \sum_{j=20}^{27} \beta_j SECTOR_{it} + \sum_k \beta_k Y_t + \delta_i + \eta_{it}
 \end{aligned}$$

where the unobservable heterogeneity (firm-specific or firm fixed effects) is represented by δ_i , which may affect R&D intensity because it considers all those unobservable firm characteristics unchangeable over time but changeable among individuals. The error term is represented by η_{it} .

The model was estimated using the generalised method of moments (GMM) procedure (Arellano & Bond, 1991). With this estimator, we can control the unobservable heterogeneity (δ_i) as well as the endogeneity. Another advantage of using GMM is that it also mitigates the estimation bias. The GMM estimator calculates the Wald χ^2 test, the Arellano–Bond tests AR(1) and AR(2) and the Hansen test.

5 | RESULTS

5.1 | Descriptive statistics and correlation

Table 5 presents the descriptive statistics of all the variables. On average, R&D intensity (R&D_I) is 4.79%, showing that for each monetary unit that firms spent on R&D, their sales increase by 4.79 monetary units. Thus, spending on R&D may improve firms' sales. CEO power (CEO_POW) is 1.88—near 2, the midpoint because this variable can range between 0 and 4. Therefore, CEOs in our sample firms have on average more than moderate power; that is, their power is significant. Hofstede's four cultural dimensions show the following mean values: power distance (PDI) 45.49, individualism (IDV) 71.10, masculinity (MAS) 60.57, uncertainty avoidance (UAI) 56.88, long-

TABLE 4 Description of variables.

Variables	Description
R&D_I	Research and development intensity is calculated as the ratio between research and development expenses and total sales
CEO_POW	The aggregation of four dummies variables: (1) CEO tenure, which is a dummy variable that takes the value 1 if CEO tenure is above the sample median and 0 otherwise; (2) the Chairman of the board is ex-CEO, which is a dummy variable that takes the value 1 if the chairman of the board held the CEO position in the company prior to becoming chairman and 0 otherwise; (3) CEO duality, which is a dummy variable that takes the value 1 if the same person serves simultaneously as CEO and chairman of the board and 0 otherwise; and (4) CEO board member, which is a dummy variable that takes the value 1 if the CEO serves as a board member, but not as chair of the board and 0 otherwise
PDI	Power distance is one of the six culture dimensions addressed by Hofstede et al. (2010) and ranges from 0 to 100
IDV	Individualism is one of the six culture dimensions addressed by Hofstede et al. (2010) and ranges from 0 to 100
MAS	Masculinity is one of the six culture dimensions addressed by Hofstede et al. (2010) and ranges from 0 to 100
UAI	Uncertainty avoidance is one of the six culture dimensions addressed by Hofstede et al. (2010) and ranges from 0 to 100
L_ORIENTA	Long-term orientation is one of the six culture dimensions addressed by Hofstede et al. (2010) and ranges from 0 to 100
INDUL	Indulgence is one of the six culture dimensions addressed by Hofstede et al. (2010) and ranges from 0 to 100
F_SIZE	Firms size is the log of total assets
ROA	Return on assets is calculated as the operate income before interests and taxes over total assets
LEV	Leverage is calculated as the debt over total assets
BOD_SIZE	Board size is the number of directors on board
BOD_MEET	Board meetings is the number of meetings held by the board every year
CIVIL_LAW	Dummy variable that takes the value 1 if the company operates in a civil law country and 0 otherwise
BAS MAT	Dummy variable coded as 1 if the firm operates in the basic material sector and 0 otherwise
CONS NON-CYC	Dummy variable coded as 1 if the firm operates in the consumer non-cyclical sector and 0 otherwise
ENEN	Dummy variable coded as 1 if the firm operates in the energy sector and 0 otherwise
INDUST	Dummy variable coded as 1 if the firm operates in the industrial sector and 0 otherwise
UTILITIES	Dummy variable coded as 1 if the firm operates in the utilities sector and 0 otherwise
CONS CYC	Dummy variable coded as 1 if the firm operates in the consumer cyclical sector and 0 otherwise
HEALTHCARE	Dummy variable coded as 1 if the firm operates in the healthcare sector and 0 otherwise
TECHNOLOG	Dummy variable coded as 1 if the firm operates in the technology sector and 0 otherwise
TELECOM SERVIC	Dummy variable coded as 1 if the firm operates in the telecommunication services and 0 otherwise

term orientation (L_ORIENTA) 48.56 and indulgence (INDUL) 58.79. Firm size (F_SIZE) and ROA are 9.70% and 6.58%, respectively. The leverage (LEV) on average is 72.90%, board size (BOD_SIZE) is 10.88 board directors and board meetings (BOD_MEET) averages 9.41 per year. Furthermore, 43.58% of sample firms operate in a civil-law country (CIVIL_LAW). Finally, 14.33% of the firms operate in the basic materials sector, 9.85% in consumer non-cyclicals, 10.17% in energy, 21.19% in industrials, 6.20% in utilities, 18.70% in consumer cyclicals, 7.81% in healthcare, 7.95% in the technology and 3.74% in telecommunication services.

In Table 6, we also present the correlation coefficients among all the variables. With this analysis, we can assess if our research has a multicollinearity problem. We observe that some pairs of correlations are statistically significant, but none is above 0.8 (Basheer et al., 2018). This indicates that multicollinearity is not present. However, to reinforce the argument for no multicollinearity problems, we also calculated the variance inflation factors (VIFs) that Table 6 shows. The higher the value of VIF, the higher is the correlation between one variable and the rest. VIF values higher than 10 indicate high correlation among variables, prompting multicollinearity concerns. From the

findings, we see that no VIFs pass the 10 threshold (PeiZhi & Ramzan, 2020), and therefore, there is no multicollinearity.

5.2 | Regressions analysis

Model 1 in Table 7 provides the findings for checking Hypothesis 1. In this hypothesis, we propose that powerful CEOs will support innovation. The variable CEO power (CEO_POW) exhibits a positive sign and is statistically significant. Thus, we do not reject the first hypothesis and show that CEO power has a positive effect on innovation. Sariol and Abebe (2017) also provide evidence of the positive impact of powerful CEOs on R&D activities. This evidence is consistent with Berrone et al. (2013) and Aibar-Guzmán and Frías-Aceituno (2021), who support the idea that powerful CEOs, worried about their image and reputation, will tend towards involvement with innovation activities because it may enhance their image. Powerful CEOs may significantly influence the decision-making process because boards have less capacity to constrain them, and this may allow them to autonomously make decisions in line with their own interests, such as

TABLE 5 Descriptive statistics.

Variable	Obs	Mean	Standard deviation
R&D_I	12,802	4.79	82.80
CEO_POW	12,802	1.88	0.98
PDI	12,802	45.49	14.95
IDV	12,802	71.10	22.31
MAS	12,802	60.57	20.04
UAI	12,802	56.88	21.43
L_ORIENTA	12,802	48.65	24.26
INDUL	12,802	58.79	15.64
F_SIZE	12,802	9.70	1.47
ROA	12,802	6.50	7.62
LEV	12,802	72.90	69.23
BOD_SIZE	12,802	10.88	3.56
BOD_MEET	12,802	9.41	5.27
CIVIL_LAW	12,802	43.58	49.58
BAS_MAT	12,802	14.33	35.04
CONS_NON-CYC	12,802	9.85	2.98
ENEN	12,802	10.17	30.23
INDUST	12,802	21.19	40.87
UTILITIES	12,802	6.20	24.13
CONS_CYC	12,802	18.70	38.99
HEALTHCARE	12,802	7.81	26.84
TECHNOLOG	12,802	7.95	27.05
TELECOM_SERVIC	12,802	3.74	18.99

innovation activities. This kind of activity can create firm risk, which may stop CEO support. However, as García-Sánchez et al. (2020) show, CEOs with much experience—an indicator of their power—will have better professional and career opportunities, resulting in less risk aversion and greater managerial ability that, together, could lead to spending more on R&D. Additionally, because of their better experience, powerful CEOs will be more capable CEOs; therefore, their attitude towards complex situations will be more self-assured and proactive in supporting innovation activities. Our findings show that for CEOs, the benefits of improving their image and reputation by inclining towards R&D activities are higher than the costs to the firm of performing such activities in the short-term.

Regarding the control variables, firm size and board meetings present a positive sign and are significant, showing that big firms with active boards have a greater likelihood of performing innovation activities, if the firm's CEO is powerful, and less probability when firms are less profitable. The rest of the control variables are nonsignificant.

From Models 2 to 7, we aim to analyse the moderating role of the six Hofstede's cultural dimensions: power distance, individualism, masculinity, uncertainty avoidance, long-term orientation and indulgence, respectively. In Model 2, we examine how power distance as a cultural dimension affects the association between CEO power and innovation activities. The interaction variable CEO power and power distance (CEO_POW x PDI) exhibits a negative sign and is statistically

significant. This evidence is contrary to the proposed Hypothesis 2, in which we predict that the power distance dimension reinforces the association between powerful CEOs and innovation activities. Thus, we must reject the hypothesis. This finding shows that when powerful CEOs operate in power distance contexts, the positive impact of CEO power on innovation activities is attenuated. We would expect that powerful CEOs operating in power distance cultures would have greater power due to a lack of communication among individuals from different hierarchical levels and managers' unwillingness to accept changes in the distribution of power, leading to performing more innovation activities. Nevertheless, it seems that CEOs running firms in power distance societies are less confident and tend to make fewer risky decisions like innovation activities. Indeed, more powerful CEOs seem to accept equal power distribution, and subordinates can give their opinions and participate in the decision-making process. Subordinates may associate more innovation with fewer jobs; that is, workers may perceive innovation as a threat to their jobs and, thus, try to convince their superiors not to perform innovation activities.

In Model 3, we analyse the effect that individualism has on the relationship between CEO power and innovation. As predicted, the interaction variable CEO_POW x IND exhibits a positive sign and is significant. Then, the data support the hypothesis that firms in individualistic cultural contexts are more inclined to perform innovation activities when CEOs are more powerful. In individualistic societies, individual interests prevail over collective ones. Our evidence seems to show that powerful CEOs in these cultures will be more independent, autonomous and able to use their leadership to make decisions consistent with their individual criteria and tendencies, such as those concerning innovation activities. Although these activities are riskier than others, the strong individualism of CEOs in individualistic cultures leads them to minimise the uncertainty and support riskier decisions, perhaps due to the CEO's overconfidence that individualistic cultures inspire (e.g. Chui et al., 2010). Pour and Murinde (2017) reach the same conclusion, presenting evidence that in individualistic contexts, the negative association between CEO power and bank risk-taking is less pronounced. Gervais et al. (2011) also support this argument, showing that CEOs tend to engage in risky decisions in individualistic societies. Among such decisions are innovation activities. Thus, the individualist cultural dimension reinforces the positive association between powerful CEOs and innovation.

Model 4 examines how masculinity moderates the relationship between CEO power and innovation. Contrary to our expectations, the interaction variable between CEO power and masculinity (CEO_POW x MAS) shows a negative sign and is statistically insignificant. Therefore, we must reject the hypothesis that posits masculinity reinforcing the positive impact of CEO power on innovation. In this regard, masculinity prevailing in some cultural contexts does not affect more innovation activities that powerful CEOs support. This evidence contrasts with what culture literature suggests about masculine societies. We expected that a higher degree of values related to masculine stereotypes (e.g. dominance or aggressiveness) prevalent in masculine cultures leads to greater CEO power, resulting in more innovation activities because these societies are more likely to have



TABLE 6 Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
R&D_J	1.000													
CEO_POW (2)	1.23	-0.024***	1.000											
PDI (3)	2.80	-0.001	0.168**	1.000										
IDV (4)	3.81	0.018**	0.303***	-0.348***	1.000									
MAS (5)	1.42	0.131***	0.050***	0.056***	-0.104***	1.000								
UAI (6)	2.66	0.056***	-0.162***	0.429***	-0.491***	0.117***	1.000							
L_ORIENTA (7)	5.54	0.1040***	0.240***	0.265***	0.725***	0.369***	0.456***	1.000						
INDUL (8)	5.39	-0.066***	0.0032	-0.613***	0.599***	0.283***	0.467***	0.600***	1.000					
F_SIZE (9)	1.08	0.022**	0.058***	0.229***	-0.071***	0.101***	0.086***	0.087***	0.171***	1.000				
ROA (10)	1.12	0.013	0.077***	-0.083***	0.148***	-0.119***	-0.248***	-0.247***	0.205***	-0.186***	1.000			
LEV (11)	1.21	-0.186**	-0.012	0.073***	-0.080***	0.039***	0.081***	0.093***	-0.088***	0.297***	-0.353***	1.000		
BOD_SIZE (12)	1.19	-0.033***	0.077***	0.226***	-0.118***	0.055***	0.063***	0.147***	-0.277***	0.500***	-0.077***	0.176***	1.000	
BOD_MEET (13)	1.16	0.052***	-0.116***	0.057***	-0.182***	-0.012	0.216***	0.093***	0.039***	0.046***	-0.232***	0.090***	-0.084***	1.000
CIVIL_LAW (14)	3.55	0.082***	-0.253***	0.322***	-0.783***	0.123***	0.644***	0.753***	-0.589***	0.189***	-0.182***	0.116***	0.133***	1.000
BAS_MAT (15)	2.94	0.076***	-0.089***	-0.059***	-0.089***	-0.026**	0.074***	0.010	0.038***	-0.056***	-0.076***	-0.025***	-0.060***	1.000
CONS_NON-CYC (16)	2.43	-0.123***	0.014	-0.004	0.017**	-0.008	-0.018**	-0.032***	0.045***	0.016*	0.046***	0.045***	0.067***	1.000
ENEN (17)	2.55	-0.002	-0.018**	0.046***	-0.018**	-0.153***	-0.016*	-0.040**	0.003	0.096**	0.0429**	-0.075**	-0.013	1.000
INDUST (18)	3.56	-0.112***	0.015*	0.022**	-0.069***	0.129***	0.045***	0.137***	-0.055***	-0.009	0.042***	0.119***	0.033***	1.000
UTILITIES (19)	2.56	-0.168***	0.006	0.102***	-0.008	-0.078**	-0.001	-0.001	-0.034**	0.160**	-0.125***	0.15***	0.099**	1.000
CONS_CYC (20)	5.19	-0.156***	0.025***	-0.026***	0.091**	0.066**	-0.039**	-0.040**	-0.044**	-0.081**	0.025**	-0.043**	-0.015*	1.000
HEALTHCARE (21)	3.13	0.331***	0.023***	-0.071***	0.094***	0.001	-0.056***	-0.056***	-0.061***	-0.074**	0.089***	-0.089***	-0.074***	1.000
TECHNOLOG (22)	3.15	-0.105**	0.051***	0.017**	0.059***	0.057***	-0.023**	-0.023**	-0.007	-0.063***	0.100***	-0.217***	-0.079**	1.000
TELECOM_SERVIC (23)	1.55	-0.106***	-0.024***	-0.007	-0.078**	-0.094**	0.013	0.013	0.027**	0.105**	0.004	0.093**	0.078**	1.000

Abbreviation: VIF, variance inflation factor.

* $p < 0.01$, ** $p < 0.05$, and *** $p < 0.001$.

TABLE 6 (Continued)

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
R&D_J										
CEO_POW (2)										
PDI (3)										
IDV (4)										
MAS (5)										
UAI (6)										
L_ORIENTA (7)										
INDUL (8)										
F_SIZE (9)										
ROA (10)										
LEV (11)										
BOD_SIZE (12)										
BOD_MEET (13)	1.000									
CIVIL_LAW (14)	0.136***	1.000								
BAS_MAT (15)	0.016*	0.033	1.000							
CONS_NON-CYC (16)	-0.021**	-0.0122	-0.135***	1.000						
ENEN (17)	0.011	-0.047***	-0.134***	-0.161***	1.000					
INDUST (18)	0.023**	0.092	-0.212***	-0.248***	-0.175***	1.000				
UTILITIES (19)	0.062***	-0.025***	-0.105***	-0.123***	-0.175***	-0.134***	1.000			
CONS_CYC (20)	-0.102***	-0.059***	-0.196***	-0.159***	-0.161***	-0.249***	-0.123***	1.000		
HEALTHCARE (21)	-0.018*	-0.023***	-0.119***	-0.139***	-0.098***	-0.123***	-0.075***	-0.139***	1.000	
TECHNOLOG (22)	0.007	-0.023***	-0.120***	-0.141***	-0.099***	-0.152***	-0.076***	-0.141***	-0.085***	1.000
TELECOM_SERVIC (23)	0.084***	0.053***	-0.081***	-0.094***	-0.066***	-0.102***	-0.051***	-0.094***	-0.057***	-0.058***

Abbreviation: VIF, variance inflation factor.
 * $p < 0.01$, ** $p < 0.05$, and *** $p < 0.001$.

TABLE 7 Results of the generalised method of moments.

	Model 1 coef.	Model 2 coef.	Model 3 coef.	Model 4 coef.	Model 5 coef.	Model 6 coef.	Model 7 coef.
R&D _I (_{t-1})	0.539***	0.381***	0.341***	0.550***	0.498***	0.343***	0.309***
CEO_POW	0.518***	4.124***	-1.838***	1.415*	1.954***	1.540**	-3.404***
PDI	0.187***						
IDV			-0.116***				
MAS			0.073*				
UAI			0.057				
L_ORIENTA						0.177*	
INDUL							-0.176***
F_SIZE	0.185***	0.192**	0.208***	0.174***	0.185***	0.163***	0.141**
ROA	-0.064***	-0.082***	-0.0819***	-0.0518***	-0.069***	-0.065***	-0.081***
LEV	-0.003	0.001	-0.000	-0.001	0.002	0.001	0.006
BOD_SIZE	0.119	0.191*	0.177*	0.165***	0.179	0.057	0.043
BOD_MEET	0.082***	0.047	0.258	0.074***	0.068***	0.043	0.035
CIVIL_LAW	-1.099	-0.051	-2.810**	-0.966	-1.562**	-6.030	-1.087
BASIC MATERIALS	4.647	8.363	2.595	7.194	9.545	3.812	8.452
CONSUMER NON-CYCLICAL	4.243	5.564	2.782	5.156	11.111	-1.141	5.164
ENERGY	7.013	9.648	4.608	8.993	11.170	5.681	10.126
INDUSTRIALS	11.932	7.389	4.081	10.956	14.632*	4.126	7.022
UTILITIES	4.715	9.034	1.360	4.476	9.150	-0.397	7.911
CONSUMER CYCLICAL	1.674	7.271	1.500	3.617	6.029	1.884	5.790
HEALTHCARE	7.772	9.370	4.639	9.560	11.718	6.820	8.816
TECHNOLOGY	6.186	7.967	3.158		11.764	6.088	8.319
CEO_POW × PDI		-0.084***					
CEO_POW × IND			0.029***				
CEO_POW × MAS				-0.013			
CEO_POW × UAI					-0.024**		
CEO_POW × L_ORIENTA						-0.020	
CEO_POW × INDUL							0.061***
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald χ^2 test	8922/08***	2724/51***	1748/11***	3756/23***	1112/13***	1076/00***	1045/00***
Arellano-Bond test AR(1) (z, p > z)	-2.16(0.031)	-2.08(0.037)	-2.40(0.017)	-2.04(0.041)	-1.93(0.054)	-1.50(0.135)	-1.68(0.093)
Arellano-Bond test AR(2) (z, p > z)	-1.17(0.241)	-1.03(0.305)	-0.92(0.359)	-1.27(0.204)	-1.20(0.232)	-0.870(0.386)	-0.53(0.597)
Hansen test (Chi-square, p > Chi²)	22.92(0.29)	14.83(0.674)	20.88(0.286)	18.28(0.438)	19.10(0.386)	14.23(0.714)	13.48(0.762)

* $p < 0.01$, ** $p < 0.05$, and *** $p < 0.001$.

more sex-differentiated occupational structures. Furthermore, we expected that powerful CEOs would be more assertive, showing more concern for job performance and less concern for individual feelings and needs, alongside the competition and achievement that these cultures emphasise. These characteristics would lead more directly to empowering CEOs. However, our evidence shows that masculinity does not moderate the association between CEO power and innovation activities. It seems that powerful CEOs disregard the values that masculine societies emphasise because they may already feel sufficiently powerful in their firms to perform innovation activities. The competition, success and achievement prevailing in masculine contexts may motivate people wanting to be the best but are not relevant for powerful CEOs who may consider themselves the best in their job.

In Model 5, we aim to explore the moderating role of the uncertainty avoidance dimension on the positive association between CEO power and innovation activities. The moderating variable, CEO_POW \times UAI, presents a negative sign, as expected, and is statistically significant. Thus, we cannot reject the proposed hypothesis. Our result documents the positive effect of CEO power on innovation activities that uncertainty-avoidance cultures negatively moderate. Powerful CEOs facing uncertainty may feel less comfortable and behave to reduce this uncertainty and ambiguity. In these situations, as Rieger et al. (2014) find, not only economic conditions but also cultural features may condition attitudes towards risk; thus, greater risk aversion may be present in uncertainty-avoidance contexts. Although CEOs with more power may make risky decisions, such as innovation activities, they may feel more risk aversion in uncertainty-avoidant societies, making their behaviour towards these activities more conservative and discouraging. These uncertainties may lead to unsuccessful innovation activities; therefore, powerful CEOs may not support these activities. Uncertainty-avoidance cultures do not seem to motivate powerful CEOs to take risks with such decisions as innovation activities since facing uncertain conditions may concern them. This view aligns with Li and Zahra (2012), who suggest that managers are less inclined to perform innovative projects in societies with high uncertainty, due to the ambiguity and unpredictability of these projects.

In Model 6, we analyse the moderating impact of long-term orientation between CEO power and firm's innovation. The coefficient of the moderating variable, CEO_POW \times L_ORIENTA, exhibits a negative sign, but it is statistically insignificant. Then, the sixth hypothesis has to be rejected. It would be expected that powerful CEOs with long-term goals might invest in long-term projects like innovation because innovation investments are costly, risky and long-term orientation in line with Rujirawanich et al. (2011) and Zheng et al. (2012). However, our evidence leads us to conclude that CEOs with power operating in firms domiciled in long-term orientation cultures do not have effect on firm's innovation. Our findings support the view that powerful CEOs in long-term orientation societies are not focused on the future by investing on firm's innovation. These CEOs are not more likely to plan for the future by taking innovation activities. It can be possible because CEOs with power in long-term orientation tend to be individualist, which means that these members are more likely to think in terms of 'I' rather than 'we'. Powerful CEOs are not more likely to

make decisions based on the future but on the present. The results of firm's innovation can be seen a long-term, and CEOs with power sometimes need to have returns a short-term because they can have doubts about if they will continue as CEOs or not. In this way, they can assure a short-term profitability in case they are fired.

In Model 7, we explore the moderating effect of indulgency Hofstede's cultural dimension between CEO power and firm's innovation. The coefficient of this variable (CEO_POW \times INDUL) is positive and statistically significant. Thus, this allows us to not reject the seventh hypothesis, which posits that powerful CEOs operating in indulgent contexts tend to support firm's innovation. It seems that powerful CEOs feel freer, have greater personal control and are more focused on well-being and individual happiness in indulgent societies by resulting in a higher firm's innovation. This contrasts with restrictive contexts, where CEOs with more power may feel more constraint to express their emotions, freedom, happiness and opinions, which suggests a lower probability of involving with innovation tasks. The fact that powerful CEOs operate in indulgent versus restrictive societies is a key determinant to take into account when innovation is considered. CEOs with more power associate innovation with higher individual happiness, freedom and higher gratification.

From Models 1 to 7, firm size shows a positive sign and ROA a negative sign, and both are significant. Board size is positive and significant in Models 3, 4 and 5, as is the board meetings variable in Models 4 and 5. In Models 3 and 5, the civil-law-countries variable is negative and significant, and in Model 5, the industrial sector is positive and statistically significant. The rest of the control variables are not significant.

6 | CONCLUSIONS AND IMPLICATIONS

This paper aims to analyse the relationship between CEO power and innovation activities, an association that management organisation theory supports. Additionally, we examine the role of the culture where firms operate as a moderator between CEO power and innovation activities. The six Hofstede's cultural dimensions describe the national culture: power distance, individualism, masculinity, uncertainty avoidance, long-term orientation and indulgency. We draw on an institutional perspective to address the moderating role that the national culture plays between CEO power and innovation activities.

Our evidence shows that powerful CEOs encourage innovation activities. Furthermore, the findings reveal that power distance and uncertainty-avoidance cultural dimensions negatively moderate the positive effect of CEO power on innovation activities, individualism and indulgency reinforce this association and masculinity and long-term orientation do not moderate the relationship. All our hypotheses are empirically supported, except those relative to the moderating role of power distance, masculinity and long-term orientation between CEO power and innovation activities. These Hofstede's cultural dimensions were expected to positively moderate the positive impact of CEO power on innovation activities; however, power distance moderates negatively such relationship and masculinity, and long-term

orientation does not play any moderating role. Our evidence seems to suggest that powerful CEOs in societies with higher power distance discourage innovation activities. Subordinates assume that power is unequally distributed in contexts with power distance and will not tend to scrutinise their superiors, particularly powerful CEOs. Additionally, these subordinates hardly will have access to information sharing, and all their behaviours and creative thinking will be constrained by the hierarchy, which is contrary to innovation activities. Thus, CEOs, who support innovation activities, may feel freer to change their position and discourage these activities because the resources pretended to be allocated in innovation tasks can be invested in other activities more beneficial for powerful CEOs. Furthermore, our findings also reveal that powerful CEOs do not tend to encourage innovation activities in masculine and long-term contexts, which may be because some characteristics of these cultures like assertiveness, decisiveness and aggressiveness in individual habits as well as long-term profitability do not influence powerful CEOs. Powerful CEOs may be also disproportionately prone to narcissistic tendencies and may mask their own strong desire for power and prestige with confident, charming exterior and disregard values and costumes of masculine cultures.

Our evidence prompts the following implications. First, our findings reinforce the theoretical rationales from managerial organisation theory, which posits powerful CEOs encouraging risky activities, such as innovation. This evidence is contrary to the agency perspective that suggests a negative association of CEO power with innovation activities. Our empirical evidence sheds new light on the CEO power literature because, in contrast to our results, most past research documents what agency theory argues. Second, we find that the national culture is a relevant moderator between powerful CEOs and innovation activities. The culture where firms operate is a determinant that firms and managers, specifically powerful CEOs, cannot disregard. When their firms reside in individualist and indulgent contexts, these CEOs will encourage more innovation activities; operating in power distance and uncertainty-avoidance cultures discourages innovation activities. However, powerful CEOs running firms in masculine and long-term societies will be neither more nor less likely to perform innovation activities; the cultural dimension has no significant effect on the relationship between CEO power and innovation activities. These findings can also provide relevant empirical evidence to the culture literature. Third, other researchers may extend our study by using other moderators, such as mass media or stakeholder pressure. Further, the analysis of how other CEO characteristics (e.g. narcissism, reputation, religion that may negatively affect creativity) may affect innovation activities also merits their attention. Fourth, policy-makers may also find our results useful for regulating or discouraging the concentration of so much power in CEOs—for instance, by separating the roles of CEO and chairman of the board. We show that CEO power may have positive effects on such business decisions as innovation activities, and therefore, the same individual always performing both roles is negative for firms and stakeholders. Finally, our evidence can have relevance, on the one hand, for powerful CEOs or managers inclined towards innovation activities because the cultural context where firms

operate can imply increasing or reducing these activities and on the other hand, for shareholders and stakeholders who are oriented towards innovation or value creative firms.

This research is not free of caveats. First, although the international sample used in this research includes several countries, a sample comprising more countries may provide much evidence about the role that powerful CEOs play in innovation intensity and the moderating effect of the national culture. Second, we have used Hofstede's model for national culture because it is the most suitable for this study, given that it is an international measure and has been used in different knowledge areas. However, other models or proxies have been used for measuring national culture, although such measures are not as easily available (Jensen & Webster, 2009). Third, we have used R&D expenditure over total firm sales as a proxy for innovation intensity, although other measures of innovation such as patents could be used. Fourth, it is possible that we disregarded some relevant factors affecting innovation. Finally, in this research, we have based on individual financial statements, where revenues and R&D expenditures are not worldwide; namely, we have only used data from the headquartered country. It is possible that different findings would have obtained if data from consolidated financial statements, where all worldwide activities could be provided, would have been used.

We propose the following lines of future research. First, we have used a sample with nonfinancial firms. By extending this research to a sample of financial firms, new evidence about the role of powerful CEOs affecting innovation in financial institutions would be relevant to CEO literature. Second, constructing a culture index by aggregating all the scores of Hofstede's cultural dimensions, to know whether the findings remain unchanged, would be interesting. Finally, the impact of powerful CEOs on other business decisions, such as integrated reporting, tax avoidance or intellectual investment, using an international sample would also be interesting.

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