THE IMPACT OF CORPORATE INNOVATION ON LONG-TERM PERFORMANCE: DOES CHIEF EXECUTIVE OFFICER POWER MATTER IN AN EMERGING MARKET?

Hareth Alshamayleh *

* Faculty of Business Studies, Arab Open University, Riyadh, Saudi Arabia
Contact details: Faculty of Business Studies, Arab Open University, P. O. Box 84901, Riyadh 11681, Prince Faisal Ibn Abdulrahman, Hittin, Saudi Arabia

OPEN ACCESS

How to cite this paper: Alshamayleh, H. (2025). The impact of corporate innovation on long-term performance: Does chief executive officer power matter in an emerging market? *Corporate Board: Role, Duties and Composition, 21*(1), 49–59. https://doi.org/10.22495/cbv21i1art5

ISSN Online: 2312-2722
ISSN Print: 1810-8601

Received: 21.11.2024
Accepted: 25.03.2025

JEL Classification: G32, G34, O31
DOI: 10.22495/cbv21i1art5

Abstract

This study aims to investigate the relationship between corporate innovation, financial sustainability, and the moderating role of chief executive officer (CEO) power within the context of Saudi Arabian firms. Grounded in resource-based theory, the research highlights the dual role of research and development (R&D) investments as a critical driver of long-term financial sustainability and a mechanism for fostering competitive advantage (Barney, 1991). Using a panel dataset of 1260 company-year observations from 2013 to 2022, the study employs pooled ordinary least squares (OLS) and fixed effects (FE) estimators to examine the impact of R&D investments on financial sustainability, measured by the sustainable growth rate (SGR). The findings reveal a positive association between R&D investments and SGR, suggesting that firms prioritizing innovation tend to experience greater financial stability. However, the study also uncovers a significant moderating effect of CEO power, indicating that excessive CEO control can hinder long-term investments in innovation and jeopardize future financial well-being, aligning with agency theory concerns (Naaman & Sun, 2022). This research contributes to the understanding of corporate innovation, CEO power dynamics, and financial sustainability, particularly within the emerging market context of Saudi Arabia, by highlighting the importance of effective corporate governance in fostering long-term value creation.

Keywords: Financial Sustainability, R&D Investments, CEO Power, Emerging Market

Authors' individual contribution: The Author is responsible for all the contributions to the paper according to CRediT (Contributor Roles Taxonomy) standards.

Declaration of conflicting interests: The Author declares that there is no conflict of interest.

1. INTRODUCTION

In today's dynamic corporate world, the pursuit of short-term profitability often clashes with the strategic imperative of long-term growth (Demydyuk & Carlbäck, 2024). This tension is particularly acute in the realm of research and development (R&D), where the upfront costs and uncertain returns can deter investment, especially in the face of investor pressure or takeover threats. However, neglecting R&D can severely hamper a company's ability to innovate and sustain growth over the long haul.

R&D is not merely an expense, but a strategic investment in resources and capabilities that can

yield a lasting competitive advantage (Barney, 1991). It fuels the creation of new knowledge assets, leading to innovative products and processes that enhance efficiency and open up new markets (Brown et al., 2018). Moreover, R&D can serve as a defensive strategy against competitors and bolster decision-making under pressure (Clarkson & Toh, 2010; Slivko & Theilen, 2014).

While prior research acknowledges the importance of R&D for innovation and firm value (Barney, 1991; Brown et al., 2018; Chun et al., 2014; Johnson & Pazderka, 1993; Yoo et al., 2019), there remains a gap in understanding how R&D contributes to sustained financial performance, particularly in emerging markets. This research addresses this gap by examining the impact of corporate R&D investments on the long-term financial sustainability of firms, specifically within the unique context of Saudi Arabia.

This study utilizes a panel dataset of 1260 company-year observations from Saudi Arabia between 2013 and 2022, a period marked by significant economic shifts and policy reforms. We employ both pooled ordinary least squares (OLS) and fixed effects (FE) estimators to rigorously analyze the relationship between R&D expenditure and financial sustainability, measured by (sustainable growth rate [SGR]). Furthermore, we explore the moderating role of chief executive officer (CEO) power in this relationship. Drawing on agency and organizational theories, we investigate the dual impact of CEO power on firm innovation and performance. While excessive CEO dominance can stifle innovation due to short-term focus and risk aversion (Naaman & Sun, 2022; Mousa, 2023; Pucheta-Martínez & Gallego-Álvarez, 2024), strong leadership can also catalyze innovation by championing new ventures and fostering a forward-thinking organizational culture (Ju et al., 2023).

Our findings reveal a positive association between R&D investments and a company's financial health, suggesting that firms prioritizing R&D tend to experience greater financial stability in the long run. However, we also uncover a novel finding, the positive impact of R&D on financial sustainability is weakened by the presence of powerful CEOs. This implies that excessive CEO control might hinder long-term investments in innovation, potentially jeopardizing future financial well-being.

As an additional analysis, we explore how the COVID-19 pandemic has affected the link between R&D investment and financial resilience. Our findings indicate that the crisis has a detrimental impact on both innovation strategies and financial sustainability. Then, we employ an alternative measure of financial sustainability and a generalized method of moments (GMM) regression to address endogeneity concerns. The results remain consistent with our initial findings.

This study makes several significant contributions to the existing literature. Firstly, it provides fresh insights into the relationship between R&D expenditures and financial sustainability, specifically within the context of Saudi Arabian firms. This is particularly relevant given Saudi Arabia's commitment to a knowledge-based economy and its strategic focus on innovation as a driver of economic diversification and long-term financial sustainability. Secondly, the study sheds light on the interplay between R&D investments, CEO power, and financial sustainability in the unique business landscape of Saudi Arabia. This landscape is characterized by a mix of family-owned and publicly listed companies, providing a fertile ground to investigate how ownership models moderate the role of R&D in driving financial viability. Thirdly, the study examines the moderating role of CEO power on the relationship between corporate innovation and financial sustainability in an emerging market context. The findings underscore the importance of effective corporate governance in fostering innovation and long-term value creation.

The remainder of this paper is structured as follows. Section 2 outlines the literature review. Section 3 details the dataset, variables, and methods used for analysis. Section 4 presents the results of the study. Section 5 gives the discussion. Finally, Section 6 concludes with key takeaways and policy implications.

2. LITERATURE REVIEW

2.1. Research and development investments

A significant body of research indicates that corporate governance practices play a vital role in shaping R&D investment intensity. Honoré et al. (2015) highlight that the effectiveness of governance structures can significantly influence innovative behavior and performance in technology-based firms. Similarly, Yu et al. (2017) emphasize the necessity of tailoring governance mechanisms to specific industry contexts to address R&D investment shortages. This suggests that companies with robust governance frameworks are better positioned to allocate resources efficiently toward R&D activities, thereby enhancing their innovative capabilities. Moreover, the relationship between financing constraints and R&D investment is complex and often characterized by an inverted U-shaped curve. Li (2022) provides evidence that moderate financing constraints can stimulate R&D investment, while excessive constraints hinder it. This finding is supported by Gao (2022), who notes a negative correlation between financing constraints and corporate performance, further underscoring the importance of adequate financing for successful R&D endeavors. Thus, firms must navigate their financing strategies carefully to optimize their R&D investments. Government subsidies also play a crucial role in influencing corporate R&D investments. Liu et al. (2022) argue that economic policy uncertainty can dampen R&D investment, particularly in new energy sectors, where external economic conditions significantly affect investment decisions. Conversely, Yin (2019) finds that government subsidies, alongside internal financing, have a substantial positive impact on R&D expenditures. This interplay suggests that while government support can enhance R&D investment, firms must also be wary of the potential negative effects of policy instability. The impact of R&D investments on corporate performance is well-documented, with several studies linking increased R&D spending to improved financial outcomes. For instance, Xie et al. (2020) explore the time-lag effects of R&D investment on the value of listed companies, demonstrating that sustained R&D efforts can lead to long-term value creation. Furthermore, Ravšelj and Aristovnik (2020) assert that R&D investment is essential for maintaining competitive advantage in an increasingly globalized market, reinforcing the notion that innovation is a key driver of corporate success.

2.2. Financial sustainability

Corporate financial sustainability is a multifaceted concept that encompasses various dimensions, including sustainable corporate governance, finance, and corporate social responsibility, with research highlighting the need for a systematic approach to understand how these elements integrate and align with sustainability goals (Bui et al., 2020).

Strong corporate governance plays a crucial role in fostering corporate financial sustainability by facilitating the integration of sustainability metrics into governance frameworks and aligning financial incentives with long-term sustainability goals, counteracting the short-term focus often associated with the financialization of firms (Lashitew, 2021; Cupertino et al., 2019). Furthermore, effective governance can mediate the relationship between green finance and corporate sustainability, enabling companies with robust governance frameworks to leverage green finance for sustainable growth (Wang et al., 2023). The relationship between financial performance and sustainability is complex and multifaceted, with studies indicating that strong financial performance can lead to improved sustainability outcomes through digital finance, resilience, and innovation (Hu et al., 2023; Kahloul & Zouari, 2013). However, despite progress in integrating sustainability into corporate finance, challenges remain, such as the pressure for short-term financial returns, which often conflicts with long-term sustainability goals due to executive compensation structures and investor expectations that prioritize immediate financial performance (Siegrist et al., 2020). Nevertheless, opportunities for advancing corporate financial sustainability are emerging, including the integration of digital technologies in finance, which presents new avenues for enhancing corporate sustainability through improved financial health and operational efficiency (Mao, 2024). Additionally, the increasing emphasis on sustainability disclosures and transparency is fostering a more accountable corporate environment, as evidenced by studies on sustainability disclosures in Indonesian firms (Rachmat et al., 2024).

2.3. Chief executive officer power

The literature on CEO power presents a multifaceted view of how the authority and influence of a CEO can impact various aspects of firm performance and governance (Fayyaz et al., 2021; Utomo & Machmuddah, 2024). CEO power can be conceptualized through several dimensions, including structural power, ownership power, expert power, and prestige power, which collectively influence decision-making processes within firms (Niu, 2024). Research indicates that powerful CEOs often have a significant impact on corporate governance, as their authority can lead to both positive and negative outcomes. For instance, while strong CEO power can facilitate swift decision-making during periods of uncertainty, it may also exacerbate agency problems, leading to overconfidence and risky corporate strategies (Ouyang et al., 2015; Sheikh, 2019). Moreover, the relationship between CEO power and firm performance is complex and context-dependent. Studies have shown that powerful CEOs can enhance firm performance, particularly in times of crisis, by making decisive actions that may not require board approval (Koo, 2015; Dowell et al., 2011). However, this power can also lead to detrimental effects, such as the manipulation of compensation contracts to favor the CEO at the expense of shareholder interests (Abernethy et al., 2015; Morse et al., 2011). The duality of CEO roles — where the CEO also serves as the chair of the board — has been found to influence the effectiveness of governance mechanisms, often resulting in a concentration of power that can hinder accountability (Humphery-Jenner et al., 2022). Furthermore, the dynamics of CEO power are influenced by external factors such as market competition and corporate governance structures. For example, research suggests that powerful CEOs may perform better in competitive markets, where their ability to enact strategic changes quickly can be a significant advantage (Sheikh, 2019; Humphery-Jenner et al., 2022). Conversely, the presence of a strong board can mitigate the risks associated with powerful CEOs, ensuring that their decisions align with the long-term interests of the firm (Tang et al., 2011; Arena et al., 2011). Overall, the systematic review of literature on CEO power underscores the importance of understanding the nuanced roles that powerful CEOs play in shaping corporate outcomes, highlighting both the potential benefits and risks associated with concentrated leadership.

2.4. Hypotheses development

Stakeholder theory posits that investing in R&D aligns with the long-term interests of stakeholders. By focusing on sustainable practices and innovations, companies can mitigate risks associated with environmental regulations and changing consumer preferences. This proactive approach can lead to increased market share and profitability, thereby ensuring financial sustainability (Shen et al., 2017). Thus, corporate investments in R&D act as a powerful engine for firm sustainable growth. This is because R&D fosters a culture of innovation that fuels several key drivers of long-term success. In particular, R&D activities conduct the development of new technologies, processes, and products (Cancino et al., 2018). These advancements allow companies to improve efficiency, create entirely new markets, and stay ahead of the competition. As an example, allocating funds to research in renewable energy could lead to cost-effective solar panels, propelling a company into a leading position within the sustainable energy sector (Kamoun et al., 2019).

By continuously investing in R&D, companies build a strong internal innovation infrastructure (Habanik et al., 2019). This includes skilled personnel, robust research processes, and a culture that encourages experimentation. This capacity to innovate becomes a core competency, allowing the company to adapt to changing market demands and develop solutions for future challenges. Furthermore, R&D often leads to the creation of valuable intangible assets like patents, trademarks, and proprietary knowledge. These assets provide a competitive edge and can be leveraged to generate future revenue streams (Chareonsuk & Chans-Ngavej, 2008; Gamayuni, 2015). A strong patent portfolio, for example, can prevent competitors from replicating a company's innovative product, ensuring sustained market advantage (Singhal et al., 2020; Yuan et al., 2021).

The positive impact of R&D on sustainable growth is further supported by research. Studies have shown a clear correlation between investments

in R&D and improved company performance, including higher profitability and market share gains (Boiko, 2022; Alam et al., 2020; Arif Khan et al., 2023). Additionally, companies making significant investments in R&D are more inclined to develop eco-friendly products and processes, contributing to environmental sustainability — a crucial aspect of long-term success in today's world (Lin et al., 2021; Xu et al., 2021; Sun et al., 2023). Drawing upon the aforementioned research, the study formulated the following hypothesis:

H1: Research and development investments correlate positively with financial sustainability.

Agency theory underscores the potential impact of CEO power on firm innovation. According to DeAngelo and Rice (1983) and Jensen and Ruback (1983), a domineering CEO can create internal power struggles and stifle the decision-making processes crucial for innovation.

On the one hand, powerful CEOs can be pressured by short-term goals set by investors and financial analysts, leading them to prioritize strategies that boost short-term profits at the expense of long-term viability (Matozza & D'Amico, 2020; Lo & Shiah-Hou, 2022). This can result in underinvestment in R&D, which is essential for innovation (Naaman & Sun, 2022; Mousa, 2023; Pucheta-Martínez & Gallego-Álvarez, 2024). Additionally, risk-averse CEOs, particularly those with a strong financial background, might shy away from risky, but potentially transformative R&D projects, especially those related to environmental innovation (Chen, 2014; Han et al., 2016; Qiao & Fung, 2016). Furthermore, some CEOs might prioritize manipulating short-term stock prices through practices like share buybacks or aggressive marketing campaigns, creating an illusion of financial health while neglecting long-term investments (Shahab et al., 2020; Dutta et al., 2011; Al Mamun et al., 2020). This can ultimately hinder the company's ability to achieve sustainable growth. Empirically, studies by Tien et al. (2013) and Sewpersadh (2019) support this negative impact of unbalanced CEO power.

On the other hand, management and organizational theory suggest a positive correlation between CEO power and innovative drive. Fueled by a desire to enhance their reputation (Griffin & Tversky, 1992), powerful CEOs are more likely to champion risky, innovative ventures. Their strategic acumen (Hirshleifer et al., 2012) equips them to navigate the complexities and uncertainties inherent in such endeavors, ultimately positioning the firm for substantial growth and profitability. Moreover, occupying the highest position in the organizational hierarchy, these leaders possess the authority to shape corporate direction and cultivate a culture of innovation (Ju et al., 2023). Beyond financial gains, powerful CEOs often prioritize employee satisfaction and public image, aligning innovation with broader organizational and societal goals (Lewellyn & Muller-Kahle, 2012).

As firms expand through new product development, the increasing complexity and strategic decisions necessitate strong, decisive leadership. A powerful CEO is well-positioned to navigate these challenges (Baker et al., 2012). Research by Sheikh (2012) suggests a positive link between CEO compensation and firm innovation. Furthermore, Lin et al. (2011) provide empirical evidence supporting the positive relationship between CEO characteristics and innovation, particularly within the Chinese business landscape. In light of the reviewed literature, this study aimed to examine the given hypothesis:

H2: Chief executive officer power moderates the positive association between research and development investments and financial sustainability.

3. RESEARCH METHODOLOGY

The research used a positivistic-quantitative approach to find out how CEO power affects the influence of investments in R&D on financial sustainability. The objects of research were firms trading on the capital raising market of Tadawul (Tasi Index) in non-financial industries since companies in the financial industry have specific regulatory environments, asset-heavy nature, reliance on debt financing, and distinct risk profiles (Al Mamun et al., 2020). The type of data used in the research is secondary data sourced from Bloomberg. Our last sample is formed by an unbalanced panel of 1260 firm-year observations, which represent 162 Saudi companies from 2013 to 2022.

We explore the connection within Saudi enterprises for the subsequent motives. Firstly, Saudi Arabia's commitment to a knowledge-based economy is demonstrably evident in its surging R&D investments. Data reveals a significant increase, reaching $5.1 billion in 2022[1]. This strategic shift, aligned with Vision 2030, reflects a national focus on innovation as a key driver of economic diversification and long-term financial sustainability. Furthermore, the targeted investment in sectors like automotive, food and agriculture, telecom, media, and technology highlights a well-defined approach to fostering innovation in areas critical for future growth. By prioritizing R&D and strategically directing investments, Saudi Arabia is laying the groundwork for a more innovative and financially sustainable future for its companies. Secondly, Saudi Arabia's business landscape presents a unique opportunity to investigate the interplay between R&D investments, CEO power, and financial sustainability. This is due to its distinctive composition, characterized by a coexistence of family-owned enterprises, often exhibiting well-defined CEO succession plans (Al-Ghamdi & Rhodes, 2015). Then, Saudi Arabia's recent adoption of International Financial Reporting Standards (IFRS) has significantly transformed the business landscape. This shift, coupled with increased foreign investor interest, has created a dynamic environment for Saudi companies. Consequently, corporate leaders, particularly CEOs, have had to adapt their strategic orientations to align with the new financial reporting framework and global market expectations. Thus, by studying companies in Saudi Arabia, we can gain valuable insights into how ownership models moderate the role of R&D in driving financial viability. Thirdly, Saudi Arabia's focus on human capital development provides a solid foundation for R&D activities to flourish. The country boasts a young and skilled workforce, supported by ongoing educational programs and a national commitment to enhancing workforce capabilities. This emphasis on building a skilled talent pool fosters an environment conducive to innovation. A robust R&D ecosystem, fueled by a skilled

[1] https://www.arabnews.com/node/2403566/business-economy

workforce, is critical for companies to achieve long-term financial sustainability and maintain a competitive edge in the global marketplace.

Our analysis included the following variables:

• Financial sustainability: We used the *SGR* as a proxy for financial sustainability, calculated as return on equity multiplied by retention rate (El Madbouly, 2022; Hartono & Utami, 2016; Amouzesh et al., 2011). This measure reflects a company's ability to generate sustainable growth without relying on external financing.

• R&D investments: *R&D* intensity was measured as total *R&D* expenditure divided by sales (Honoré et al., 2015; Huang et al., 2020; Hamza & Gamra, 2023). This captures the extent to which companies invest in *R&D* activities.

• CEO power: *CEOPOWER* was measured as the ratio of CEO ownership to CEO tenure (Al Mamun et al., 2020). This measure reflects the level of control and influence a CEO has within a company.

• Control variables: We controlled for several factors that could influence both *R&D* investments and financial sustainability (Alshareef, 2024; Rahi et al., 2024; Zhou et al., 2022; Singh et al., 2022), including firm size (measured as the natural log of total assets), financial leverage (debt divided by total assets), and firm risk (measured using the beta coefficient).

To analyze the data, multiple linear regressions OLS, and FE are employed with the assistance of the statistical package Stata program. The use of OLS allows us to establish baseline relationships between variables, as it is widely used and easy to interpret (Zdaniuk, 2024). Meanwhile, the FE model is particularly relevant in our study as it accounts for unobserved heterogeneity by controlling for time-invariant firm-specific characteristics (Hedges, 1994). This dual approach helps us address potential biases and strengthen the reliability of our findings.

The data processing involved testing for classical assumptions — multicollinearity, homoscedasticity, and autocorrelation — before applying the OLS and FE models using the following two models.

The first model, presented in Eq. (1), tests the direct impact of our main independent variable (investment decisions on *SGR*).

$$SGR_{i,t} = \alpha_0 + \alpha_1 R\&D_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 LEV_{i,t} + \alpha_4 RISK_{i,t} + Industry\ dummies + Year\ dummies + \varepsilon_{i,t} \quad (1)$$

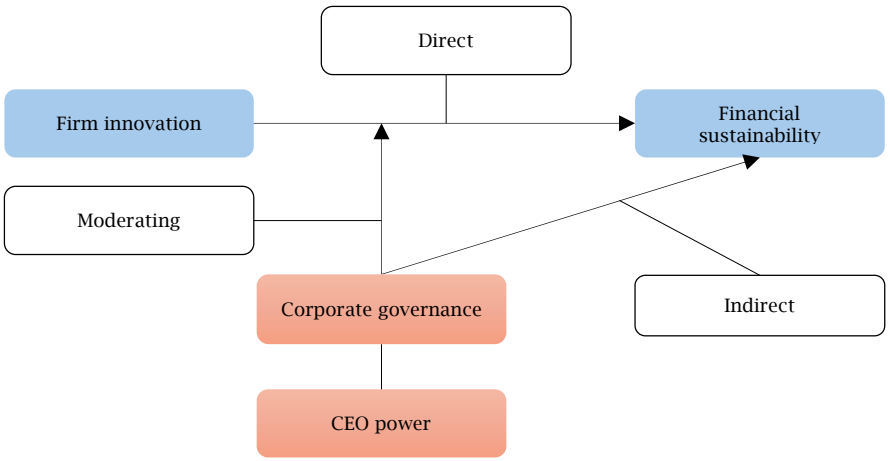
In addition, to assess how *CEOPOWER* moderates the direct relationship between investments in *R&D* and *SGR*, we introduce an interaction term and a moderator term into the previous equation. These additional terms capture the essence of our *H2* and are presented in Eq. (2) as follows:

$$SGR_{i,t} = \alpha_0 + \alpha_1 R\&D + \alpha_2 CEOPOWER_{i,t} + \alpha_3 CEOPOWER_{i,t} * R\&D_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 RISK_{i,t} + Industry\ dummies + Year\ dummies + \varepsilon \quad (2)$$

where,

• *SGR* is the sustainable growth rate;
• *R&D* is research and development investments;
• *CEOPOWER* is CEO power;
• *SIZE* is company size;
• *LEV* is financial leverage;
• *RISK* is a firm risk.

Figure 1. Conceptual model



4. RESULTS

4.1. Univariate analysis

Table 1 offers an overview of the statistics summarizing the firms in our dataset. It displays the mean, median, standard deviation, lower quartile, and upper quartile of essential variables. The results show that the median *R&D* investment expenditures divided by total sales, is 0.491%. This result shows that *R&D* and investments account for nearly 0.5% of business investment. In addition, it can be observed that the average value of *SGR* (dependent variable) is 2.93%, which indicates that Saudi companies face significant challenges in achieving long-term financial stability. Such

an average hints at a maximum *SGR* of 2.93% for Saudi companies without resorting to external financing. This average also implies that our sample businesses have a growth capability of 2.93% based on internal funding. That means companies that need to grow more than 2.93% will need more outside funding or have to cut their dividends.

Table 1. Descriptive statistics

Variables	*N*	*Mean*	*Standard deviation*	*25th percentile*	*Median*	*75th percentile*
SGR	1263	0.0293	0.0541	0	0	0.0414
R&D	1263	0.0049	0.1351	0.00065	0.00242	0.00680
SIZE	1263	21.5782	1.5913	20.6712	21.4335	22.1475
LEV	1263	0.2336	0.1911	0.0426	0.2191	0.3815
RISK	1263	0.9429	0.2658	0.7768	0.9382	1.1155

Table 2 presents the Pearson correlations for all variables used in this study. A positive, but weak significant correlation coefficient was observed between financial sustainability proxy (*SGR*) and *R&D* investment. We assess the multicollinearity's presence using variance inflation factors (VIFs). The detailed results (available upon request) show that all VIF values fall within acceptable thresholds (VIF < 10) (Gujarati, 2002). This suggests a limited risk of multicollinearity impacting our analysis.

Table 2. Correlation matrix

Variables	*SGR*	*R&D*	*SIZE*	*LEV*	*RISK*
SGR	1				
R&D	0.0503*	1			
SIZE	0.1531***	0.2569***	1		
LEV	0.0306	-0.0051	0.3894***	1	
RISK	-0.0620**	-0.0149	0.0513*	0.1209***	1

*Note: *** p < 0.01, ** p < 0.05, * p < 0.1.*

4.2. Multivariate analysis

To examine our hypotheses, we utilized panel data and employed suitable econometric methodologies. Initially, we compared pooled OLS, random effects (RE), and FE models. The Breusch-Pagan Lagrange multiplier test indicated the superiority of OLS over RE. Subsequently, to account for unobserved firm-level heterogeneity and obtain more robust estimates of the causal relationship between innovation and financial sustainability, as well as the moderating role of *CEOPOWER*, we implemented an FE model. Table 3 presents the results of the estimation of the research model using OLS and FE regressions. Guided by the resource-based view (RBV) of the firm, which emphasizes the role of intangible assets, such as *R&D*, in achieving sustainable competitive advantage, this study examines the impact of *R&D* investments on financial sustainability (Jafari & Rezaee, 2014). To ensure robustness, all continuous variables are winsorized at the 1% and 99% levels of their distribution to mitigate the influence of outliers. In the OLS model, *R&D* exhibits a positive and significant coefficient of 0.0404 at the 5% level (t-statistic = 2.11), supporting *H1*. This finding aligns with the RBV, suggesting that firms' strategic investments in innovation foster financial resilience and long-term sustainability (Dave et al., 2013). Similarly, in the FE model, the coefficient for *R&D* remains positive (0.0339) and becomes even more significant at the 1% level (t-statistic = 2.77), further substantiating the notion that *R&D* contributes to financial sustainability even after accounting for unobserved heterogeneity (Wang et al., 2023).

The positive relationship between *R&D* investment and financial sustainability observed in this study is consistent with previous research on the impact of innovation on firm performance. *R&D* investments can lead to improved products, processes, and technologies, which in turn can enhance a company's competitive position and financial outcomes. This aligns with Jafari and Rezaee (2014), who posit that unique and valuable resources, such as those developed through R&D, can be a source of sustainable competitive advantage.

Table 3. The influence of investments in *R&D* on financial sustainability

Variables	*OLS (1)*	*FE (2)*
INTERCEPT	0.0671 (-2.75)***	-0.0850 (-2.06)**
R&D	0.0404 (2.11)**	0.0339 (2.77)***
SIZE	0.0050 (4.34)***	0.0055 (2.88)***
LEV	-0.0057 (-0.61)	-0.0106 (-1.23)
RISK	-0.0136 (-2.62)***	-0.0064 (-1.23)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Data set size	1260	1260
F-statistic	10.85	8.94
Adjusted R^2	0.0318	0.0469

*Note: *** p < 0.01, ** p < 0.05, * p < 0.1.*

The results from Table 4 demonstrate the complex relationship between *R&D* investments, *CEOPOWER*, and financial sustainability. *R&D* investments show a positive and significant association with financial sustainability in both OLS and FE models (OLS = 8.5511, t-statistic = 2.19, p < 0.01; FE = 8.3832, t-statistic = 2.05, p < 0.05). This reinforces the importance of *R&D* for firm performance and long-term financial health. However, *CEOPOWER* exhibits a negative and highly significant direct effect on financial sustainability (OLS = -2.1422, t-statistic = -5.63, p < 0.001; FE = -2.5902, t-statistic = -6.39, p < 0.01). This suggests that concentrated CEO authority may impair financial outcomes, aligning with previous research indicating that increased *CEOPOWER* can lead to negative outcomes and inferior operating performance. The interaction term (*R&D * CEOPOWER*) is negative and significant in both models (OLS = -1.1612, t-statistic = 2.76, p < 0.001; FE = -1.7799, t-statistic = -2.65, p < 0.001). This indicates that higher *CEOPOWER* weakens the positive effect of *R&D* on financial sustainability, providing evidence in favor of our *H2*. These findings support the agency theory perspective, suggesting that excessive *CEOPOWER* may lead to suboptimal decision-making, potentially undermining the benefits of innovation investments (Naaman & Sun, 2022).

Table 4. The moderating effect of *CEOPOWER* on *R&D* investments-financial sustainability nexus

Variables	*OLS (1)*	*FE (2)*
INTERCEPT	-27.3891 (-4.24)***	-87.0949 (-1.06)
R&D	8.5511 (2.19)**	8.3832 (2.05)*
CEOPOWER	-2.1422 (-5.63)***	-2.5902 (-6.39)***
*R&D*CEOPOWER*	-1.1612 (2.76)***	-1.7799 (-2.65)***
SIZE	1.7769 (6.46)***	4.2633 (1.13)
LEV	-16.3100 (-11.52)***	-20.8503 (-4.34)***
RISK	-6.5008 (-3.35)***	1.0616 (0.65)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Data set size	1228	1228
F-statistic	41.18	19.04
Adjusted R^2	0.2009	0.1003

*Note: *** p < 0.01, ** p < 0.05, * p < 0.1.*

4.3. Check for robustness

4.3.1. An alternative proxy for financial sustainability

To further solidify our findings, we delved deeper into the interconnection between investments in *R&D* and financial sustainability by examining an alternate metric. Table 5 presents the results of this examination, in which we used return on assets (ROA) as a gauge for financial sustainability instead of the *SGR* used in Table 3. The outcomes are comparable to our original analysis, with the calculated coefficient of investments in *R&D* still having a positive and significant influence on ROA. Just like a strong *SGR*, a higher ROA also signifies a positive and sustainable growth trajectory for Saudi companies.

Table 5. The influence of investments in *R&D* on financial sustainability

Variables	*OLS (1)*	*FE (2)*
INTERCEPT	-31.0746 (-4.75)***	-75.8939 (-0.90)
R&D	15.1641 (4.24)***	18.5503 (4.07)***
SIZE	1.7725 (6.28)***	3.6103 (0.93)
LEV	-18.0632 (-12.45)***	-22.7411 (-4.39)***
RISK	-0.0833 (-0.06)	6.3039 (3.89)***
Year FE	Yes	Yes
Industry FE	Yes	Yes
Data set size	1228	1228
F-statistic	48.62	13.51
Adjusted R^2	0.1451	0.1221

*Note: *** p < 0.01, ** p < 0.05, * p < 0.1.*

4.3.2. Endogeneity

While our initial findings suggest a positive relationship between corporate innovation and financial sustainability and a mitigating role of *CEOPOWER*, the possibility of endogeneity bias cannot be ignored. To address this, we employed a dynamic panel GMM model to account for potential unobserved factors influencing both variables. Table 6 presents the two-step GMM estimation results, which address potential endogeneity concerns. The AR1 and AR2 diagnostics indicate that the error terms are not serially correlated, supporting the validity of our GMM estimates. Then, our previous findings were confirmed.

Table 6. Tracking endogeneity (GMM)

Variables	*GMM*
INTERCEPT	-24.6543 (-2.74)***
LAG SGR	0.8218 (3.65)***
R&D	6.6532 (3.17)***
CEOPOWER	-1.4321 (-3.23)***
*R&D*CEOPOWER*	-0.8543 (3.54)***
SIZE	1.4321 (3.98)***
LEV	-10.5439 (-5.21)***
RISK	-4.5218 (-2.73)***
N	1260
AR(1) test (p-value)	-0.69**
AR(2) test (p-value)	1.82
Hansen-J test of over-identification (p-value)	2.95
Year **FE**	Yes
Industry **FE**	Yes

*Note: *** p < 0.01, ** p < 0.05, * p < 0.1.*

5. DISCUSSION

The results confirm that *R&D* investments have a positive and significant impact on financial sustainability (*SGR*), supporting the notion that innovation serves as a critical driver of long-term growth. This finding aligns with the RBV, which emphasizes the importance of intangible assets like R&D in fostering sustainable competitive advantages. Consistent with prior research, such as Aw et al. (2008) and Amoroso (2017), the results highlight that firms investing in both innovation and physical assets experience significant improvements in future profitability. These studies collectively underscore the transformative potential of R&D in driving firm growth and resilience, particularly in industries and regions where innovation plays a central role. A key contribution of this study is its examination of *CEOPOWER* as a moderating factor. The findings reveal that *CEOPOWER* negatively affects financial sustainability and weakens the positive relationship between *R&D* investments and firm performance. This aligns with agency theory, suggesting that excessive *CEOPOWER* may lead to managerial myopia, where short-term financial gains are prioritized over long-term strategic investments. Naaman and Sun (2022) further corroborate this perspective, asserting that powerful CEOs often overlook the long-term benefits of R&D, focusing instead on immediate financial outcomes. This short-sighted approach can undermine the firm's ability to innovate and adapt, ultimately stifling financial sustainability.

Moreover, the analysis of control variables provides additional insights. Larger firms (*SIZE*) demonstrate greater financial sustainability, reflecting the advantages of economies of scale, resource access, and market resilience. However, firms with high leverage (*LEV*) or elevated risk levels (*RISK*) tend to experience diminished financial sustainability, highlighting the importance of maintaining prudent capital structures and mitigating operational risks.

From a governance perspective, the findings emphasize the critical role of robust corporate governance mechanisms in mitigating the negative effects of excessive *CEOPOWER*. Emerging markets, like Saudi Arabia, can benefit significantly from implementing stronger governance structures, such as independent boards, transparent compensation practices, and effective shareholder rights. These measures align CEO incentives with long-term value creation, ensuring that *R&D* investments are adequately prioritized. Institutional investor presence and shareholder activism further enhance corporate governance practices, reducing the potential for CEO overreach and fostering a culture of innovation-driven growth.

6. CONCLUSION

This research examined the intricate relationship between CEO power, investments in R&D, and a firm's financial sustainability. Utilizing a dataset of 1260 firm-year observations from companies in Saudi Arabia, we developed a theoretical model positing that while R&D investment is crucial for sustainable growth, the extent of CEO power can significantly moderate this relationship. Our findings suggest that powerful CEOs, despite their ability to drive strategic initiatives, may succumb to short-term pressures, leading to underinvestment in R&D and hindering long-term financial sustainability. However, this study is not without limitations. Firstly, our focus on Saudi Arabia may limit the generalizability of these findings to other countries with differing economic and regulatory contexts. Future research should explore this dynamic across a broader geographical scope. Secondly, we acknowledge that factors beyond CEO power and R&D investment contribute to financial sustainability. Future studies could incorporate variables like industry competition, government regulations, and market volatility to provide a more comprehensive understanding. Finally, our cross-sectional design captures a snapshot in time. Longitudinal studies would strengthen our findings by tracking the evolution of CEO power, R&D investment, and financial sustainability over time.

Despite these limitations, our research offers valuable insights for both corporations and policymakers. For corporations, our findings underscore the importance of strong corporate governance mechanisms that balance CEO power with a long-term strategic vision. Boards of directors should actively promote R&D investment and foster a culture of innovation within their organizations. By empowering managers to champion long-term projects and rewarding them for R&D successes, companies can mitigate the potential negative effects of concentrated CEO power. For policymakers, our study highlights the need for policies that incentivize long-term R&D investment. This could include tax breaks for sustainable technologies or grants for research in strategically important sectors. Additionally, promoting transparency in corporate reporting of R&D activities can foster accountability and encourage a long-term focus. For society, this research contributes to a broader understanding of how leadership and innovation drive sustainable economic growth. By shedding light on the complex interplay between CEO power and R&D investment, this study can inform discussions on corporate governance, innovation policy, and the role of leadership in building a sustainable future.

In conclusion, this study provides compelling evidence of the moderating effect of CEO power on the relationship between R&D investment and financial sustainability. By acknowledging the limitations and highlighting the practical implications, we hope this research serves as a catalyst for future studies and informs decision-making at various levels of society.

REFERENCES

Abernethy, M. A., Kuang, Y. F., & Qin, B. (2015). The influence of CEO power on compensation contract design. *The Accounting Review, 90*(4), 1265–1306. https://doi.org/10.2308/accr-50971

Al Mamun, M., Balachandran, B., & Duong, H. N. (2020). Powerful CEOs and stock price crash risk. *Journal of Corporate Finance, 62*, Article 101582. https://doi.org/10.1016/j.jcorpfin.2020.101582

Alam, A., Uddin, M., Yazdifar, H., Shafique, S., & Lartey, T. (2020). R&D investment, firm performance and moderating role of system and safeguard: Evidence from emerging markets. *Journal of Business Research, 106*, 94–105. https://doi.org/10.1016/j.jbusres.2019.09.018

Al-Ghamdi, M., & Rhodes, M. (2015). Family ownership, corporate governance and performance: Evidence from Saudi Arabia. *International Journal of Economics and Finance, 7*(2), 78–89. https://doi.org/10.5539/ijef.v7n2p78

Alshareef, M. N. (2024). Ownership structure and financial sustainability of Saudi listed firms. *Sustainability, 16*(9), Article 3773. https://doi.org/10.3390/su16093773

Amoroso, S. (2017). Multilevel heterogeneity of R&D cooperation and innovation determinants. *Eurasian Business Review, 7*, 93–120. https://doi.org/10.1007/s40821-015-0041-1

Amouzesh, N., Moeinfar, Z., & Mousavi, Z. (2011). Sustainable growth rate and firm performance: Evidence from Iran Stock Exchange. *International Journal of Business and Social Science, 2*(23, special issue), 249–255. https://www.ijbssnet.com/journals/Vol_2_No_23_Special_Issue_December_2011/30.pdf

Arena, M. P., Ferris, S. P., & Unlu, E. (2011). It takes two: The incidence and effectiveness of co-CEOs. *The Financial Review, 46*(3), 385–412. https://doi.org/10.1111/j.1540-6288.2011.00305.x

Arif Khan, M., Bin, M., Wang, C., Bilal, H., Ali Khan, A., Ullah, I., Iqbal, A., & Rahman, M. U. (2023). Impact of R&D on firm performance: Do ownership structure and product market competition matter? *SAGE Open, 13*(4). https://doi.org/10.1177/21582440231199560

Aw, B. Y., Roberts, M. J., & Xu, D. Y. (2008). R&D investments, exporting, and the evolution of firm productivity. *American Economic Review, 98*(2), 451–456. https://doi.org/10.1257/aer.98.2.451

Baker, H. K., Dutta, S., Saadi, S., & Zhu, P. C. (2012). Are good performers bad acquirers? *Financial Management, 41*(1), 95–118. https://doi.org/10.1111/j.1755-053X.2012.01179.x

Baker, T. A., Lopez, T. J., Reitenga, A. L., & Ruch, G. W. (2019). The influence of CEO and CFO power on accruals and real earnings management. *Review of Quantitative Finance and Accounting, 52*, 325–345. https://doi.org/10.1007/s11156-018-0711-z

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120. https://doi.org/10.1177/014920639101700108
Boiko, K. (2022). R&D activity and firm performance: Mapping the field. *Management Review Quarterly, 72*, 1051–1087. https://doi.org/10.1007/s11301-021-00220-1
Brown, S., Bessant, J., & Jia, F. (2018). *Strategic operations management* (4th ed.) Routledge. https://doi.org/10.4324/9781315123370
Bui, T. D., Ali, M. H., Tsai, F. M., Iranmanesh, M., Tseng, M.-L., & Lim, M. K. (2020). Challenges and trends in sustainable corporate finance: A bibliometric systematic review. *Journal of Risk and Financial Management, 13*(11), Article 264. https://doi.org/10.3390/jrfm13110264
Cancino, C. A., La Paz, A. I., Ramaprasad, A., & Syn, T. (2018). Technological innovation for sustainable growth: An ontological perspective. *Journal of Cleaner Production, 179*, 31–41. https://doi.org/10.1016/j.jclepro.2018.01.059
Chareonsuk, C., & Chansa-Ngavej, C. (2008). Intangible asset management framework for long-term financial performance. *Industrial Management & Data Systems, 108*(6), 812–828. https://doi.org/10.1108/02635570810884021
Chen, H.-L. (2014). Board capital, CEO power and R&D investment in electronics firms. *Corporate Governance: An International Review, 22*(5), 422–436. https://doi.org/10.1111/corg.12076
Chun, H., Ha, J., & Kim, J.-W. (2014). Firm heterogeneity, R&D, and economic growth. *Economic Modelling, 36*, 149–156. https://doi.org/10.1016/j.econmod.2013.09.028
Clarkson, G., & Toh, P. K. (2010). 'Keep out' signs: The role of deterrence in the competition for resources. *Strategic Management Journal, 31*(11), 1202–1225. https://doi.org/10.1002/smj.853
Cupertino, S., Consolandi, C., & Vercelli, A. (2019). Corporate social performance, financialization, and real investment in US manufacturing firms. *Sustainability, 11*(7), Article 1836. https://doi.org/10.3390/su11071836
Dave, P., Wadhwa, V., Aggarwal, S., & Seetharaman, A. (2013). The impact of research and development on the financial sustainability of information technology (IT) companies listed on the S&P 500 index. *Journal of Sustainable Development, 6*(11), 122–138. https://doi.org/10.5539/jsd.v6n11p122
DeAngelo, H., & Rice, E. M. (1983). Antitakeover charter amendments and stockholder wealth. *Journal of Financial Economics, 11*(1–4), 329–359. https://doi.org/10.1016/0304-405X(83)90016-8
Demydyuk, G. V., & Carlbäck, M. (2024). Balancing short-term gains and long-term success in lodging: The role of customer satisfaction and price in hotel profitability model. *Tourism Economics, 30*(4), 844–875. https://doi.org/10.1177/13548166231199156
Dowell, G. W. S., Shackell, M. B., & Stuart, N. V. (2011). Boards, CEOs, and surviving a financial crisis: Evidence from the Internet shakeout. *Strategic Management Journal, 32*(10), 1025–1045. https://doi.org/10.1002/smj.923
Dutta, S., MacAulay, K., & Saadi, S. (2011). CEO power, M&A decisions, and market reactions. *Journal of Multinational Financial Management, 21*(5), 257–278. https://doi.org/10.1016/j.mulfin.2011.07.003
El Madbouly, D. (2022). Factors affecting the sustainable growth rate and its impact on firm value: Empirical evidence from the Egyptian Stock Exchange. *Journal of Accounting and Auditing of the Association of Arab Universities, 1*(11), 1–40. https://doi.org/10.21608/naus.2022.229413
Fayyaz, A., Chaudhry, B. N., & Fiaz, M. (2021). Upholding knowledge sharing for organization innovation efficiency in Pakistan. *Journal of Open Innovation: Technology, Market, and Complexity, 7*(1), Article 4. https://doi.org/10.3390/joitmc7010004
Gamayuni, R. R. (2015). The effect of intangible asset, financial performance and financial policies on the firm value. *International Journal of Scientific & Technology Research, 4*(1), 202–212. https://surl.li/aukmjn
Gao, R. (2022). Financing constraints, R&D investment and enterprise performance. In *Proceedings of the 2022 International Conference on Bigdata Blockchain and Economy Management (ICBBEM 2022)* (pp. 1129–1135). Atlantis Press. https://doi.org/10.2991/978-94-6463-030-5_113
Griffin, D., & Tversky, A. (1992). The weighing of evidence and the determinants of confidence. *Cognitive Psychology, 24*(3), 411–435. https://doi.org/10.1016/0010-0285(92)90013-R
Gujarati, D. N. (2002). *Basic econometrics* (4th ed.). McGraw-Hill.
Habanik, J., Grencikova, A., & Krajco, K. (2019). The impact of new technology on sustainable development. *Engineering Economics, 30*(1), 41–49. https://doi.org/10.5755/j01.ee.30.1.20776
Hamza, F., & Gamra, S. B. (2023). Corporate research and development expenditures in Saudi Arabia: Does CEOs' power matter? *Vision*. https://doi.org/10.1177/09722629221147118
Han, S., Nanda, V. K., & Silveri, S. (2016). CEO power and firm performance under pressure. *Financial Management, 45*(2), 369–400. https://doi.org/10.1111/fima.12127
Hartono, G. C., & Utami, S. R. (2016). The comparison of sustainable growth rate, firm's performance and value among the firms in Sri Kehati index and IDX30 index in Indonesia Stock Exchange. *International Journal of Advanced Research in Management and Social Sciences, 5*(5), 68–81. https://garph.co.uk/IJARMSS/May2016/7.pdf
Hedges, L. V. (1994). Fixed effects models. In H. Cooper & L. V. Hedges (Eds.), *The handbook of research synthesis* (pp. 285–299). Russell Sage Foundation.
Hirshleifer, D., Low, A., & Teoh, S. H. (2012). Are overconfident CEOs better innovators? *The Journal of Finance, 67*(4), 1457–1498. https://doi.org/10.1111/j.1540-6261.2012.01753.x
Honoré, F., Munari, F., & de La Potterie, B. v. P. (2015). Corporate governance practices and companies' R&D intensity: Evidence from European countries. *Research Policy, 44*(2), 533–543. https://doi.org/10.1016/j.respol.2014.10.016
Hu, S., Zhu, Q., Zhao, X., & Xu, Z. (2023). Digital finance and corporate sustainability performance: Promoting or restricting? Evidence from China's listed companies. *Sustainability, 15*(13), Article 9855. https://doi.org/10.3390/su15139855
Huang, J., Luan, B., Cai, X., & Zou, H. (2020). The role of domestic R&D activities played in carbon intensity: Evidence from China. *Science of the Total Environment, 708*, Article 135033. https://doi.org/10.1016/j.scitotenv.2019.135033
Humphery-Jenner, M., Islam, E., Rahman, L., & Suchard, J.-A. (2022). Powerful CEOs and corporate governance. *Journal of Empirical Legal Studies, 19*(1), 135–188. https://doi.org/10.1111/jels.12305

Jafari, M., & Rezaee, F. (2014). The effect of resource based view on sustainable capability advantage. *Management Science Letters, 4*, 2537–2554. https://doi.org/10.5267/j.msl.2014.11.002
Jensen, M. C., & Ruback, R. S. (1983). The market for corporate control: The scientific evidence. *Journal of Financial Economics, 11*(1–4), 5–50. https://doi.org/10.1016/0304-405X(83)90004-1
Johnson, L. D., & Pazderka, B. (1993). Firm value and investment in R&D. *Managerial and Decision Economics, 14*(1), 15–24. https://doi.org/10.1002/mde.4090140103
Ju, X., Jiang, S., & Zhao, Q. (2023). Innovation effects of academic executives: Evidence from China. *Research Policy, 52*(3), Article 104711. https://doi.org/10.1016/j.respol.2022.104711
Kahloul, A., & Zouari, E. (2013). Corporate sustainable growth and the financing of innovation: Evidence from cash-flow disaggregation. *International Journal of Social Ecology and Sustainable Development, 4*(4), 43–64. https://doi.org/10.4018/ijsesd.2013100104
Kamoun, M., Abdelkafi, I., & Ghorbel, A. (2019). The impact of renewable energy on sustainable growth: Evidence from a panel of OECD countries. *Journal of the Knowledge Economy, 10*, 221–237. https://doi.org/10.1007/s13132-016-0440-2
Koo, K. (2015). The effects of CEO power on firm value: Evidence from the financial crisis of 2008. *Accounting and Finance Research, 4*(4), 13–25. https://doi.org/10.5430/afr.v4n4p13
Lashitew, A. A. (2021). Corporate uptake of the sustainable development goals: Mere greenwashing or an advent of institutional change? *Journal of International Business Policy, 4*, 184–200. https://doi.org/10.1057/s42214-020-00092-4
Lewellyn, K. B., & Muller-Kahle, M. I. (2012). CEO power and risk taking: Evidence from the subprime lending industry. *Corporate Governance: An International Review, 20*(3), 289–307. https://doi.org/10.1111/j.1467-8683.2011.00903.x
Li, J. (2022). Analysis on the relationship between financing constraints and research and development from the perspective of the location of top management network. *Discrete Dynamics in Nature and Society, 2022*(1), Article 8690801. https://doi.org/10.1155/2022/8690801
Lin, C., Lin, P., Song, F. M., & Li, C. (2011). Managerial incentives, CEO characteristics and corporate innovation in China's private sector. *Journal of Comparative Economics, 39*(2), 176–190. https://doi.org/10.1016/j.jce.2009.12.001
Lin, S. L., Wu, S. C., & Li, Q. (2021). Do R&D and ESG affect the corporate value? Evidence from China fin-tech industry. *Journal of Accounting, Finance & Management Strategy, 16*(2), 159–205. https://shorturl.at/jGkCT
Lisic, L. L., Neal, T. L., Zhang, I. X., & Zhang, Y. (2016). CEO power, internal control quality, and audit committee effectiveness in substance versus in form. *Contemporary Accounting Research, 33*(3), 1199–1237. https://doi.org/10.1111/1911-3846.12177
Liu, M., Wen, J., Liu, Y., Lv, X., Liu, Q., Lu, J., Qin, Y., & Zhang, L. (2022). An inverted U-shaped relationship? The impact of government subsidies on the R&D investment of new energy companies: Economic policy uncertainty and enterprise heterogeneity perspectives. *Frontiers in Energy Research, 10*, Article 887108. https://doi.org/10.3389/fenrg.2022.887108
Lo, H.-C., & Shiah-Hou, S.- R. (2022). The effect of CEO power on overinvestment. *Review of Quantitative Finance and Accounting, 59*, 23–63. https://doi.org/10.1007/s11156-022-01060-0
Mao, J., Xie, J., Gao, Y., Tang, Q., Li, Z., & Zhang, B. (2024). Navigating growth: The nexus of supply chain finance, digital maturity, and financial health in Chinese a-share listed corporations. *Sustainability, 16*(13), Article 5418. https://doi.org/10.3390/su16135418
Matozza, F., & D'Amico, E. (2020). When does co-leadership drive innovation? The non-linear effect of co CEOs' power differences on R&D spending. *Corporate Board: Role, Duties and Composition, 16*(1), 28–38. https://doi.org/10.22495/cbv16i1art3
Morse, A., Nanda, V., & Seru, A. (2011). Are incentive contracts rigged by powerful CEOs? *The Journal of Finance, 66*(5), 1779–1821. https://doi.org/10.1111/j.1540-6261.2011.01687.x
Mousa, A. (2023). Utilization of coal bottom ash from thermal power plants as a cement replacement for building: A promising sustainable practice. *Journal of Building Engineering, 74*, Article 106885. https://doi.org/10.1016/j.jobe.2023.106885
Mousa, F.-T., Chowdhury, J., & Gallagher, S. R. (2023). The implications of CEO power on the relationship between firm resources and innovation. *Journal of Management & Organization, 29*(1), 14–29. https://doi.org/10.1017/jmo.2019.84
Naaman, C., & Sun, L. (2022). CEO power and R&D investment. *Accounting Research Journal, 35*(2), 160–177. https://doi.org/10.1108/ARJ-07-2020-0195
Niu, W., & Wang, L. (2024). CEO power, CEO pay stickiness and R&D investment. *The EUrASEANs: Journal on Global Socio-Economic Dynamics, 3*(46), 226–239. https://doi.org/10.35678/2539-5645.3(46).2024.226-239
Ouyang, B., Liu, Z., & Sun, C. (2015). CEO power and auditor choice. *International Journal of Finance & Banking Studies, 4*(4), 44–51. https://doi.org/10.20525/ijfbs.v4i4.39
Pucheta-Martínez, M. C., & Gallego-Álvarez, I. (2024). Firm innovation as a business strategy of CEO power: Does national culture matter? *Business Strategy and the Environment, 33*(3), 1865–1886. https://doi.org/10.1002/bse.3574
Qiao, P.-h., & Fung, A. (2016). How does CEO power affect innovation efficiency? *The Chinese Economy, 49*(4), 231–238. https://doi.org/10.1080/10971475.2016.1179017
Rachmat, L. M., Sumirat, E., & Nainggolan, Y. A. (2024). The influence of sustainability disclosure on financial performance: A study of Indonesian firms. *International Journal of Current Science Research and Review, 7*(3), 1857–1879. https://doi.org/10.47191/ijcsrr/V7-i3-48
Rahi, A. F., Johansson, J., Blomkvist, M., & Hartwig, F. (2024). Corporate sustainability and financial performance: A hybrid literature review. *Corporate Social Responsibility and Environmental Management, 31*(2), 801–815. https://doi.org/10.1002/csr.2600
Ravšelj, D., & Aristovnik, A. (2020). The Impact of R&D expenditures on corporate performance: Evidence from Slovenian and world R&D companies. *Sustainability, 12*(5), Article 1943. https://doi.org/10.3390/su12051943
Sewpersadh, N. S. (2019). An examination of CEO power with board vigilance as a catalyst for firm growth in South Africa. *Measuring Business Excellence, 23*(4), 377–395. https://doi.org/10.1108/MBE-10-2018-0083

Shahab, Y., Ntim, C. G., Ullah, F., Yugang, C., & Ye, Z. (2020). CEO power and stock price crash risk in China: Do female directors' critical mass and ownership structure matter? *International Review of Financial Analysis, 68*, Article 101457. https://doi.org/10.1016/j.irfa.2020.101457

Sheikh, S. (2012). Do CEO compensation incentives affect firm innovation? *Review of Accounting and Finance, 11*(1), 4–39. https://doi.org/10.1108/14757701211201803

Sheikh, S. (2019). CEO power and corporate risk: The impact of market competition and corporate governance. *Corporate Governance: An International Review, 27*(5), 358–377. https://doi.org/10.1111/corg.12285

Shen, K.-Y., Yan, M.-R., & Tzeng, G.-H. (2017). Exploring R&D influences on financial performance for business sustainability considering dual profitability objectives. *Sustainability, 9*(11), Article 1964. https://doi.org/10.3390/su9111964

Siegrist, M., Bowman, G., Mervine, E., & Southam, C. (2020). Embedding environment and sustainability into corporate financial decision-making. *Accounting & Finance, 60*(1), 129–147. https://doi.org/10.1111/acfi.12533

Singh, S. K., Del Giudice, M., Chiappetta Jabbour, C. J., Latan, H., & Sohal, A. S. (2022). Stakeholder pressure, green innovation, and performance in small and medium-sized enterprises: The role of green dynamic capabilities. *Business Strategy and the Environment, 31*(1), 500–514. https://doi.org/10.1002/bse.2906

Singhal, C., Mahto, R. V., & Kraus, S. (2020). Technological innovation, firm performance, and institutional context: A meta-analysis. *IEEE Transactions on Engineering Management, 69*(6), 2976–2986. https://doi.org/10.1109/TEM.2020.3021378

Slivko, O., & Theilen, B. (2014). Innovation or imitation? The effect of spillovers and competitive pressure on firms' R&D strategy choice. *Journal of Economics, 112*, 253–282. https://doi.org/10.1007/s00712-013-0361-5

Sun, W., Zhang, X., & Hazarika, N. (2023). Dilemmas of R&D investment risks and sustainability in the clean-tech economy: Evidence from Nasdaq clean edge index components. *International Journal of Green Energy, 20*(2), 139–152. https://doi.org/10.1080/15435075.2021.2023883

Tang, J., Crossan, M., & Rowe, W. G. (2011). Dominant CEO, deviant strategy, and extreme performance: The moderating role of a powerful board. *Journal of Management Studies, 48*(7), 1479–1503. https://doi.org/10.1111/j.1467-6486.2010.00985.x

Tien, C., Chen, C.-N., & Chuang, C.-M. (2013). A study of CEO power, pay structure, and firm performance. *Journal of Management & Organization, 19*(4), 424–453. https://doi.org/10.1017/jmo.2013.30

Utomo, S. D., & Machmuddah, Z. (2024). The impact of CEO compensation and governance disclosure on firm value moderated by integrated reporting. *Corporate Board: Role, Duties and Composition, 20*(2), 27–33. https://doi.org/10.22495/cbv20i2art3

Wang, L., Ur Rehman, A., Xu, Z., Amjad, F., & Ur Rehman, S. (2023). Green corporate governance, green finance, and sustainable performance nexus in Chinese SMEs: A mediation moderation model. *Sustainability, 15*(13), Article 9914. https://doi.org/10.3390/su15139914

Wang, X., Fan, M., Fan, Y., Li, Y., & Tang, X. (2022). R&D investment, financing constraints and corporate financial performance: Empirical evidence from China. *Frontiers in Environmental Science, 10*, Article 1056672. https://doi.org/10.3389/fenvs.2022.1056672

Xie, H., Yang, J., Yu, W., Yang, Y., & Wu, W. (2020). The time-lag effect of R&D investment on the value of listed companies in China: A cross-industry analysis. *Journal of Creating Value, 6*(2), 217–231. https://doi.org/10.1177/2394964320923543

Xu, J., Liu, F., & Shang, Y. (2021). R&D investment, ESG performance and green innovation performance: Evidence from China. *Kybernetes, 50*(3), 737–756. https://doi.org/10.1108/K-12-2019-0793

Yin, X. (2019). Government subsidies, financial structure and R&D investment: Evidence from Chinese SMEs. *Journal of Service Science and Management, 12*, 186–199. https://doi.org/10.4236/jssm.2019.122013

Yoo, J., Lee, S., & Park, S. (2019). The effect of firm life cycle on the relationship between R&D expenditures and future performance, earnings uncertainty, and sustainable growth. *Sustainability, 11*(8), Article 2371. https://doi.org/10.3390/su11082371

Yu, P., Li, R., & Fang, S. (2017). An empirical study of the impact of corporate governance on R&D investment expenditure based on Guangdong high-tech enterprises. In *Proceedings of the 2017 International Conference on Management Science and Management Innovation (MSMI 2017)* (pp. 64–66). Atlantis Press. https://doi.org/10.2991/msmi-17.2017.15

Yuan, X., Hou, F., & Cai, X. (2021). How do patent assets affect firm performance? From the perspective of industrial difference. *Technology Analysis & Strategic Management, 33*(8), 943–956. https://doi.org/10.1080/09537325.2020.1855325

Zdaniuk, B. (2024). Ordinary least-squares (OLS) model. In F. Maggino (Ed.), *Encyclopedia of quality of life and well-being research* (2nd ed., pp. 4867–4869). Springer. https://doi.org/10.1007/978-3-031-17299-1_2008

Zhou, G., Liu, L., & Luo, S. (2022). Sustainable development, ESG performance and company market value: Mediating effect of financial performance. *Business Strategy and the Environment, 31*(7), 3371–3387. https://doi.org/10.1002/bse.3089