

Corporate Governance and Enterprise Innovation: Enhancing Firm Performance in China's Energy Sector

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ABSTRACT: This study examines the relationship between corporate governance, enterprise innovation, and firm performance, with a focus on the energy industry. The objective is to explore how corporate governance influences innovation and how innovation impacts overall performance. Data were collected from energy firms represented by 128 executives through a structured questionnaire and analyzed using partial least squares-structural equation modeling (PLS-SEM). The findings reveal that corporate governance positively affects both enterprise innovation and firm performance, and that enterprise innovation mediates the relationship between governance and performance. The implications for management practices and future research are discussed, highlighting the critical role of innovation in leveraging governance for better firm performance.

KEYWORDS: Corporate Governance, Enterprise Innovation, Firm Performance, Energy Sector, Mediation Analysis, Sustainability and Technology.

1. INTRODUCTION

The global energy sector is undergoing significant transformation, driven by the need for sustainable practices and technological innovation. Artificial intelligence (AI) has emerged as a critical tool in enhancing efficiency and sustainability, as highlighted by Ahmad et al. (2021), who emphasize its potential to optimize energy processes and address environmental challenges. However, integrating AI remains fraught with technical and regulatory hurdles. Similarly, blockchain technology, as explored by Andoni et al. (2019), presents both opportunities and challenges in ensuring transparency and efficiency in energy transactions, contributing to the sector's modernization.

The decarbonisation of energy systems, crucial for mitigating climate change, poses considerable challenges, particularly in achieving scalability and cost-effectiveness, as noted by Papadis and Tsatsaronis (2020). In parallel, innovations in hydrogen energy, discussed by Li and Zhang (2022), signify a promising avenue for achieving low-carbon energy solutions but require strategic policy frameworks for widespread adoption. Additionally, the stability of emulsions in the chemical and energy industries, as reviewed by Goodarzi and Zendehboudi (2019), underscores the complexity of energy processes and the importance of material science advancements. Despite technological strides, social aspects like gender diversity in renewable energy, especially wind power, remain underexplored. De Noronha et al. (2024) highlight the significance of inclusion from an environmental, social, and governance (ESG) perspective, indicating that addressing these gaps is essential for holistic sustainability.

Furthermore, incorporating effective corporate governance structures can serve as a catalyst for improving firm performance in energy companies. Corporate governance, as a framework for transparency and accountability, encourages innovation and strategic decision-making. This has been increasingly recognized in manufacturing sectors like China, where the mediation of enterprise innovation is becoming a critical factor in bridging governance practices with enhanced firm performance.

In line with that, the relationship between corporate governance and enterprise innovation in the energy industry highlights significant research gaps. Ferreira et al. (2021) and Zhu (2022) argue governance enhances innovation when tied to environmental objectives, yet Al Mamun et al. (2022) focus on strategic orientation's impact in SMEs outside the energy context. Ni et al. (2020) emphasize flexibility, but its applicability to energy organizations with rigid structures is unclear. The role of governance in fostering energy-specific innovations like renewables or AI-driven solutions remains underexplored. Similarly, the impact of enterprise innovation on firm performance in the energy sector also presents inconsistencies. Al Mamun et al. (2022) highlight innovation's benefits across industries, but Games and Rendi (2019) show variable financial outcomes based on innovation types, which lack specificity in energy contexts. Su et al. (2022) confirm strong innovation effects in data-intensive sectors but omit energy-specific challenges, while Yadav et al. (2019) find that innovation's influence varies by market dynamics, underlining the need for sector-specific studies. In addition to that, the connection between corporate governance and firm performance in energy remains partially addressed. Zhu (2022) links governance to performance through carbon reduction strategies, but Ferreira et al. (2021) identify performance gains primarily via dynamic capabilities. Games and Rendi (2019) and Al-Hakimi et al. (2021) stress governance-driven risk-taking and resilience, yet their relevance to energy firms navigating decarbonisation challenges and technology adoption is insufficiently addressed. The mediating role of enterprise innovation in the energy industry requires further exploration. Su et al. (2022) and Yadav et al. (2019) emphasize the importance of innovation as a mediator across sectors, but they lack insights on innovations specific to energy, such as hydrogen technology or smart grids. Zhu (2022) and Al Mamun et al. (2022) acknowledge variation in mediation effects by industry and organizational structure, underscoring the need to clarify how energy-specific governance structures leverage innovation to drive performance amidst global sustainability demands.

Thus, this study aims to determine how corporate governance affects firm performance and the relationship between these variables as mediated by enterprise innovation. Additionally, this study seeks to explore the impact of these variables on the energy industry, particularly focusing on how the integration of governance and innovation can drive performance in the context of ongoing challenges and transformations in the sector.

2. LITERATURE

Corporate Governance

Corporate governance underscores its significant influence on various aspects of firm behavior and performance, including tax strategies, corporate social responsibility (CSR), and environmental disclosure, which are critical for firms in the energy industry (Bhagat & Bolton, 2019; Kyere & Ausloos, 2021; Aguilera, Marano, & Haxhi, 2019). Kovermann and Velte (2019), Aguilera et al. (2021), and Alabdullah et al. (2019) discuss the role of corporate governance structures in mitigating corporate tax avoidance, highlighting a vital aspect of accountability for energy companies, which often face scrutiny over tax practices due to their environmental impact. Similarly, Zaman et al. (2022), Ullah, Muttakin, and Khan (2019), and Nour et al. (2020) illustrate how corporate governance and CSR intersect, emphasizing that strong corporate governance frameworks enable better CSR practices, which is essential in the energy industry, where environmental and social responsibilities are closely tied to corporate reputation and operational license.

In China, corporate governance remains pivotal, as Jiang and Kim (2020) reveal that improved governance can enhance transparency and align organizational practices with global standards—a pressing issue for energy firms seeking international partnerships (Kyere & Ausloos, 2021; Purbawangsa et al., 2020). Almashhadani and Almashhadani (2023) further argue that governance structures encourage environmental disclosure, which aligns with growing stakeholder demands for sustainability. Moreover, Naciti et al. (2022) propose that sustainable corporate governance is not only a regulatory response but also a strategic component, directly impacting the sustainability and long-term success of companies in industries like energy (Bhagat & Bolton, 2019; Aguilera et al., 2021).

Enterprise Innovation

Enterprise innovation highlights its essential role in driving sustainability, especially within the energy industry, where innovation is critical for balancing environmental impact and economic growth (Wu et al., 2021; Gu et al., 2023; Cen, Li, & Cui, 2020). Shao et al. (2020) discuss the influence of environmental regulations on enterprise innovation, suggesting that such policies can spur firms in the energy sector to adopt cleaner technologies and processes to comply with regulations while maintaining competitiveness (Zhuo & Chen, 2023; Qiu et al., 2020; Hu, Wang, & Wang, 2021). This is particularly relevant in industries with high environmental footprints, as regulatory pressures can drive advancements in energy efficiency and emissions reduction.

Digital transformation is another significant factor in enterprise innovation. Li et al. (2022) and Zhuo and Chen (2023) argue that digitalization facilitates enterprise innovation by enabling real-time data analysis, improving operational efficiency, and fostering agile responses to market demands. In the energy sector, where digital transformation can streamline operations and enhance decision-making processes, digital tools support innovations that reduce costs and environmental impact (Yang et al., 2019; Jie, Martínez, & Crespo, 2020; Jones, Fleming, & Laugharne, 2020; Pan et al., 2022).

Firm Performance

Firm performance is a multi-dimensional concept that is influenced by various factors, including social media, board characteristics, diversification, CEO behavior, and data analytics, all of which are critical in the energy industry where external pressures and operational complexities are particularly high (Schommer et al., 2019; Otto et al., 2020; Loukis, Janssen, & Mintchev, 2019). Taouab and Issor (2019) and Al-Surmi, Cao, and Duan (2020) provide foundational insights into firm performance measurement models, highlighting that the appropriate model depends on the specific industry and strategic goals. Customized criteria are necessary for precise performance measurement in the energy sector, where both financial performance and environmental effect are crucial (Bandiera et al., 2020). Tajvidi and Karami (2021) explore the impact of social media on firm performance, underscoring how digital engagement can enhance customer relationships and brand reputation. This is significant in energy, where public perception of sustainability can drive customer loyalty and investor interest (Bajari et al., 2019; Mikalef et al., 2019).

The composition and characteristics of boards also play a pivotal role in firm performance. Pucheta-Martínez and Gallego-Álvarez (2020), Bernard, Moxnes and Saito (2019), and Bayraktaroglu et al. (2019) demonstrate that diverse and well-structured boards can improve decision-making quality, a necessity in the energy sector where strategic foresight is crucial. Alqatan et al. (2019) and Merendino and Melville (2019) similarly emphasize the role of board structure, suggesting that effective governance can lead to improved financial performance by ensuring accountability and innovation alignment (Yang et al., 2019; Khan, 2022; Lee et al., 2019).

Theory

In order to give a thorough understanding of how corporate governance affects firm performance and how enterprise innovation mediates this relationship, especially in the energy industry, the theoretical framework for this study incorporates three important theories: corporate entrepreneurship theory (CET) and innovation diffusion theory (IDT). The theoretical framework for this study integrates the IDT and CET to explore the dynamics of innovation adoption and its impact on organizational performance. IDT, as highlighted by Arunachalam et al. (2021) and Hassan et al. (2020), explains how innovations spread within organizational settings, emphasizing the role of organizational readiness, leadership, and external pressures. Kamal and Flanagan (2019) further suggest that effective diffusion is contingent on clear communication channels and managerial commitment, critical in contexts like digital transformation and green innovation (Lee & Trimi, 2022).

Complementing this, CET underscores the importance of entrepreneurial strategies in fostering competitive advantage through innovation (Wales et al., 2019). Spender and Corvello (2021) argue that firms with robust corporate entrepreneurship processes are better equipped to integrate innovations into their strategies. Mathisen and Rasmussen (2020) also highlight the synergistic role of innovation and sustainability in enhancing organizational resilience, especially in small and medium-sized enterprises (SMEs). Combining these theories allows a comprehensive understanding of how organizational innovation is both a driver and an outcome of entrepreneurial strategies, offering a robust model to study its mediating effects on firm performance.

3. METHODOLOGY

Research Participants and Data

This study was conducted in Xingtai City, Handan Hebei Province, where the majority of the energy firms are situated. These companies are represented by their executives with at least 3 years of experience working for them. Most of the companies represented are from the Jizhong energy group, which has many branches scattered throughout China.

The number of samples is a minimum of 124 respondents based on the priori statistical power analysis using G Power with power = $.80(1 - \beta)$, effect size = $.25$, and $\alpha = .05$. Statistical power analysis is the appropriate method in computing for the sample size if the goal is to accept or reject any hypothesis (Cohen, 1992; Jobst et al., 2023).

128 executives of energy enterprises participated in the survey using Survey Star online forms. The researchers assured that the data and information gathered would remain confidential and strictly used for research purposes.

Instrumentation

The survey questionnaire was used to collect data from the respondents. Likert scale items were formulated based on the guidance from previous literature to measure each of the constructs as detailed in Table 1:

Table 1. Likert Scale Items

Variables/Constructs	Questionnaire Items / Indicators	Source
Corporate Governance	The CEO, Chairperson, and other members of the board of directors present at the annual general meeting to answer shareholder questions. Any member of the board of directors reprimanded properly for violating any company or government regulations The independent directors are involved in the board of directors meeting materials. The board of directors complies with board meeting rules. The company establish an investor relations department.	Bhagat and Bolton (2019) and Antwi et al. (2021)
Enterprise Innovation	Ideas of innovation continue to be generated from employees and customers. The speed at which ideas are incubated are favourable to the business process. Innovative ideas are implemented and put into good use in our systems We are reaping the benefits of innovative ideas in our processes and systems.	Li et al. (2022) and Zhuo and Chen (2023)
Firm Performance	Revenues continue to increase. Marketing efforts are realized through sales. The company is financially stable based on its financial position. Operations continue to improve in terms of product/service quality and efficiency.	Pucheta-Martínez and Gallego-Álvarez (2020)

Each construct or latent variable described in the conceptual framework was intended to be measured by the questionnaire items with a 4-point Likert scale. Respondents assess it based on how much they concur with each of these assertions (Hair et al., 2011).

Statistical Treatment

The partial least square-structural equation model (PLS-SEM) was used following the instructions and recommendations of Hair et al. (2022). The measurement model was first conducted by determining the construct validity and reliability of the constructs. After such, the direct effects and the indirect effects were ascertained to build the structural model (Hair et al., 2011).

Data Analysis

Measurement Model Evaluation

Construct Validity and Scale Reliability

Table 2 Construct Validity and Scale Reliability

Construct	Items	Cronbach's α	Loadings	Ave. Ext.	Var.
Corporate Governance	1	0.926	0.931	0.727	
	2		0.781		
	3		0.847		
	4		0.961		
	5		0.721		
Enterprise Innovation	1	0.961	0.927	0.860	
	2		0.916		
	3		0.945		
	4		0.922		
Firm Performance	1	0.953	0.921	0.840	
	2		0.939		
	3		0.923		
	4		0.882		

Note: All loadings have p value of <.001.

The reliability and convergent validity test results are shown in Table 2. All survey items measuring each construct considerably exceeded the required Cronbach's coefficient value of at least 0.70. This evidence the reliability of each construct.

In establishing convergent validity, the standard is that all loadings and all Average Variance Extracted (AVE) should be ≥ 0.50 . Based on the analysis, the relevant constructs' items exceed these standards. As a result, these items were valid in measuring each construct.

Discriminant Validity

Table 3. Discriminant Validity for Reflective Constructs

Constructs	1	2	3	Discriminant Validity
Corporate Governance (1)	0.853			Yes
Enterprise Innovation (2)	0.672	0.928		Yes
Firm Performance (3)	0.757	0.77	0.916	Yes

Table 3 shows the results of discriminant validity to determine if respondents can distinguish one variable from the other and grasp the differences between the variables. It can be noticed that the square root of the AVE, shown in bold figures, are greater than the correlations of each variable to one another. Therefore, each construct meets the standard of the discriminant validity prescribed by Fornell-Larcker (1981).

The measurement model is deemed appropriate considering the findings of composite reliability, convergent reliability, and discriminant validity.

Hypothesis

Corporate Governance Linked with Enterprise Innovation

Corporate governance plays a critical role in driving enterprise innovation, particularly within the energy sector, where sustainability and technological advancement are paramount (Xue et al., 2022; Oladeinde et al., 2023). Asensio-López, Cabeza-García, and González-Álvarez (2019) highlight that strong corporate governance structures are essential to fostering an environment conducive to enterprise innovation by ensuring

accountability and aligning the strategic goals of innovation initiatives. For state-owned enterprises, Jia, Huang, and Zhang (2019) show that both corporate and public governance significantly influence enterprise innovation, as government involvement can either enhance or constrain enterprise innovation depending on regulatory frameworks and market pressures.

In high-tech energy enterprises, governance practices are especially influential due to the rapid evolution of technology and the need to integrate big data into operational decisions. Lin et al. (2020) and Khan et al. (2019) emphasize that a combination of internal and external governance mechanisms can enhance innovation by facilitating access to resources and supporting risk management in uncertain environments, such as those driven by big data technologies. This is echoed by Scherer and Voegtlin (2020), who argue that governance aimed at responsible innovation can ensure sustainable development by balancing profit with environmental and social considerations (Khan et al., 2019; Oladeinde et al., 2023). This hypothesis is thus developed based on the comprehension of the debate above:

H1: Corporate Governance has a significant effect on enterprise innovation

Enterprise Innovation Linked with Firm Performance

Enterprise innovation is a critical driver of firm performance, particularly within the energy industry, where technological advancements, environmental considerations, and resource constraints create both challenges and opportunities (Xu et al., 2019; Chege, Wang, & Suntu, 2020). Kijkasiwat and Phuensane (2020) argue that firm size and financial access play key roles in how innovation impacts performance, particularly for small and medium enterprises (SMEs). Such moderating elements are crucial to comprehending performance results in the energy sector, where scaling innovation can be capital-intensive (Latifi, Nikou, & Bouwman, 2021). Similarly, Wang (2019) and Feng, Ma, and Jiang (2021) find that technological innovation positively impacts firm performance in SMEs, with environmental factors as significant moderators, emphasizing the importance of external conditions—such as regulatory and ecological pressures in the energy sector—that shape the relationship between innovation and success.

In addition, Zhang, Rong, and Ji (2019) provide evidence that enterprise innovation improves firm performance among Chinese firms, underscoring the dual economic and environmental benefits of green initiatives in the energy industry. Their findings align with Ramadani et al. (2019), who demonstrate that enterprise innovation enhances performance in transition economies, where energy firms face pressures to innovate amidst fluctuating market and regulatory environments. Bigliardi et al. (2020) and Xu et al. (2019) examine open innovation and conclude it positively influences firm performance by expanding collaboration and resource sharing—an approach that is especially valuable for energy companies in addressing complex, industry-wide challenges (Chege, Wang, & Suntu, 2020; Corral de Zubielqui et al. 2019). Based on the aforementioned studies, there seems to be a connection when firms consider sustainable practices to their competitive advantage:

H2: Enterprise innovation has a significant effect on firm performance

Corporate Governance Linked with Firm Performance

Hermuningsih et al. (2020) and Rejeb and Missaoui (2019) stated that corporate governance significantly influences firm performance, with this relationship particularly crucial in the energy industry, where robust governance is essential to managing high operational risks, compliance requirements, and stakeholder interests. Bhagat and Bolton (2019) and Antwi et al. (2021) emphasize that effective corporate governance frameworks improve firm performance by aligning management with shareholder interests, a benefit for energy firms that must navigate complex, capital-intensive operations. Alodat et al. (2022) and Puni and Anlesinya (2020) similarly find that corporate governance mechanisms enhance firm performance, a finding particularly relevant to energy companies in regions with developing regulatory environments, such as Jordan. These governance mechanisms help firms maintain investor confidence and ensure compliance, both of which are critical in the energy industry, where environmental and social governance (ESG) standards are becoming increasingly strict (Wang et al., 2020; Kapil & Mishra, 2019; Koji, Adhikary, & Tram, 2020).

Studies in emerging markets, such as those by Ciftci et al. (2019) in Turkey and Farooq et al. (2022) in Pakistan, further demonstrate that governance practices, including board independence and ownership structures, can enhance firm performance. These factors are vital for energy companies in emerging economies, which face distinct challenges like political instability and varying regulatory standards. Mertzanis et al. (2019) and Huynh et al. (2022) find that social institutions and governance structures can either hinder or bolster firm performance depending on institutional quality, emphasizing the need for reliable governance in energy firms operating in politically and economically volatile areas (Danoshana & Ravivathani, 2019; Arayssi & Jizi, 2019). The following theory is put out after a comprehensive analysis of the pertinent literature:

H3: Corporate governance has a significant effect on firm performance

Enterprise Innovation as a Mediating Variable

The mediating role of enterprise innovation is pivotal in understanding the link between corporate governance and firm performance, particularly in the energy industry, where innovation drives sustainability and efficiency (Ferreira et al., 2021; Al-Hakimi et al., 2021). Al Mamun et al. (2022) and Chen and Kim (2023) highlight that innovation mediates the relationship between strategic orientation and enterprise performance, a finding particularly relevant to the energy sector as firms must align innovation with strategic goals to address environmental challenges and improve operational outcomes. Similarly, Ni et al. (2020) and Su et al. (2022) expand on the mediating role of innovation by demonstrating that dual innovations—incremental and radical—bridge the gap between big data analytics capabilities and organizational performance. This finding is particularly applicable to the energy industry, where leveraging data-driven innovation can optimize energy consumption, predict maintenance needs, and enhance grid resilience (Zhu, 2022; Ferreira et al., 2021).

Additionally, Chen and Kim (2023) show that digital transformation impacts innovation performance through mediating innovation factors, further underscoring the necessity for energy firms to embrace digital solutions to maintain competitiveness and sustainability. Yadav et al. (2019) and Games and Rendi (2019) emphasize the mediating role of innovation in linking market orientation to performance, suggesting that energy firms with a strong market focus must invest in innovative solutions to meet evolving consumer demands for renewable energy and sustainable practices (Al-Hakimi et al., 2021).

H4: Enterprise Innovation mediates the relationship between corporate governance and firm performance.

4. RESULTS

Structural Model Evaluation

Table 4. Structural Path Results

Direct Path	Estimate	SE	Z	p	Interpretation
Corporate Governance to Enterprise Innovation	0.756	0.0842	8.98	<.001	H1 Accepted
Enterprise Innovation to Firm Performance	0.469	0.1879	2.49	0.013	H2 Accepted
Corporate Governance to Firm Performance	0.428	0.1526	2.80	0.005	H3 Accepted

Table 4 shows the direct path evaluation results. The findings show corporate governance affects enterprise innovation positively ($\beta = 0.756$; $p = <.001$). The results evidence the probability that enterprise innovation increases around 0.756 for every 1-level increase of corporate governance. Thus, H1 is accepted.

On the other hand, the result further indicates that enterprise innovation affects firm performance positively ($\beta = 0.469$; $p = 0.013$). The results evidence the probability that firm performance increases around 0.469 for every 1-level increase in enterprise innovation. Therefore, H2 is consequently accepted.

Results also indicate that corporate governance affects firm performance positively ($\beta = 0.428$; $p = 0.005$). The results evidence the probability that firm performance increases around 0.469 for every 1-level increase in corporate governance. Therefore, H3 is also accepted.

Mediating Effect of Enterprise Innovation on the Relationship Between Corporate Governance and Firm Performance

Table 5 Indirect, Direct and Total Effects

Effect	Estimate	SE	Z	p	Interpretation
Indirect	0.355	0.142	2.51	0.01	H4 Accepted
Direct	0.428	0.153	2.8	0.01	
Total	0.782	0.083	9.39	<.001	

Note: If the p-value is lower than 5% or 0.05, it is statistically Significant. If the p-value is greater than 5%, the result is statistically non-significant.

Mediation analysis was conducted to assess the mediating effect of enterprise innovation on the relationship between corporate governance and firm performance as shown in Table 5. The indirect effect of enterprise

innovation on corporate governance with firm performance as a mediator is found significant ($\beta = 0.355$, $z(123) = 2.51$, $p = 0.01$). Due to the result, the H4 is accepted. This depicts that enterprise innovation may amplify any relationship between corporate governance and firm performance. Enterprise innovation may increase or supplement the impact of corporate governance on firm performance. However, the direct analysis results in Table IV show that corporate governance significantly affects firm performance. This is a case of partial mediation by enterprise innovation.

5. CONCLUSION

Corporate Governance on Enterprise Innovation

Based on the evaluation of results, it concludes that effective corporate governance significantly promotes enterprise innovation. When organizations adopt strong governance structures, they create an environment that fosters creativity and new product development. This finding aligns with prior research, which suggests that corporate governance facilitates innovation by providing clearer organizational objectives and resources (Xue et al., 2022; Oladeinde et al., 2023). This contributes to a deeper understanding of how governance influences innovation practices, which has not been widely explored in the energy sector.

Enterprise Innovation on Firm Performance

The results indicate that enterprise innovation positively influences firm performance, which reinforces the view that innovation is a key driver of business success. By introducing novel solutions and practices, companies can enhance efficiency, reduce costs, and improve competitive positioning. This conclusion is consistent with previous studies that highlight the critical role of innovation in improving firm outcomes (Latifi, Nikou, & Bouwman, 2021). These findings are particularly relevant to the energy sector, where technological advancements and innovation can significantly boost operational performance.

Corporate Governance on Firm Performance

The analysis confirms that corporate governance directly affects firm performance, underscoring the importance of governance practices in ensuring organizational effectiveness. This result mirrors earlier studies, which emphasize that robust governance frameworks lead to improved decision-making and resource allocation (Hermuningsih et al., 2020). For the energy industry, this finding suggests that companies with strong governance structures are better positioned to achieve sustainable business outcomes and meet performance targets.

Mediating Role of Enterprise Innovation

The mediation analysis indicates that enterprise innovation partially mediates the relationship between corporate governance and firm performance. This suggests that while governance contributes directly to performance, innovation amplifies this effect. These results support the notion that governance alone is insufficient for optimal performance in the energy sector; innovation is essential for fully capitalizing on governance structures (Chen & Kim, 2023). This insight provides a more nuanced understanding of the interplay between governance, innovation, and performance, particularly in industries like energy, where innovation is key to adapting to market shifts.

Implications

For theory development

The study's findings reinforce the theoretical interplay between Corporate Entrepreneurship Theory (CET) and Innovation Diffusion Theory (IDT), demonstrating that corporate governance directly enhances firm performance while enterprise innovation serves as a partial mediator in this relationship. By providing an environment conducive to entrepreneurial activities, governance facilitates the adoption and diffusion of innovation, amplifying its impact on performance. This highlights the importance of fostering a culture of innovation alongside robust governance frameworks, particularly in the energy sector, where sustainability and technological advancements are critical. These insights contribute to the theoretical understanding of how governance and innovation synergize to drive performance in rapidly evolving industries.

Business and management practice

Findings emphasized the importance of integrating corporate governance with enterprise innovation to improve firm performance. Energy companies should view governance not just as a regulatory requirement, but as a strategic tool to foster innovation. By aligning governance practices with innovation initiatives, firms can enhance their competitive edge and drive sustainable growth. Moreover, since enterprise innovation partially mediates the relationship between governance and performance, energy firms should cultivate an innovative culture to maximize the benefits of governance reforms, ensuring long-term success and resilience in a rapidly evolving industry.

Energy Sector

Corporate governance plays a crucial role in fostering enterprise innovation, which in turn drives firm performance. Emphasizing robust governance practices not only enhances innovation but also amplifies firm outcomes, reinforcing the importance of leadership and strategic decision-making. Energy companies should recognize the symbiotic relationship between governance and innovation, leveraging both to improve efficiency and competitiveness. Understanding the mediating role of innovation in this dynamic can guide industry professionals in crafting policies that enhance long-term performance and sustainability.

The findings suggest that energy enterprises should view corporate governance not merely as a compliance mechanism but as a strategic tool to foster innovation and enhance performance. Robust governance structures can create an environment that supports innovation, enabling firms to address sector-specific challenges such as sustainability and technological advancement. By aligning governance practices with innovation-driven initiatives, energy companies can improve operational efficiency, adapt to market demands, and achieve long-term competitive advantage. This underscores the need for energy enterprises to invest in both governance reforms and a culture of innovation to navigate the rapidly evolving industry landscape effectively.

Implications

This study is limited by its focus on energy enterprises in a specific geographic region, which may restrict the generalizability of the findings to other industries or global contexts. Additionally, the reliance on cross-sectional data and a survey design introduces potential biases such as common method bias and self-reporting inaccuracies, which may affect the reliability of the results. The survey design also limits the ability to capture deeper, qualitative insights into organizational processes and contextual nuances. Future research could address these limitations by conducting longitudinal studies across diverse industries and regions to explore variations in the observed relationships, employing mixed-method approaches to combine quantitative and qualitative insights, and including additional factors such as regulatory frameworks, cultural influences, or technological readiness to provide a more comprehensive understanding of how corporate governance and innovation interact to drive firm performance.

Declarations

Ethics approval and consent to participate

The objectives, contents, and conclusion of this research were evaluated by a Research Ethics Board of a University and were found meritorious. No violations of research ethics standards were found, as the researchers were cautious and courteous in their data-gathering. There is no potential conflict of interest to declare. Informed consent was secured from the participating companies before data gathering.

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