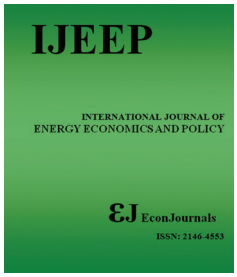

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Corporate Governance and Sustainable Energy Performance: Challenges and Strategies of Moroccan Subsidiaries in the Green Transition

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ABSTRACT

In the current global landscape shaped by the energy transition and increasing sustainability imperatives, corporate governance is progressively recognized as a strategic driver for enhancing energy responsibility. This study investigates the influence of governance mechanisms on energy performance and sustainability within subsidiaries of Moroccan business groups. Adopting a quantitative and deductive research design, the study develops a conceptual framework that links governance quality, energy transparency, and sustainable performance. Empirical data were collected from a sample of subsidiaries operating in energy-intensive industries. Multiple linear regression analysis was employed to test the hypotheses derived from prior research on corporate governance and sustainability. The results reveal a positive and statistically significant relationship between governance mechanisms and energy responsibility, demonstrating that transparency, strategic oversight, and board commitment contribute to improved sustainable performance among subsidiaries. These findings confirm that corporate governance plays a pivotal role in supporting Morocco's energy transition. They further underscore the necessity of adopting governance frameworks that explicitly integrate energy responsibility into strategic and operational decision-making. This research enriches the literature on energy governance in emerging economies by proposing an integrated empirical model of sustainable performance contextualized to Moroccan corporate realities.

Keywords: Corporate Governance, Energy Responsibility, Sustainable Performance, Moroccan Business Groups
JEL Classifications: G34, Q48, Q01, Q40, L20

1. INTRODUCTION

The energy transition has become an imperative strategic necessity in the face of the challenges posed by climate change, rising environmental pressures, and the volatility of global energy markets. For emerging economies, this transition presents a dual challenge: Ensuring energy security while improving the competitiveness of businesses within a context marked by increasing sustainability requirements. In this regard, corporate governance emerges as a critical lever for guiding organizations toward controlled energy performance aligned with sustainable development objectives. Recent literature highlights that governance mechanisms significantly influence the integration of responsible practices within companies, particularly through transparency, strategic oversight, and executive accountability (Masud et al., 2024). Several empirical studies show that the quality of the board of directors, the independence of its members, and the diversity of their profiles strengthen strategic choices that favor energy sustainability (Lee and Chin Yee, 2025). Other works emphasize that a company's environmental commitment cannot be fully understood without considering the quality of its governance framework and the institutional mechanisms that accompany it (Alkhawaja and Dsouza, 2025).

However, while the relationship between governance and environmental performance has garnered increasing attention, few studies have specifically focused on energy responsibility - understood as transparency, efficiency, and strategic management of energy consumption - and its integration with the internal governance of organizations. Moreover, most research focuses on large multinational corporations or publicly listed companies, overlooking subsidiaries of national groups, which play a central economic role in emerging countries and have varying degrees of decision-making autonomy depending on the governance mechanisms in place (Taghzouti, 2025).

Against this backdrop, the present study aims to analyze the effect of corporate governance structures on the energy performance and sustainability of subsidiaries belonging to Moroccan conglomerates. It relies on a conceptual model that incorporates energy transparency as an intermediary variable between governance and sustainable performance. A quantitative approach, based on data collected from managers of subsidiaries operating in energy-intensive sectors, allows for the empirical testing of hypotheses derived from previous studies on governance and organizational sustainability (Wooldridge, 2018; Lassoued, 2021; Momin et al., 2025).

This study contributes to the literature on governance and the energy transition in three key ways. First, it offers an analytical framework explicitly linking internal governance to energy responsibility. Second, it examines this relationship within the context of an emerging economy, taking into account the specificities of Moroccan conglomerates. Third, it provides managerial implications for sustainably integrating energy performance into governance practices.

The remainder of the article is structured as follows: after a theoretical review of the foundations linking governance, energy responsibility, and organizational sustainability, the conceptual model and research hypotheses are presented. The empirical analysis methodology is then detailed, followed by a discussion of the results and the formulation of implications and recommendations.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Literature Review

2.1.1. Corporate governance, energy consumption, and sustainable development

A strong link exists between the quality of governance and the energy and environmental performance of organizations. Effective institutional governance promotes a more rational use of energy, thereby enhancing both economic and environmental sustainability (Lassoued, 2021). In a study conducted across 17 countries in the MENA region, Lassoued (2021) demonstrates that institutional weakness reduces the capacity of economies to convert their energy consumption into sustainable growth, highlighting the importance of a solid governance framework in the energy transition. Similarly, Ijaz and Chughtai (2022) show that institutional governance plays a significant moderating role between economic factors and energy efficiency, confirming that robust governance mechanisms create an environment conducive to improving the energy performance of businesses. These findings suggest that, for companies, internal governance—through control mechanisms, strategic oversight, and transparency—serves as a critical lever for guiding energy decisions towards sustainability.

2.1.2. Energy management practices: Audits and internal mechanisms

Energy audits and internal energy management practices play a central role in improving energy performance within organizations. According to Alhassan and Tsokoto (2024), energy management practices (EMPs) such as consumption monitoring, energy planning, and internal audits enable companies to identify sources of energy waste and enhance their environmental performance. These authors also demonstrate that the effectiveness of these practices is amplified when companies benefit from institutional or governmental incentives.

Furthermore, Masud et al. (2024) show that corporate governance plays a crucial role in improving environmental, social, and governance (ESG) performance, particularly in the environmental aspect related to emission reduction and energy efficiency. In a similar vein, Sarpong and Osei (2023) emphasize that board leadership is pivotal in supporting investments in renewable energy, highlighting a direct interaction between strategic governance and sustainable energy performance.

Thus, internal mechanisms such as energy audits serve as an operational extension of governance structures, reinforcing the energy management practices within organizations. These audits enable businesses to systematically track energy use, ensure compliance with sustainability goals, and identify opportunities for efficiency improvements, making them essential tools for driving long-term energy sustainability.

2.1.3. Skills, training, and energy ownership

The literature also highlights the critical role of human capital in the success of corporate energy strategies. Khan et al. (2023) demonstrate that continuous training in energy management contributes to the acquisition of the technical skills necessary for optimizing energy consumption. Similarly, Alhassan and Tsokoto (2024) confirm that energy awareness fosters organizational commitment to improving energy performance.

Moreover, Masud et al. (2024) argue that companies with effective governance mechanisms are more likely to integrate the energy dimension into their internal training programs, enabling better adoption of energy practices at all hierarchical levels. This approach not only strengthens the technical capabilities of employees but also promotes a culture of energy responsibility throughout the organization, ensuring that energy management becomes a shared priority across different tiers of the business. By enhancing energy ownership and competence, companies can better align their workforce with their sustainability goals, ultimately driving more effective energy management.

2.1.4. External stakeholders, institutional incentives, and normative pressure

The institutional environment and the involvement of external stakeholders also play a decisive role in the energy performance of companies. According to Yilanci and Pata (2023), uncertainties related to energy policies are a significant barrier to the adoption of sustainable energy solutions. In another study, Türedi (2024) demonstrates that institutional quality enhances the impact of ESG practices on the sustainable performance of companies, particularly in energy-intensive sectors.

Finally, Alhassan and Tsokoto (2024) emphasize that governmental incentives stimulate the adoption of energy management practices and strengthen the effectiveness of internal mechanisms. These findings confirm that sustainable energy performance results from a combination of internal governance mechanisms and external institutional pressures. This interplay between internal and external factors creates a conducive environment for companies to invest in energy efficiency, comply with environmental standards, and achieve long-term sustainability goals. By aligning governance with institutional expectations and regulatory frameworks, organizations can better navigate the complexities of the energy transition.

2.2. Hypothesis Development

In light of the conclusions drawn from the literature, it is clear that the sustainable energy performance of companies is influenced by a combination of internal governance mechanisms and external institutional pressures. In the specific context of subsidiaries of Moroccan conglomerates, which are often faced with significant energy challenges, the integration of energy governance practices becomes a strategic lever for sustainability.

Energy audits are a key tool for identifying sources of energy waste, reducing costs, and improving overall energy efficiency. They enable continuous monitoring and ensure the optimal allocation of energy resources (Alhassan and Tsokoto, 2024). These authors demonstrate that companies that regularly adopt formal energy management practices (EMPs), including audits, energy tracking, and planning, experience significant improvements in their environmental performance. Furthermore, Masud et al. (2024) show that corporate governance strengthens these internal mechanisms by imposing oversight and transparency, thereby facilitating better integration of energy goals into the overall strategy.

Additionally, Sarpong and Osei (2023) confirm that board-level supervision enhances energy performance through strategic oversight. Therefore, energy audits, combined with proactive governance, should positively contribute to the energy performance of Moroccan subsidiaries. By ensuring that energy management is embedded within both governance frameworks and operational practices, these organizations are better positioned to achieve sustainable energy outcomes.

H_1: Energy audits and proactive cost management positively influence sustainable energy performance.

The role of human capital is central to the adoption of an effective energy strategy. According to Khan et al. (2023), the development of internal skills through technical and managerial training in energy management enhances a company's ability to integrate energy efficiency solutions. The authors also highlight that energy awareness directly contributes to reducing energy consumption. Alhassan and Tsokoto (2024) further argue that energy performance is not only dependent on technical investments but also on the organizational capacity to foster an energy culture. This dissemination occurs through continuous training, team empowerment, and the involvement of managers in understanding energy issues. Finally, Masud et al. (2024) emphasize that companies with effective governance systematically integrate training into their ESG programs.

H_2: Continuous energy training enhances sustainable energy performance.

External stakeholders - such as the government, regulators, banks, and investors - exert normative and financial pressures that influence corporate energy decisions. Alhassan and Tsokoto (2024) demonstrate that institutional incentives, such as subsidies or public energy programs, enhance the effectiveness of internal energy management practices. Similarly, Türedi (2024) shows that institutional quality positively moderates the impact of ESG practices, particularly by facilitating access to sustainable finance and promoting the adoption of renewable energy. Furthermore, Yilanci and Pata (2023) emphasize that regulatory stability is a key factor supporting the energy transition: political uncertainties or regulatory risks hinder companies' energy commitments. Finally, Ijaz and Chughtai (2022) confirm that institutions play a crucial role in strengthening the link between corporate governance and energy performance.

H_3: The engagement of external stakeholders enhances sustainable energy performance.

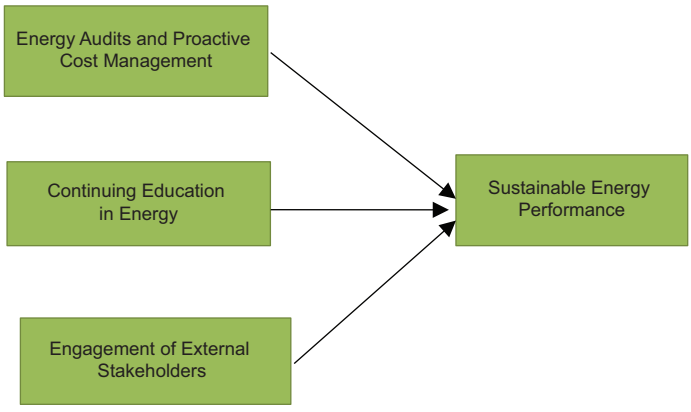
Figure 1 illustrates the conceptual research model developed on the basis of the research hypotheses.

3. METHODOLOGY AND DATA

3.1. Methodology and Sample of the Study

In the context of this research, a quantitative approach based on a hypothetico-deductive reasoning framework has been employed.

Figure 1: Research model



Source: Authors' own elaboration

The aim of this approach is to empirically test the hypotheses derived from the conceptual model, using a sample of managers from Moroccan subsidiaries undergoing a green transition.

Data were collected through a structured questionnaire, designed using a five-point Likert scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"). The final sample consists of 246 respondents, with data collection taking place from mid-December 2024 to the end of July 2025.

3.2. Measurement Scales

3.2.1. The variable energy audits and proactive cost management

The variable "Energy Audits and Proactive Cost Management" reflects the degree of commitment of companies to a structured approach for controlling their energy consumption. This is achieved through the periodic execution of energy audits and the implementation of tools for monitoring and optimizing energy expenditures. Several empirical studies (Cagno et al., 2013; Lee and Cheng, 2018; IEA, 2022) emphasize that energy audits are the primary lever for identifying inefficiencies, while proactive cost management aims to continuously improve energy performance. This variable is measured using items derived from previous studies and adapted to the context of industrial enterprises (Table 1).

3.2.2. The variable continuous energy training

Continuous energy training is a key lever for enhancing internal competencies related to energy management and cost reduction. It helps raise employee awareness of energy-related issues, improves process efficiency, and supports the adoption of energy-efficient technologies. Several studies have shown that companies investing in continuous training achieve better energy performance (Thollander and Palm, 2012; Caffal, 1995; Abdelaziz et al., 2011). The following items are used to measure the subsidiary's level of commitment to the development of energy-related skills (Table 2).

3.2.3. The variable engagement of external stakeholders

External stakeholder engagement refers to the extent of interaction and collaboration between a firm and external actors such as energy suppliers, public institutions, customers, professional associations, and certification bodies. In the context of energy performance, such engagement plays a pivotal role by facilitating access to innovation, energy efficiency programs, financing mechanisms, and regulatory incentives. As emphasized by Freeman (1984) and Clarkson (1995), firms that actively involve their stakeholders in their sustainable development strategies tend to strengthen their competitiveness and improve operational performance. Accordingly, external stakeholder engagement is expected to exert a positive influence on the subsidiary's sustainable energy performance (Table 3).

Table 1: Measures related to energy audits and proactive cost management

Code	Items	Scale type	References
AE1	In our subsidiary, energy audits are conducted regularly (annually or multi-annually).	5-point Likert scale (1 = Strongly Disagree → 5 = Strongly Agree)	Cagno et al. (2013), Rohdin et al. (2007), Lee and Cheng (2018), Backlund et al. (2012), Trianni et al. (2016), ISO 50001 (2018), Thollander and Palm (2012)
AE2	The recommendations resulting from energy audits are effectively implemented.		
AE3	We have a formal system for measuring and monitoring energy consumption.		
AE4	A specific budget is allocated for actions aimed at improving energy performance.		
AE5	Energy costs are taken into account in investment decisions (machinery, equipment, buildings).		
AE6	Energy performance indicators (KPIs) are regularly monitored in the subsidiary.		

Source: Authors' own elaboration

Table 2: Measures related to continuous energy training

Code	Items	Scale type	References
FCE1	Our subsidiary regularly organizes training related to energy efficiency.	5-point Likert scale (1 = Strongly Disagree → 5 = Strongly Agree)	Abdelaziz et al. (2011), Thollander and Palm (2012), Caffal (1995), Backlund et al. (2012), Schulze et al. (2016), ISO 50001 (2018)
FCE2	Employees are made aware of best practices for reducing energy consumption.		
FCE3	Training sessions are dedicated to the optimal use of energy-intensive equipment.		
FCE4	An internal or external program for enhancing energy skills is available to staff.		
FCE5	The subsidiary actively encourages staff participation in energy management training.		

Source: Authors' own elaboration

Table 3: Measures related to engagement of external stakeholders

Code	Items	Scale type	References
EPE1	Our subsidiary collaborates with suppliers to optimize energy consumption.	5-point Likert scale (1 = Strongly Disagree → 5 = Strongly Agree)	Freeman (1984), Clarkson (1995), Mitchell et al. (1997), IEA (2022), Cagno et al. (2013), Henriques and Sadorsky (1999), Delmas and Toffel (2004)
EPE2	We regularly receive support from public organizations or energy agencies (e.g., AMEE).		
EPE3	The environmental and energy requirements of our clients influence our internal practices.		
EPE4	Our subsidiary participates in national or sectoral energy efficiency programs.		
EPE5	We engage external partners to conduct specialized energy diagnostics or audits.		

Source: Authors' own elaboration

Table 4: Measures related to sustainable energy performance

Code	Items	Scale type	References
PED1	Our subsidiary has reduced its energy consumption over the past 3 years.	5-point Likert scale (1 = Strongly Disagree → 5 = Strongly Agree)	IEA (2022), ISO 50001 (2018), Tanaka (2011), Thollander and Ottosson (2008), Trianni et al. (2016), Worrell et al. (2009), Porter and Van der Linde (1995)
PED2	We have improved our energy efficiency through process optimization.		
PED3	The reduction in energy costs has contributed to improving our economic performance.		
PED4	Our subsidiary uses energy-efficient or eco-friendly technologies/equipment.		
PED5	We regularly monitor energy performance indicators.		

Source: Authors' own elaboration

Table 5: Summary of the exploratory factor analysis of variables

Variables	Items	Decision	Cronbach's alpha
Energy audits and proactive cost management	AE1	Retained	0.811
	AE2	Retained	
	AE3	Retained	
	AE4	Retained	
	AE5	Retained	
	AE6	Retained	
Continuous energy training	FCE1	Retained	0.826
	FCE2	Retained	
	FCE3	Retained	
	FCE4	Retained	
	FCE5	Retained	
Engagement of external stakeholders	EPE1	Retained	0.866
	EPE2	Retained	
	EPE3	Retained	
	EPE4	Retained	
	EPE5	Retained	
Sustainable energy performance	PED1	Retained	0.833
	PED2	Retained	
	PED3	Retained	
	PED4	Retained	
	PED5	Retained	

Source: SPSS software output

3.2.4. The variable sustainable energy performance

Sustainable energy performance refers to a company's capacity to continuously optimize energy consumption while simultaneously reducing costs and environmental impacts. Rather than reflecting isolated improvements, it embodies an ongoing process embedded within the firm's overall strategic framework. According to the International Energy Agency (IEA, 2022) and ISO 50001 standards (2018), sustainable energy performance encompasses three key dimensions: Energy efficiency, cost management, and the reduction of the environmental footprint. In empirical research, this construct is generally treated as a dependent variable within explanatory models that examine the relationship between energy management practices and organizational performance outcomes (Table 4).

3.3. Analysis of Results

3.3.1. Exploratory factor analysis of variables

An exploratory phase was conducted to verify the validity and reliability of the measurement constructs, serving as a necessary preliminary step prior to testing the research hypotheses. The data analysis performed using SPSS enabled the assessment of the relevance and internal coherence of the selected items to ensure their suitability for inclusion in the regression model. The results of this initial analysis revealed satisfactory representation quality across all variables, confirming the robustness and consistency of the factorial structure. The Table 5 below provides a summary of the final measurement scales retained following validation of item representativeness.

3.3.2. Independence of errors

To ensure the independence of the residuals, the Durbin-Watson test was applied. As shown in Table 6, the obtained value (DW = 1.927) lies within the acceptable range between 1 and 3, indicating the absence of significant autocorrelation between the residual errors.

3.3.3. Evaluation of the overall quality of the explanatory variables model

The Table 7 below presents the results of the analysis of variance (ANOVA). The value of the F-test = 163.680, significant at a P-value threshold <0.05, confirms that the overall model is highly significant. In other words, the probability of incorrectly rejecting the hypothesis that the model does not explain the variance of the dependent variable is very low. These results validate the explanatory power of the model and its statistical relevance in the analysis of sustainable energy performance.

The simultaneous regression of the first model reveals that all the explanatory variables account for 65.1% of the variance in the dependent variable (adjusted R^2 = 0.671). This level of explained variance reflects a high predictive power of the model, indicating its statistical robustness and its capacity to account for the determinants of the studied variable.

Therefore, it can be concluded that the model provides a satisfactory fit to the empirical data, thereby justifying the continuation of the analysis through the testing of research hypotheses related to the explanatory variables of sustainable energy performance.

3.3.4. Analysis of the coefficients of the explanatory variables model for sustainable energy performance

After verifying the suitability of the variables for regression analysis, we now present the results related to the regression coefficients.

The analysis of the coefficients reveals that the significance thresholds are satisfactory, with P-values below 0.05 and beta coefficients exhibiting statistically significant explanatory strength.

Energy audits and proactive cost management, continuous energy training, and external stakeholder engagement strongly explain sustainable energy performance within the Moroccan sub-groups, with respective beta coefficients of 0.427, 0.241, and 0.252, and P-values below 0.05.

Table 6: Coefficients of model significance

Model	R	R-squared	Adjusted R-squared	Standard error of estimation	Durbin-watson
1	0.833	0.651	0.671	0.57333169	1.927

Source: SPSS software output

Table 7: Regression indices of the anova model

Model	Sum of squares	df	Mean square	F	Significance
1	Regression	165.452	3	55.151	163.680
	Student error	69.548	242	0.329	
	Total	246.000	246		

Source: SPSS software output

We conclude that hypothesis H_1, stating that energy audits and proactive cost management positively influence sustainable energy performance, is accepted.

Hypothesis H_2, stating that continuous energy training improves sustainable energy performance, is also accepted.

Finally, hypothesis H_3, stating that external stakeholder engagement improves sustainable energy performance, is accepted.

4. INTERPRETATION AND DISCUSSION OF RESULTS

This section is dedicated to the analysis, interpretation, and contextualization of the obtained results, with the aim of highlighting the key theoretical contributions.

4.1. Effect of Energy Audits and Proactive Cost Management on Sustainable Energy Performance

Energy audits constitute a strategic instrument for improving sustainable energy performance. As a systematic evaluation of a firm's energy consumption, they enable the identification of inefficiency sources, quantification of energy losses, and formulation of corrective actions to reduce energy costs (Cagno et al., 2013). For Moroccan subsidiaries, which operate under increasing pressure from rising energy prices and regulatory constraints, energy audits represent a decisive lever for rationalizing energy use and enhancing operational competitiveness.

The findings of this study confirm that energy audits exert a positive and statistically significant impact on sustainable energy performance ($\beta = 0.427$; $P < 0.05$). This result is consistent with prior research by Rohdin et al. (2007) and Backlund et al. (2012), who argue that regular implementation of energy audits not only reduces energy waste but also reinforces the firm's ability to control operational costs. However, the effectiveness of energy audits depends largely on the firm's capacity to transform audit recommendations into a proactive strategy of continuous improvement.

Moreover, the observed positive effect stems from proactive energy cost management, which entails the establishment of internal monitoring and control mechanisms such as energy dashboards, performance indicators (KPIs), and dedicated energy efficiency budgets (Trianni et al., 2016). These management tools reflect organizational commitment to structured energy governance and contribute to the sustainability of energy performance gains over time. They also function as early warning systems and support strategic decision-making related to energy investments (ISO 50001, 2018).

The integration of energy audits into the firm's governance framework further enhances energy transparency and optimizes resource allocation (Thollander and Palm, 2012; Lee and Cheng, 2018). When audits are followed by quantified action plans and periodic monitoring, they become genuine value creation mechanisms, enabling firms to reduce energy costs while strengthening environmental responsibility (Porter and Van der Linde, 1995).

In the specific context of Moroccan subsidiaries, the results indicate that companies adopting proactive energy cost management significantly improve their energy performance while remaining aligned with national regulatory and budgetary requirements. This evolution reflects growing awareness of energy issues, supported by national initiatives such as those promoted by the moroccan agency for energy efficiency (AMEE).

Therefore, the empirical findings validate Hypothesis H_1: Energy audits and proactive energy cost management have a positive and significant effect on sustainable energy performance. These results highlight the importance of structuring energy management practices around a long-term sustainability logic consistent with both economic efficiency and environmental responsibility.

4.2. Effect of Continuous Energy Training on Sustainable Energy Performance

Continuous energy training constitutes a strategic lever for advancing the energy transition and enhancing sustainable energy performance within organizations. By strengthening both technical and managerial capabilities, it enables employees to optimize energy consumption and reduce related operational costs. The literature indicates that energy efficiency is not solely the outcome of technological investments but also largely depends on the qualification of human capital and its ability to adopt energy-responsible behaviors (Abdelaziz et al., 2011; Thollander and Palm, 2012).

The empirical findings of this study reveal that continuous energy training has a positive and statistically significant impact on sustainable energy performance ($\beta = 0.241$; $P < 0.05$). This result is consistent with Khan et al. (2023), who argue that the acquisition of specialized skills in energy management enhances the efficient use of industrial equipment and processes, thereby reducing energy losses and improving operational efficiency. Furthermore, ongoing training contributes to the development of an energy culture within organizations by involving employees in energy-saving initiatives

Table 8: Coefficients of the individual significance of the model variables

Model	Unstandardized coefficients	Standardized coefficients	t	Significance	Collinearity statistics
	B	Standard error	Beta		
1	(Constant)	1.119E−16	0.037	0.000	
Energy audits and proactive cost management	0.427	0.050	0.427	8.105	0.000
Continuous energy training	0.241	0.057	0.241	4.417	0.000
Engagement of external stakeholders	0.252	0.058	0.252	4.691	0.000

Source: SPSS software output

and reinforcing their commitment to sustainability objectives.

Continuous training also serves as a mechanism for disseminating best practices and fostering organizational innovation. Backlund et al. (2012) note that firms implementing structured training programs are better able to identify continuous improvement opportunities and adopt effective solutions such as predictive maintenance, production cycle optimization, and reduction of energy waste. This learning dynamic drives long-term performance gains by embedding energy optimization into organizational routines.

The ISO 50001 standard (2018) further underscores training as a critical component of an effective energy management system. It strengthens internal stakeholder engagement and promotes a cross-functional approach to energy governance. In the context of Moroccan subsidiaries, continuous energy training is particularly valuable as it helps address technical gaps and supports the progressive adoption of energy-efficient technologies and renewable energy solutions in line with national transition strategies.

Accordingly, the empirical evidence validates Hypothesis H_2, which posits that continuous energy training significantly enhances sustainable energy performance. It reinforces internal energy capabilities, improves operational energy management, and positions subsidiaries within a proactive approach to cost reduction and environmental responsibility. Continuous training thus emerges as a key success factor for any long-term sustainable energy strategy.

4.3. Effect of External Stakeholder Engagement on Sustainable Energy Performance

External stakeholder engagement constitutes a decisive factor in the success of corporate energy strategies, particularly in contexts where internal capabilities are limited and the institutional environment promotes energy transition. External stakeholders include public agencies (such as the Moroccan Agency for Energy Efficiency - AMEE), energy suppliers, financial institutions, clients, professional associations, and certification bodies. Their involvement or pressure guides firms toward responsible energy practices while strengthening their competitiveness and long-term sustainability (Freeman, 1984; Clarkson, 1995).

The empirical results of this study indicate that external stakeholder engagement exerts a positive and statistically significant influence on the sustainable energy performance of Moroccan subsidiaries ($\beta = 0.252$; $P < 0.05$). This finding aligns with Henriques and Sadorsky (1999), who demonstrate that firms facing external expectations—whether from customers, regulators, or investors—are more likely to adopt environmentally responsible practices. External engagement operates as a legitimacy-enhancing mechanism (DiMaggio and Powell, 1983), encouraging firms to conform to national regulatory requirements and international energy standards.

Operationally, collaboration with external stakeholders enables firms to mobilize technical expertise and financial resources essential for continuous improvement in energy performance. Programs such as energy subsidies, co-financed audits, and technological partnerships with specialized suppliers help reduce investment constraints and accelerate the adoption of energy-efficient technologies (IEA, 2022; Cagno et al., 2013). Furthermore, institutional support facilitates compliance with energy regulations and supports firms in mitigating technological and environmental risks.

External stakeholder engagement also promotes cooperative dynamics that reinforce organizational sustainability. According to Delmas and Toffel (2004), interaction with regulatory authorities and professional networks fosters energy transparency and improves firms' credibility and performance. In the Moroccan context, initiatives such as national energy efficiency strategies, green financing mechanisms, and public-private partnerships serve as catalysts for improving the energy performance of industrial subsidiaries.

Thus, the empirical findings validate Hypothesis H_3, which posits that external stakeholder engagement positively contributes to sustainable energy performance. This effect results from a dual mechanism: (1) normative and regulatory pressures that encourage firms to comply with responsible energy standards, and (2) strategic, financial, and technological support that facilitates the implementation of energy innovation projects. Consequently, stakeholder engagement is not merely a compliance requirement but also a strategic lever for competitiveness and energy sustainability for Moroccan subsidiaries.

5. CONCLUSION AND POLICY IMPLICATIONS

This study examined the determinants of sustainable energy performance among Moroccan subsidiaries by focusing on three managerial drivers: Energy audits combined with proactive cost management, continuous energy training, and external

stakeholder engagement. The empirical results demonstrate that these practices exert a significant positive influence on sustainable energy performance, highlighting the importance of structured managerial commitment and integrated energy governance. Furthermore, the findings are consistent with stakeholder and institutional theory, emphasizing that sustainable energy performance is shaped not only by internal managerial practices but also by external pressures, regulatory expectations, and collaborative partnerships.

From a managerial standpoint, the study highlights that sustainable energy outcomes are the result of integrated strategies combining technical optimization, human resource development, and strategic collaboration. These elements should not be treated in isolation but as part of a cohesive approach to energy management. The findings suggest that companies must align their technical, human, and relational resources to drive lasting improvements in energy performance.

For policymakers, the results advocate for several key interventions to support the industrial energy transition in Morocco. These include: (1) offering stronger incentives for regular energy audits, (2) investing in capacity-building programs through professional training, (3) fostering public-private partnerships that can facilitate knowledge sharing and resource mobilization, (4) reinforcing regulatory frameworks such as ISO 50001 to standardize energy management practices, and (5) expanding green financing mechanisms to provide the necessary capital for energy efficiency projects. These measures would help enhance the country's industrial energy performance and contribute to the broader goal of energy sustainability.

Despite its contributions, the study has certain limitations. The focus on Moroccan subsidiaries and the examination of only three determinants of energy performance limit the generalizability of the findings. Future research could expand the model by incorporating additional variables such as technological innovation, digitalization, or corporate governance mechanisms. Furthermore, adopting longitudinal or qualitative approaches could provide deeper insights into the dynamics of the energy transition, particularly in emerging economies.

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