



CEO diversity, status quo bias and environmental audits in the EU

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ABSTRACT

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This study seeks to empirically investigate the effects of CEO characteristics on the likelihood that firms adopt environmental audits in the EU member countries by incorporating the mediating role of status quo bias (SQB). This study utilizes World Bank Enterprise Survey data for the 2018-2020 period. Using the logistic regression model and Generalized Structural Equation Modeling (GSEM), this study analyzes the direct and indirect effects of CEO diversity on four types of environmental audits: water, energy, pollutant, and carbon. SQB is measured with product and process innovations. The results demonstrate that CEO diversity (work experience and political connections) motivates firms to engage in all types of environmental audits. Nevertheless, female CEOs only motivate firms to engage in energy audits. Next, firms with more diverse CEO tend to exhibit lower SQB. Our findings also reveal the indirect effect of CEO diversity on environmental audits through SQB, especially energy and carbon audits. This research is unique because it integrates behavioral dimensions, highlighting that sustainability-related decisions are influenced not only by leaders' demographic characteristics but also by their cognitive biases. Standard setters like the European Financial Reporting Advisory Group (EFRAG) and the International Sustainability Standards Board (ISSB) need to consider organizational culture and psychological aspects when proposing more effective sustainability reporting and audits. This paper extends the Upper Echelons Theory by showing how SQB mediates the relationship between CEO diversity and environmental audits. The findings highlight the importance of behavioral factors in sustainability decisions among firms operating in EU member countries.

Contribution/Originality: This study contributes to the existing literature by introducing status quo bias as a behavioral mechanism linking managerial characteristics and ownership structure to environmental audits. It is one of the very few studies that separately examines four environmental audit types using European Union firm-level data.

1. INTRODUCTION

Environmental audits are critical in ensuring firms' operational accountability and sustainability, especially amidst increasing global pressures due to climate change and environmental degradation. In the European Union area, which is subject to strict regulations such as the European Green Deal and the Non-Financial Reporting Directive, environmental audits are a common practice. Nevertheless, the adoption of environmental audits has been less optimal, although this area has experienced more than 5,800 extreme climate incidents since 1980, causing

economic losses of €650 billion (European Environment Agency, 2025). The spikes in numerous incidents such as heatwaves, floods, and droughts underscore the urgency of audits to mitigate and adapt to climate risks.

More than regulatory obligations, environmental audits also support the achievement of the Sustainable Development Goals (SDGs), especially SDG 12 (responsible consumption and production) and SDG 13 (climate action). Audits help firms identify resource efficiency, reduce waste, and develop climate adaptation strategies. Nevertheless, significant gaps remain in environmental impact disclosure practices. Carbon Disclosure Project (2023) 2024 report indicates that among the 23,000 global firms providing environmental data, fewer than 1% completely disclose their environmental impacts. Moreover, almost 4,000 firms lack a system for evaluating their ecological impacts, and over 1,500 business sites have been recognized as potentially harmful to biodiversity (Carbon Disclosure Project, 2023; Tyszkiewicz, 2024).

Prior studies indicate that environmental audits not only improve reputation and operational efficiency but are also positively correlated with ESG scores (Zhang & Guo, 2024) and external audit quality (Diab & Eissa, 2024). Nevertheless, amid the requirements of the Corporate Sustainability Reporting Directive (CSRD), numerous firms adopt defensive measures. Increased reporting complexity and costs motivate numerous firms to comply solely with the minimum criteria, lacking actual innovation in sustainability (Khan & Mackrael, 2025). The scenario presents a paradox: despite audits demonstrating their advantages, firms hesitate to commit further.

Within the framework of the Upper Echelons Theory (Hambrick & Mason, 1984), organizations' strategic decisions are heavily influenced by their leaders' characteristics, such as gender, experience, and political connections. More experienced or politically connected CEOs arguably appreciate the importance of audits as a legitimation and access strategy to sustainability incentives. Conversely, conservative or change-averse CEOs tend to consider audits costly. Hence, the decisions to adopt audits are not only affected by regulations but also by leaders' subjective perception of risks and changes.

Although several studies have identified the association between CEO diversity and sustainability orientation (Harakati, Ghazouani, & Hlioui, 2024; Muhammad, 2025; Xu & Hou, 2024), empirical results are inconsistent. For instance, Zhu, Li, and Ma (2023) document that CEOs with environmental backgrounds encourage disclosures on environmental management information, including more open and systematic environmental audits. This indicates that environmentally related professional backgrounds boost firms' commitments to environmental audit practices. Nevertheless, Zhang and Guo (2024) highlight that the effect is significant in certain contexts, such as younger CEOs or private (non-state-owned) firms. Meanwhile, studies on the impacts of CEO gender document inconsistent results; most demonstrate female sensitivity toward environmental issues (Mansour, Al Zobi, et al., 2024; Muhammad, 2025), while other studies document that the effect depends on firms' location and size (Aabo & Giorici, 2023; Al-Shaer, Zaman, & Albitar, 2026). Similarly, on the one hand, political connections strengthen regulatory compliance in several cases (Xu, Wang, Cai, Bai, & Huang, 2024), while on the other hand, they may facilitate evasion of stringent supervision (Heubeck & Ahrens, 2025).

This inconsistency raises an important question: why does diversity in CEO characteristics not consistently result in environmental audit practices? A likely explanation for this inconsistency is psychological and structural inhibiting factors, such as status quo bias (SQB). SQB refers to a tendency to persist in established habits, even when changes are much more beneficial (Samuelson & Zeckhauser, 1988). In the organizational context, such biases are not only individual but also embedded in corporate culture and work systems. Hofman, De Vries, and Van De Kaa (2022) observe that European construction firms' resistance to sustainable innovations is affected by a combination of tradition, information limitations, and the systemic status quo.

SQB arguably serves as a mediating variable that explains why leaders' diverse characteristics do not necessarily lead to audit adoption. For instance, female or experienced CEOs may be cautious in anticipating technical and regulatory risks; hence, they are more resistant to changes. On the other hand, politically connected CEOs may exploit their policy-related resources or support to mitigate biases and encourage innovations.

Accordingly, this study seeks to empirically test the effect of CEO diversity, in this context, gender, experience, and political connections – on environmental audits in the European Union and evaluate the mediating role of SQB in this association. In this study, environmental audits encompass four major dimensions: water, energy, pollutant, and carbon audits. Meanwhile, SQB is operationalized by product and process innovation indicators, which denote the degree to which a company is prepared to transform.

The contributions of this research are theoretical and practical. This study theoretically expands the Upper Echelons Theory by including psychological mechanisms as a link between managerial characteristics and strategic sustainability decisions. These findings offer insights for regulators and policymakers in the European Union to concentrate not only on legislative frameworks but also on comprehending internal organizational dynamics and behavioral biases in the development of sustainability initiatives.

2. LITERATURE STUDY

2.1. Upper Echelon Theory

Upper Echelon Theory, proposed by Hambrick and Mason (1984), posits that organizations' strategic decisions are shaped by top managers' cognitive attributes and values. This theory asserts that top managers play a pivotal role in shaping corporate strategy, influenced by their demographic characteristics, professional experiences, and assessments of risks and opportunities. Within the framework of environmental sustainability, this theory is crucial for understanding why certain organizations adopt environmental audits. The implementation of environmental audit practices is influenced not only by external regulations but also by the visions and personal preferences of firms' top leaders (Arena, Michelin, & Trojanowski, 2018; Hambrick, 2007). CEOs' or top managers' characteristics that are predicted to affect firms' decisions to adopt environmental audits include gender, work experience, and political connections (Galbreath, 2018).

2.2. Environmental Audits as a Sustainability Strategy

In practice, environmental audits demonstrably yield substantial advantages, such as increased operational efficiency, lower environmental risks, and improved corporate innovations. Jiang and Tan (2021) demonstrate that environmental audits can enhance energy efficiency and reduce emissions by facilitating the adoption of green technologies at the regional level. Nevertheless, data from the (World Bank, 2020) reveal that the prevalence of environmental audits remains relatively low, especially in highly regulated areas like the European Union. This indicates that the mere presence of a legal framework is inadequate to promote extensive audit implementation. Limited adoption may be ascribed to internal organizational obstacles, including resistance to change, limited resources, and insufficient strategic awareness of the long-term advantages of environmental audits.

As a region leading the global sustainability agenda, the European Union has developed several important instruments, such as the EU Green Deal, the Environmental Management and Audit Scheme (EMAS), and Energy Efficiency Directive (EED), which encourage firms to adopt environmental audits regularly. Within this framework, environmental audits in Europe involve a comprehensive evaluation of four major aspects: water-usage audits to evaluate the efficiency and conservation of water resources, energy-consumption audits to identify efficiency potentials and emission reduction, pollutant audits to monitor the environmental impacts on water and land quality, and carbon audits to identify major indicators of firms' contributions to climate change. Nonetheless, these audits frequently serve a symbolic purpose and have not yet been incorporated into firms' risk management and long-term sustainable competitiveness strategies.

A critical component of environmental audits is energy audits, which evaluate energy consumption and efficiency in firms' operating activities. Energy audits have become increasingly crucial amidst increased global pressures on emission reduction and energy transition. The European Union regulates energy audits through the EED, which stipulates that large firms implement regular audits and energy-conservation measures. This initiative aligns with

the European Union's ambitious targets to reduce carbon emissions by 55% by 2030 and achieve carbon neutrality by 2050. Liberova et al. (2025) emphasize that energy audits effectively identify energy-conservation potentials, reduce consumption without sacrificing productivity, and minimize operational costs. Besides, such audits facilitate regulatory compliance and the European Union's macro-policy objectives in green transformation. Consequently, the integration of energy audits into environmental audits plays a pivotal role in transforming into low-carbon economies strategically and objectively.

2.3. CEO Diversity and Environmental Audits

A crucial dimension of the backgrounds is gender, which likely affects how leaders perceive and respond to social and environmental issues. Several studies document that female managers tend to exhibit greater social empathy, stronger moral sensitivity, and more collaborative attitudes in making strategic decisions than their male counterparts (Huang, Wan Ahmad, & Saad, 2025; Liao, Luo, & Tang, 2015; Post & Byron, 2015; Zhang, Guo, & Nurdazym, 2023). In the sustainability context, the findings are reflected by female leaders' tendency to adopt pro-environmental policies, boost ESG (Environmental, Social, and Governance) transparency, and improve firms' social responsibilities more actively (Babiker, Bakhit, Bilal, Abubakr, & Abdelraheem, 2025; Nepal, Deng, Dong, & Goutte, 2025).

Environmental audits represent formal and systematic evaluations of firms' compliance with environmentally friendly regulations and practices. The decision to perform environmental audits not only reflects compliance with external regulations but also indicates firms' strategic orientation toward long-term sustainability (Testa, Boiral, & Iraldo, 2018). In this context, the Upper Echelon Theory, as proposed by Hambrick and Mason (1984), explains that the personal characteristics and cognitive values of top managers, including CEOs, are critical in firms' strategic decision-making. Several characteristics, such as gender, experience, and socio-political backgrounds, will arguably affect their preferences toward environmental issues.

Prior studies demonstrate that female leaders tend to exhibit greater sensitivity toward ethical values and social responsibility; hence, they are more motivated to adopt environmental audits as a form of external accountability and legitimacy among stakeholders (Donkor, Trireksani, & Djajadikerta, 2023; He, Zhou, Liu, & Yang, 2021). For instance, He et al. (2021) observe that female CEOs significantly increase their firms' environmental disclosure. Thus, based on the Upper Echelon theory framework and empirical studies on the role of gender in sustainability practices, we propose the first hypothesis.

H₁: Female CEOs positively affect environmental audits.

Besides gender, work experience is a major determinant of leaders' managerial perspectives and strategic orientation. CEOs with more extensive work experience, particularly across functions and sectors, tend to exhibit higher cognitive capacity and understand the complexities of external environmental changes better (Durán & Aguado, 2022; Li, Guo, & Wang, 2024; Wang, Zhang, Chang, & Kang, 2024). More diverse work experience also expands top managers' perspectives toward best practices from various industries and improves their adaptability to regulatory dynamics and stakeholders' expectations.

In the sustainability context, leaders exposed to various managerial systems and business challenges are more receptive toward novel strategies such as environmental audits that typically require additional resource allocation and changes in operational procedures. In contrast to conservative or narrowly experienced leaders, CEOs with more extensive professional backgrounds tend not to consider environmental audits administrative expenses but a strategic opportunity to boost firms' efficiency, reputation, and legitimacy. Hence, CEOs with more extensive and diverse work experience are more likely to support environmental audit initiatives as part of their firms' long-term strategies. Accordingly, we propose the second hypothesis:

H₂: CEOs' work experience positively affects environmental audits.

CEOs' political connections reflect their involvement in government agencies, political parties, or their personal relationships with policymakers. Within the Upper Echelon Theory framework (Hambrick & Mason, 1984), this background shapes their risk perception and provides exclusive access to information and policy opportunities. Guedes, Neves, and Vieira (2025) and Qi, Niu, and He (2023) demonstrate that more politically connected CEOs are more prepared to respond to regulatory changes, exploit environmental incentives, and establish strategic relationships with policymakers.

As a sustainability strategy, environmental audits require preparedness for regulatory pressure. Politically connected CEOs will arguably be able to mitigate risk perception, accelerate the adoption of audits, and secure access to green incentives and administrative facilities. Heitz, Wang, and Wang (2023) document that politically connected firms enjoy more relaxed regulations, such as flexible monitoring and less severe sanctions, which motivate these firms to adopt more active environmental strategies. Kim (2024) and Wang, Peng, Wu, and Liao (2022) also demonstrate that politically connected CEOs encourage green innovation through CSR programs, which strengthens firms' preparedness to adopt environmental audits. Hence, political connections serve as a critical catalyst in establishing sustainability practices. Accordingly, the following is our third hypothesis.

H₃: Politically connected CEOs positively affect environmental audits.

2.4. CEO Diversity and Status Quo Bias

Top management diversity is also associated with organizational tendencies to preserve the status quo. Female or more experienced managers are arguably more receptive to change and more risk-takers, hence minimizing the organizational impacts of status-quo bias (Bao, 2009; Eagly, Makhijani, & Klonsky, 1992).

Top management diversity plays a pivotal role in encouraging organizational changes, particularly in the context of resistance to innovation, which is frequently affected by status quo bias (SQB). For instance, female managers are recognized for demonstrating leadership characteristics that are more collaborative, adaptive, and responsive to environmental dynamics than those of their male counterparts. This leadership style tends to stimulate more responsive decision-making processes toward organizational transformation, including sustainability aspects. A recent study by Post, Lokshin, and Boone (2022) indicates that the presence of women in top organizational positions increases institutional adaptive capacity and commitment to overhaul outdated structures. Accordingly, we propose the following hypothesis:

H₄: Female CEOs negatively affect status quo bias.

Besides, CEOs' work experience also arguably explains why organizations preserve their status quo. More experienced CEOs typically have survived various strategic dynamics and challenges, enhancing their capacity to identify the necessity for change and evade a conservative mindset. Enhanced cognitive flexibility enables them to manage firms in responding to external developments more effectively. Behr and Fehre (2019) demonstrate that new CEOs tend to exhibit lower status quo bias. Xu and Hou (2024) underscore that internationally experienced CEOs encourage digital transformation and adaptive strategic decisions, indicating that cross-country experience expands perspectives and mitigates the tendency to preserve the status quo amidst environmental changes. Based on this argument, we propose the following hypothesis.

H₅: CEOs' work experience negatively affects status quo bias.

On the other hand, CEOs' political connections likely affect their attitudes toward organizational changes. While political connections are frequently associated with institutional stability in certain contexts, within the paradigm of strategic change, access to policy information, government incentives, and extensive bureaucratic networks can indeed accelerate organizational responses to external pressures. Choi, Liu, Yin, Qi, and Lee (2021) document that firms led by politically connected CEOs could alleviate the effects of political uncertainty and initiate more timely strategic adaptation, particularly following governmental transitions that may induce stagnation in other entities. Su, Xiao, and Yu (2019) and Zhang, Zhou, and Tian (2022) discover that CEOs' political connections positively affect

organizations' innovative capacity and commitment to take strategic risks, including those related to environmental sustainability. Both findings suggest that political connections might diminish the tendency to uphold traditional practices or status quo bias by facilitating access to resources, ensuring regulatory certainty, and enhancing external legitimacy, thus bolstering organizational readiness for change. Consequently, the subsequent hypothesis is proposed.

H₆: CEOs' political connections negatively affect status quo bias.

2.5. CEO Diversity, Status Quo Bias, and Environmental Audits

SQB inside organizations not only reflects individual cognitive biases but also constitutes systemic symptoms embedded in organizational structures and regulations that prioritize stability above strategic adaptability, particularly regarding the adoption of environmental audits. SQB is characterized by the inclination to preserve existing conditions notwithstanding the presence of more rationally advantageous options (Samuelson & Zeckhauser, 1988). This bias is driven by risk aversion, satisfaction with existing systems, and pressures to preserve operational stability. The influence is manifest in resistance to innovation, new technologies, or sustainability policies regarded as costly.

Bao (2009) documents that organizations with bureaucratic structures find it more difficult to overcome SQB. Top managers who consider existing conditions beneficial are less motivated to adopt environmental audits. The finding is supported by Chang, Du, Deng, and Wang (2024); Engler, Abson, and von Wehrden (2019); and Johnsen (2016), who assert that SQB impedes responsiveness to external pressures, particularly in organizations lacking reputational concerns or stakeholder expectations. SQB is further strengthened by a conservative culture and a short-term focus that impede the transition to sustainable business practices. Consequently, we propose the following hypothesis.

H₇: Status quo bias negatively affects environmental audits.

Although CEOs' individual characteristics like gender, work experience, and political connections affect firms' strategic orientation toward sustainability, the impacts are not necessarily direct. Numerous organizational decisions, including the adoption of environmental audits, are affected by psychological factors and internal biases embedded in the decision-making processes. One of the internal biases is SQB, an organizational tendency to preserve established practices and avoid changes, even when such changes offer numerous benefits (Samuelson & Zeckhauser, 1988). In this context, SQB can weaken or strengthen the effect of CEO characteristics on sustainability decisions.

Johnsen (2016) demonstrates that organizational status quo bias could strongly impede environmentally friendly decision-making, even when the leaders have been sustainability-oriented. Engler et al. (2019) add that psychological biases like SQB systematically impede the adoption of climate actions, including for highly regulated organizations. Nonetheless, female CEOs are arguably more adaptive and responsive toward changes; hence they are less susceptible to SQB and more likely to encourage environmental audits as a form of external accountability and legitimacy.

CEOs with more extensive (international) experience tend to adopt strategic orientations that are more adaptive and open toward environmental transformation; hence, they are less likely to preserve status quo conditions. In a similar vein, more politically connected CEOs are more accustomed to regulatory dynamics and public incentives; hence, they are likely to make more proactive and innovative decisions regarding environmental audits. Accordingly, both experience and political connections could indirectly encourage environmental audits through lower status quo tendencies, thus strengthening the mediating role of SQB in the association (Choi et al., 2021; Su et al., 2019).

Thus, status quo bias arguably serves as a variable that mediates the effect of CEO attributes on firms' decisions to adopt environmental audits. Based on these arguments, we propose the following mediation hypothesis.

H_{8a}: Status quo bias mediates the effect of female CEOs on environmental audits.

H_{8b}: Status quo bias mediates the effect of CEO experience on environmental audits.

H_{8c}: Status quo bias mediates the effect of politically connected CEOs on environmental audits.

3. METHODOLOGY

This study employs a quantitative approach to evaluate the effect of CEO diversity on the likelihood that firms adopt environmental audits as mediated by status quo bias. The data used are derived from the 2018–2020 World Bank Enterprise Surveys (WBES) that encompass manufacturing, service, and retail firms in the European Union countries, consisting of 16,948 firm observations. Data selection seeks to identify dynamic changes in organizational behavior responding to environmental and regulatory pressures. Appendix 1 presents the research variables used in this study, together with their operationalization.

To test the hypotheses, we use the Generalized Structural Equation Modeling (GSEM) with logit links in Stata 16 because all main variables are binary. This model enables the test of direct and indirect (mediated) associations simultaneously within a structural framework. In the mediated approach, status quo bias mediates the effect of top management diversity on environmental audits. The logit model is a suitable method for binary dependent variables, as it estimates the logarithm of the likelihood (log-odds) of an occurrence, as detailed in Wooldridge (2010) within the framework of binary response regression. Based on these associations, we propose the following three regression equations.

$$\text{Logit}(ENA_{it}) = \ln\left(\frac{P(ENA_{it}=1)}{1-P(ENA_{it}=1)}\right) = \beta_0 + \beta_1 EGD_{it} + \beta_2 EWE_{it} + \beta_3 EPP_{it} + \beta_4 CIT_{it} + \beta_5 CSZ_{it} + \beta_6 COR_{it} + \beta_7 CTL_{it} + \varepsilon_{it} \quad (1)$$

Equation 1 tests the effects of CEO diversity and firm characteristics on the likelihood that firms adopt environmental audits. This model is designed to test three main hypotheses (H1–H3) that focus on the effects of CEO gender, experience, and political connections on environmental audit practices.

$$\text{Logit}(SQB_{it}) = \ln\left(\frac{P(SQB_{it}=1)}{1-P(SQB_{it}=1)}\right) = \beta_0 + \beta_1 EGD_{it} + \beta_2 EWE_{it} + \beta_3 EPP_{it} + \beta_4 CIT_{it} + \beta_5 CSZ_{it} + \beta_6 COR_{it} + \beta_7 CTL_{it} + \varepsilon_{it} \quad (2)$$

Equation 2 tests the effects of top management diversity and firm characteristics on organizational tendency to preserve existing conditions or policies (SQB). The model is designed to test hypotheses H4–H6, which predict that female CEOs (H4), CEOs' work experience (H5), and CEOs' political connections (H6) negatively affect SQB.

$$\text{Logit}(ENA_{it}) = \ln\left(\frac{P(ENA_{it}=1)}{1-P(ENA_{it}=1)}\right) = \beta_0 + \beta_1 SQB_{it} + \beta_2 EGD_{it} + \beta_3 EWE_{it} + \beta_4 EPP_{it} + \beta_5 CIT_{it} + \beta_6 CSZ_{it} + \beta_7 COR_{it} + \beta_8 CTL_{it} + \varepsilon_{it} \quad (3)$$

Equation 3 tests the effect of SQB, CEO diversity, and firm characteristics on the likelihood that firms adopt environmental audits (ENA). This model is specifically designed to test hypotheses H7 and H8.

Furthermore, this model is also used to test the mediation hypotheses (H8a–H8c) that predict that SQB mediates the effects of CEO characteristics (gender, experience, and political connections) on environmental audits. In this respect, SQB is positioned as a psychological mechanism that explains how leaders' attributes indirectly affect strategic environmental decisions. We incorporate several control variables, such as industry types, firm size, regulatory obstacles, and licensed technology, into the models to ensure that the estimation models represent the associations more accurately.

In this study, higher product and process innovation scores represent lower levels of SQB, reflecting greater organizational openness toward change. Therefore, positive coefficients between innovation and environmental audits indicate that lower SQB is associated with a higher likelihood of audit adoption.

Our analysis is equipped with robustness tests through two approaches. *First*, alternative estimations using probit models to ensure that the results are independent of link-function specifications (mathematical functions that correlate the expected values of the dependent variable $[Y]$ with the linear combination of the independent variables $[X\beta]$).

Second, further tests separate the observations into two subsamples (large vs. small firms) based on the number of employees to generate empirical results of the effect of CEO diversity on environmental audits.

4. RESULTS AND DISCUSSIONS

4.1. Sample Characteristics

Table 1 suggests that the CEOs of European Union firms have an average work experience of three years, with a maximum of four years, suggesting that most CEOs are relatively less experienced in their positions. The sample predominantly consists of service and mixed-industry firms, primarily comprising micro, small, and medium-sized enterprises (MSMEs), which represent the prevailing structure in the region. Regulatory restrictions are typically not considered a significant obstacle. However, between-country differences exist, reflecting differences in bureaucratic and institutional context.

The adoption of environmental audits remains limited. Only 17.25% of firms adopt water audits, while 21.45% conduct energy audits. Meanwhile, 53.66% of firms perform pollution audits, while 49.44% undertake carbon audits. This signifies that, notwithstanding a stringent legislative framework, the implementation of environmental audits in Europe is not yet comprehensive across all environmental dimensions.

Table 1. Descriptive Statistics.

Research Variables	Minimum	Maximum	Mean	Std. Dev.
Work Experience	0.693	4.263	3.097	0.612
Industry Type	1	3	1.794	0.898
Firm Size	1	4	1.689	0.755
Regulatory Obstacle	0	4	0.974	1.102

Table 1. Continue.

Research Variables	Score 1		Score 0		Total	
	n	Proportion (%)	n	Proportion (%)	n	Proportion (%)
Water Audits	303	17.25	1,454	82.75	1,757	100
Energy Audits	958	21.45	3,508	78.55	4,466	100
Pollutant Audits	154	53.66	133	46.34	287	100
Carbon Audits	352	49.44	360	50.56	712	100
CEO Gender	2,671	15.76	14,277	84.24	16,948	100
CEO Political connection	818	4.83	16,130	95.17	16,948	100
SQB – Product innovation	7,492	44.21	9,456	55.79	16,948	100
SQB – Process innovation	4,871	28.74	12,077	71.26	16,948	100
Technology	2,773	16.36	14,175	83.64	16,948	100

Note: The upper panel reports descriptive statistics for continuous and ordinal variables, while the lower panel presents frequency distributions for binary (Dummy) variables coded as 1 and 0.

Source: World Bank Enterprise Survey (Processed).

A total of 15.76% of CEOs in the sample are female, while 84.24% are male. Only 4.83% of CEOs are politically connected, indicating a minimal representation of women and politically connected individuals in executive positions. Regarding innovation, 44.21% of firms adopted product innovation, whereas only 28.74% adopted process innovation. This suggests that firms are more receptive to external (product) innovation than to internal (process) innovation, indicating a bias toward maintaining the status quo in operational processes. This bias may impede the implementation of strategic policies, including environmental audits. Moreover, only 16.36% of firms utilize licensed technology, signifying a limited acceptance of external technology, which may hinder further innovation.

Table 2 presents varying results based on the regional distribution of data in Europe. Western Europe is the sole region exhibiting no full participation in environmental audits, although countries in other European regions adopt environmental audits regarding pollutants.

Table 2. Descriptive Statistics per European Union Region.

Variables	Western Europe	Southern Europe	Central Europe	Southeast Europe	Northern Europe
Water Audit	0%	23.77%	13.19%	21.99%	7.81%
Energy Audit	0%	27.90%	19.47%	17.61%	18.13%
Pollutant Audit	0%	46.15%	49.53%	71.43%	51.28%
Carbon Audit	0%	61.25%	41.35%	52.38%	30.91%
CEO Gender	13.60%	13.10%	19.88%	20.22%	14.95%
CEO Experience					
1. ≤ 5 years	6.40%	2.83%	5.77%	4.38%	8.05%
2. 6-10 years	7.57%	6.78%	10.60%	15.00%	9.54%
3. 11-20 years	25.46%	25.89%	32.91%	36.80%	29.72%
4. >20 years	60.57%	64.50%	50.72%	43.82%	52.70%
CEO Political Connections	4.83%	2.99%	6.41%	4.21%	5.59%
Product Innovation	55.96%	34.05%	32.09%	25.39%	63.83%
Process Innovation	37.35%	15.16%	18.41%	16.18%	51.90%
Industry Type					
1. Manufacture	41.91%	62.02%	54.77%	54.89%	54.87%
2. Service & Retail	14.32%	15.03%	14.39%	17.75%	16.23%
3. Other services	43.77%	22.95%	30.84%	27.36%	28.90%
Firm Size					
1. Small	54.79%	41.55%	55.68%	42.30%	43.18%
2. Medium	33.72%	35.17%	28.23%	31.74%	40.22%
3. Large	11.49%	22.60%	16.08%	25.96%	16.60%
4. Very large	0%	0.67%	0%	0%	0%
Obstacles					
1. No Obstacle	47.22%	40.97%	41.10%	30.63%	57.37%
2. Minor	34.73%	37.88%	37.72%	41.33%	31.14%
3. Moderate	15.21%	14.62%	15.46%	20.46%	8.48%
4. Severe	2.84%	6.53%	5.72%	7.58%	3.01%
Technology	14.57%	15.45%	15.89%	15.73%	21.39%

Source: World Bank Enterprise Survey (Processed).

Regarding CEO characteristics, all European countries are dominated by CEOs with more than 20 years of work experience, whereas only a limited number of CEOs are politically connected. The Southeast Europe region has the highest proportion of female CEOs, while Northern Europe has the highest product innovation (63.83%), process innovation (51.90%), and technological achievement (21.39%). Based on industry type, most European firms operate in the manufacturing sector and belong to the small-scale industry that faces no or minor obstacles.

4.2. Regression Results and Discussions

Table 3 presents the results of the test of the direct effect of CEO diversity on four types of environmental audits (water usage audits, energy consumption audits, pollutant audits, and carbon audits). The results of the logistic regression indicate that CEO characteristics affect the adoption of environmental audits among firms in the European Union. Specifically, the presence of female CEOs significantly reduces the likelihood of firms conducting energy audits ($\beta = -0.300$; $p < 0.05$), while it does not exhibit a significant influence on the propensity of firms to adopt water audits ($\beta = -0.099$), pollutant audits (-0.249), or carbon audits (-0.190). These findings indicate that the first hypothesis (H1) is not fully supported. The results further suggest that female leadership might be insufficient to influence sustainability policy choices, potentially due to conservative organizational structures that restrict organizational flexibility. As suggested by Javed, Wang, Usman, Gull, and Zaman (2023) and Mansour, Shubita, Lutfi, Saleh, and Saad (2024), female leadership potentially encourages green innovation, but its effectiveness depends on institutional support. Additionally, Eagly and Carli (2003) also note that conservative organizational structures could restrict flexibility for female CEOs, particularly when status quo bias persists in numerous organizations.

Table 3. The Test Results of The Effects of CEO Diversity on Environmental Audits.

Variables	Water Audits	Energy Audits	Pollutant Audits	Carbon Audits
Constant	-2.454***	-2.653***	1.565*	-0.576
CEO Gender	-0.099	-0.300**	-0.249	-0.19
CEO Experience	-0.13	0.128*	-0.635***	0.282**
CEO Political Connections	0.647***	0.898***	-0.019	0.787***
Industry Type	na	-0.271***	na	-0.576***
Firm Size	0.439***	0.586***	0.068	0.134
Regulatory Obstacles	0.495***	0.316***	0.762**	0.420**
Technology	0.708***	0.594***	0.709***	0.197
Pseudo R ²	0.052	0.079	0.061	0.06
LR chi ²	84.35	364.44	24.05	58.95
Number of obs.	1,757	4,466	287	712

Note: ***, **, * denote significance levels at 1%, 5%, and 10%, respectively.

"na" (not applicable) indicates that the Industry Type coefficient was not reported in the Water Audits and Pollutant Audits models due to estimation output generated by Stata for those specific regressions.

Source: World Bank Enterprise Survey (processed).

In contrast, the results indicate that CEO experience increases the propensity for firms to conduct energy audits ($\beta=0.128$; $p<0.1$) and carbon audits ($\beta=0.282$; $p<0.05$). However, CEO experience is associated with a decrease in the likelihood of conducting pollutant audits ($\beta = -0.635$; $p<0.01$), while it does not exhibit a significant influence on water audits ($\beta=-0.130$; $p>0.1$). These findings suggest that the second hypothesis (H2) is partially supported. This may reflect that more experienced CEOs are generally more responsive to strategic external pressures and sustainability-related decisions (Gao, Zhao, & Tian, 2022; Sang, Yan, & Ahmad, 2024), although technical issues like water may be viewed as less strategic. Huang (2013) further argues that managerial experience encourages innovation only when combined with technological readiness and organizational flexibility, indicating that organizational context remains crucial in ensuring leadership effectiveness.

Further findings demonstrate that CEOs' political connections significantly increase the likelihood of firms implementing water audits ($\beta=0.647$; $p<0.01$), energy audits ($\beta=0.898$; $p<0.01$), and carbon audits ($\beta=0.787$; $p<0.01$). Nevertheless, political connections do not exhibit a significant influence on pollutant audits ($\beta=-0.019$; $p=0.964$). These findings support the third hypothesis (H3). Political access strengthens the organizational propensity to respond proactively to institutional pressures by facilitating timely access to regulatory information, policy support, and environmental incentives. These findings are consistent with Peng, Li, and Zhang (2025) and Wang et al. (2022), who observe that politically connected CEOs tend to enhance organizational responsiveness toward regulatory changes and stakeholder expectations.

Table 4. The Test Results of the Effects of CEO Diversity on Status Quo Bias.

Variables	SQB – product innovation	SQB – process innovation
Constant	-0.214**	-0.804***
CEO Gender	-0.203***	-0.285***
CEO Experience	-0.012	-0.096***
CEO Political Connections	0.206***	0.224***
Industry Type	-0.117***	-0.127***
Firm Size	0.088***	0.191***
Regulatory Obstacles	-0.132**	-0.135**
Technology	0.679***	0.735***
Pseudo R ²	0.017	0.026
LR chi ²	394.60	521.12
Number of obs.	16,948	16,948

Note: ***, ** denote significance levels at 1%, 5% respectively.

Source: World Bank Enterprise Survey (Processed).

Beyond individual factors, organizational and external variables also play a crucial role. There is a stronger propensity for large-scale firms to adopt water audits ($\beta=0.439$; $p<0.01$) and energy audits ($\beta=0.586$; $p<0.01$), while

industry type significantly influences energy audits ($\beta = -0.271$; $p < 0.01$) and carbon audits ($\beta = -0.576$; $p < 0.01$). Regulatory obstacles significantly increase the likelihood of conducting all types of environmental audits, with coefficients ranging between 0.316 and 0.762. Similarly, the use of technology strengthens the propensity of firms to implement water, energy, and pollutant audits. The significant LR chi-square values across all models and the pseudo- R^2 values, ranging from 0.052 to 0.079, suggest that these variables sufficiently explain the variance in audit behaviors across different sectors and countries.

Table 4 presents the test results of the effects of CEO diversity on SQB as operationalized through innovation, suggesting that gender, experience, and political connections contribute to reducing SQB tendencies. Thus, H4–H6 are empirically supported. Female CEOs are generally more receptive to strategic changes (Nepal et al., 2025; Post & Byron, 2015) as reflected in the lower likelihood of firms exhibiting SQB through both product innovation ($\beta = -0.203$; $p < 0.01$) and process innovation ($\beta = -0.285$; $p < 0.01$). Next, experienced CEOs demonstrate stronger adaptive and reflective capacities toward operational transformation (Dong & Yu, 2024; Liao & Wu, 2024) as indicated by their association with lower SQB tendencies in process innovation ($\beta = -0.096$; $p < 0.01$), although no significant association is observed for product innovation ($\beta = -0.012$; $p = 0.653$). Meanwhile, politically connected CEOs tend to have greater access to incentives, regulatory information, and strategic power networks (Goldman, Rocholl, & So, 2009; Hillman, 2005), which may strengthen innovation and sustainable organizational empowerment (Guedes et al., 2025; Wang et al., 2022). This is reflected in the higher likelihood of firms engaging in product innovation ($\beta = 0.206$; $p < 0.01$) and process innovation ($\beta = 0.224$; $p < 0.01$). Next, Table 5 presents the test results of the associations between CEO diversity, environmental audits, and SQB. Lower SQB, as reflected by stronger product and process innovation, increases the likelihood of firms adopting energy audits ($\beta = 0.215$ and 0.362 ; $p < 0.01$), thus empirically supporting H7. These findings support the argument that mitigating organizational bias may strengthen firms' responsiveness toward environmental obligations. In other words, organizations characterized by stronger status quo tendencies are generally less likely to adopt environmental audits actively and progressively.

Table 5 also demonstrates that SQB mediates the association between CEO characteristics and environmental audit practices. Nevertheless, the mediating association is primarily observed in energy audits and, to a lesser extent, carbon audits ($\beta = 0.095$ and -0.031 ; $p < 0.01$), while no significant mediating association is identified for water and pollutant audits, thus providing limited support for H8. In general, CEO diversity tends to reduce SQB tendencies, which subsequently strengthen firms' propensity to adopt energy and carbon audits. Furthermore, the regression coefficients reported in Table 3 (direct effects) are greater than the indirect coefficients through SQB presented in Table 5, indicating partial mediation effects. These findings suggest that CEO diversity influences SQB, which in turn is associated with environmental audit adoption, particularly for energy audits and, to a lesser extent, carbon audits. The results further indicate that energy audits are more responsive to leaders' psychological characteristics, whereas other audit practices appear to be more strongly influenced by regulatory pressures.

Table 5. Tests of Indirect Effects.

Variables	Water Audits	Energy Audits	Pollutant Audits	Carbon Audits
SQB-product innovation → Audits	-0.086	0.215***	-0.200	-0.144
SQB-process innovation → Audits	-0.145	0.362***	-0.152	-0.120
CEO gender → SQB-product innovation → Audit	0.021	-0.052***	0.049	0.035
CEO experience → SQB-product innovation → Audits	0.002	-0.004	0.004	0.003
CEO political connections → SQB-product innovation → Audits	-0.021	0.051***	-0.048	-0.034
CEO gender → SQB-process innovation → Audits	0.050	-0.124***	0.052	-0.041
CEO experience → SQB-process innovation → Audits	0.015	-0.037***	0.015	0.012***
CEO political connections → SQB-process innovation → Audits	-0.038	0.095***	-0.040	-0.031***

Note: *** denotes significance levels at 1%, respectively.

Source: World Bank Enterprise Survey (Processed).

Specifically, the effect of female CEOs on energy audits is mediated by SQB through product and process innovations. Further, process innovation mediates the effects of experienced and politically connected CEOs on energy and carbon audits. The findings underscore that SQB serves as a psychological-organizational mechanism that affects the association between leadership and sustainability decisions.

The findings are consistent with Post and Byron (2015), who observe that female leaders are more cautious and conservative toward risks. Nguyen, Vu, Nguyen, and Troege (2022) emphasize the importance of combining leadership experience and institutional pressures to encourage environmental innovations. Besides, political connections also offer access to policy support and environmental incentives, which strengthen innovation and compliance with energy audits (Maharani, Agustia, & Qomariyah, 2023; Wang et al., 2022).

4.3. Robustness Tests

To ensure the robustness of our findings, we ran the probit models as an alternative to the logit model. The analysis results demonstrate that the effect of CEOs' political connections on energy audits remains significant in both models: logit ($OR=2.455$; $p<0.01$) and probit ($\beta=0.526$; $p<0.01$), with consistent effect directions (Appendix 2). Although there are differences in interpreting coefficients, the significance levels and directions of the association remain the same. Hence, our main findings are robust and not affected by model specifications.

Besides, as displayed in Table 6, another robust analysis splits the sample into two subsamples based on firm scale to test whether the effect of politically connected CEOs is stable in various organizational sizes. The results demonstrate that both small-scale and large-scale firms exhibit a significantly positive effect of political connections on energy audits ($\beta=0.386$, $p<0.01$ for small firms; $\beta=0.828$, $p<0.01$ for large firms). The findings indicate that political connections represent cross-scale strategic resources because they facilitate firms to acquire more timely access to regulations and policy incentives, hence enabling firms to be more responsive to sustainability pressures.

Table 6. Robustness Test – The Effect of CEO Diversity on Environmental Audits – based on Firm Size.

Variables	Water Audits	Energy Audits	Pollutant Audits	Carbon Audits
Small-scale Firms				
Constant	-0.818	-1.268	0.454	0.152
CEO Gender	-0.060	-0.113*	-0.207	-0.31
CEO Experience	-0.138	0.009	-0.323*	0.083
CEO Political Connections	-0.001	0.386***	-0.134	0.509**
Industry Type	na	-0.141***	na	-0.435***
Firm Size	-0.004	0.264***	0.255	0.014
Regulatory Obstacles	0.239	0.259***	0.277***	0.338**
Technology	0.307	0.213***	0.581***	0.135
Pseudo R ²	0.017	0.031	0.062	0.075
LR chi ²	14.06	87.51	12.92	39.67
Number of obs.	1,119	3,202	150	383
Large-scale Firms				
Constant	-2.365	-2.389	1.172	-1.548
CEO Gender	-0.069	-0.317**	-0.181	0.123
CEO Experience	0.034	0.201**	-0.444	0.272**
CEO Political Connections	0.831***	0.828***	0.071	0.458*
Industry Type	na	-0.185***	na	-0.283**
Firm Size	0.448	0.489*	na	0.351
Regulatory Obstacles	0.274	0.064	0.688**	0.178
Technology	0.442***	0.501***	0.373	0.081
Pseudo R ²	0.0518	0.0676	0.0729	0.0415
LR chi ²	37.76	110.98	13.67	18.84
Number of obs.	638	1,264	136	329

Note: ***, **, * denote significance levels at 1%, 5%, and 10%, respectively.

"na" (Not applicable) indicates that the Industry Type coefficient was not reported in the Water Audits and Pollutant Audits models due to estimation output generated by Stata for those specific regressions.

Source: World Bank Enterprise Survey (Processed).

In the context of the European Union's increasingly stringent regulations through various initiatives like the European Green Deal, the role of CEOs' political connections has become increasingly critical. Such connections facilitate firms' compliance with environmental regulations through informal influences and better access to institutional networks, as highlighted by Li and Jin (2021) and Xu et al. (2024).

5. CONCLUSIONS

This study seeks to empirically analyze whether CEO diversity significantly affects the adoption of environmental audits, with status quo bias (SQB) serving as the crucial mediator. Our empirical results demonstrate the direct and indirect effects of CEO diversity on firms' decisions to adopt environmental audits. CEO diversity, as operationalized with work experience and political connections, encourages firms to adopt environmental audits (water, energy, pollutant, and carbon audits). Meanwhile, female CEOs only motivate firms to adopt energy-related environmental audits. CEO diversity also encourages firms to innovate, leading to lower SQB. Next, SQB mediates the effects of CEO diversity on environmental audits, especially those related to energy and carbon emissions.

Theoretically, our findings expand the Upper Echelon Theory by integrating a psychological dimension – SQB – into the model as a mediator between leaders' characteristics and sustainability strategies. This indicates that the leadership effect is not necessarily direct, but is affected by how they respond to risks and changes. Practically speaking, our study implies that organizations' internal resistance, and not weak regulations, significantly impedes the adoption of environmental audits. Hence, technocratic policies must be complemented with behavioral strategies, such as mindset-transformation-based leadership training and the positive utilization of political connections. Further, the results suggest that environmental regulations must consider organizational culture, thus supporting standard setters like the European Financial Reporting Advisory Group (EFRAG) and the International Sustainability Standards Board (ISSB) to integrate psychological aspects into their sustainability audit and reporting policy designs. EFRAG and ISSB could also encourage companies to pay more attention to organizational readiness and leadership behavior when implementing sustainability practices. For example, firms may benefit from internal readiness assessments, support for green process innovation, and sustainability-related leadership training to improve the effectiveness of environmental audits and reporting. This will arguably yield non-normative and adaptive approaches to organizational dynamics. Nonetheless, our research is subject to several caveats. The data are derived from the 2018–2020 WBES that coincided with the COVID-19 pandemic, which may have affected firms' strategic focus. Besides, the data are dominated by dummy variables, thus restricting us to exploring organizational dynamics more thoroughly. This warrants cautious interpretation of empirical results. Accordingly, we advise further studies to employ a longitudinal approach, expand the ESG indicators, and integrate interdisciplinary approaches like organizational or psychological ones to better understand resistance to sustainability practices.

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Appendix 1.

Table A1 presents the operational definitions and measurement scales of all variables employed in this study. The appendix summarizes the coding of the dependent, independent, mediating, and control variables to ensure transparency and facilitate the replication of the empirical analysis.

Table A1. Measurement of Research Variables.

Variables	Measurement
Dependent Variables (ENA)	
Water Audits	Dummy variable: score 1 if the firm adopts an external water audit, 0 otherwise.
Energy Audits	Dummy variable: score 1 if the firm adopts an external energy consumption audit, 0 otherwise.
Audit Pollutant	Dummy variable: score 1 if the firm adopts an external non-CO ₂ pollutant audit, 0 otherwise.
Carbon Audits	Dummy variable: score 1 if the firm adopts an external carbon audit, 0 otherwise.
Independent Variables	
CEO Gender (EGD)	Dummy variable, score 1 if the top manager is female, 0 otherwise
CEO Experience (EWE)	The natural logarithmic value (Ln) of the top manager's work experience.
CEO Political Connections (EPP)	Dummy variable, score 1 if the top manager was selected/ appointed as a politician, 0 otherwise.
Mediating Variables (SQB)	
Product Innovation	Dummy variable: score 1 if the firm implements product innovation, 0 otherwise.
Process Innovation	Dummy variable: score 1 if the firm implements process innovation, 0 otherwise.
Control Variables	
Industry Type (CIT)	Measured ordinarily based on industry types: (1) manufacturing, (2) retail and services, and (3) other services
Firm Size (CSZ)	Measured on an ordinal scale based on the number of permanent employees: (1) small, (2) medium, (3) large, and (4) very large.
Obstacles (COR)	Measured on an ordinal scale based on the severity of environmental regulatory obstacles: (1) no obstacle, (2) minor obstacle, (3) moderate obstacle, and (4) severe obstacle.
Technology (CTL)	Dummy variable: score 1 if the firm adopts licensed technology, 0 otherwise.

Appendix 2.

Table A2 presents a comparison between the logit and probit regression models. Although the coefficient scales differ because the two models assume different error distributions, the direction of the estimated coefficients and their

statistical significance remain consistent. This consistency indicates that the empirical findings are robust and are not sensitive to the choice of estimation method.

Table A2. Comparison of Logit and Probit Regression Results.

Variables	Logit OR	Logit p-value	Probit Coef	Probit p-value
CEO Gender	0.740	0.006	-0.1600	0.008
CEO Experience	1.136	0.057	0.0697	0.066
CEO political connections	2.455	0.000	0.5263	0.000
Industry type	0.763	0.000	-0.1522	0.000
Firm size	1.796	0.000	0.3312	0.000
Obstacle	1.372	0.003	0.1879	0.003
Technology	1.811	0.000	0.3503	0.000
_cons	0.070	0.000	-1.5421	0.000

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