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Audit Committee Characteristics and Environmental Disclosure: Empirical Analysis

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Abstract

This study investigates audit committee (AC) characteristics effect on environmental disclosure (ED) in 13 listed banks on Pakistan Stock Exchange. The research develop hypothesis about the relation among audit committee independence, audit committee financial expertise, audit committee size, audit committee gender diversity, and frequency of audit committee meeting, and environmental disclosure. Despite advancements in reporting standards, many firms still disclose environmental information voluntarily and with varying quality. The audit committee, with its pivotal role in overseeing both financial and nonfinancial reporting, is hypothesized to significantly influence the quality of environmental disclosures. Researchers examined how different AC attributes influence ED extent and quality, including size, independence, gender diversity, and financial expertise. Utilizing a sample of thirteen banks for the financial year ending December 31, 2023, this study employs data from annual and sustainability reports and relevant disclosures on the banks' websites. The investigation reveals larger audit committees, those with higher independence, greater gender diversity, and significant financial expertise, are positively linked via improved environmental disclosure. The findings underscore the importance of robust audit committee characteristics in enhancing corporate transparency and accountability regarding environmental performance. This study contributes by linking AC features with ED and offers insights for managers, policymakers, and regulators aiming to improve environmental reporting practices in emerging economies.

Keywords: Environmental Disclosure, Gender Diversity, Audit Committee, Firm Size, Expertise.

Introduction

Recently, corporate environmental disclosure has gained significant attention as subject of academic inquiry, with a particular focus on the factors influencing the level and quality of such disclosures (Almaqtari et al., 2023). Corporate environmental disclosure concerns the interactions between companies and society, especially concerning the adverse environmental impacts of corporate activities. Despite the development of several standards for environmental responsibility disclosure, there remains a lack of comprehensive guidelines. Consequently, many companies continue to engage in environmental disclosure on a voluntary basis, though the quality of such disclosure remains low (Diebel et al., 2024).

Environmental disclosure is increasingly viewed as critical to a company's long-term survival,

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which depends not only on financial performance but also on social and environmental factors. As a result, companies are beginning to integrate environmental reporting as a means of reducing information asymmetry between management and stakeholders. It has been posited that managers may strategically utilize environmental disclosure to obscure true sustainability performance (Cerciello et al., 2023). However, audit committee has crucial role and ensuring accuracy corporate reports, including environmental disclosures. As a representative of the board of directors, audit committee has expected thereby reducing information asymmetry between management & stakeholders (García-Sánchez et al., 2023). Given its importance, independence and audit committee expertise are believed to significantly influence environmental disclosure quality (Mohammadi, et al., 2021; Bataineh et al., 2023). However, research objective is to inspect link among audit committee characteristics and environmental disclosure level in listed banks in Pakistan. By doing so, study contributes to existing literature on audit committee characteristics & environmental disclosure. Therefore, study contributes to literature by linking audit committee characteristics and environmental disclosure, thereby broadening understanding environmental disclosure determinants. Because there is an informational imbalance between management and other stakeholders' information on how firms deal with social and environmental concerns should be disclosed through corporate reporting or other public channels, company's staff does not always consider shareholders or other stakeholders interests when making disclosure choices. Therefore this study finds the capability of audit committee characteristics in supporting the role of environmental disclosure in formation. This study also helps managers to re-arrange their duties and make policies to excel in their environment by analyzing the international data. The findings also help policymakers and regulatory bodies adopt the governance mechanism in their context, especially in emerging economies.

Literature Review

Audit Committee (AC) and, Environmental Disclosure

Internal auditing status and autonomy are enhanced by audit committees. As noted by Yorke et al., (2023), an AC is expected to be a well-informed, discerning, and supportive financial reporting overseer. Furthermore, Al Lawati et al. (2021) emphasized that the primary rationale behind the establishment of the AC was to allow the board of executives and management to address the prolonged non-cooperation in the trading environment. They also

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rated "tackling challenges" as a key amplifying factor concerning corporate values. In addition, accounting standards, transactions, and regulatory demands have become more complex, creating the need for accurate disclosure of a firm's earnings and financial condition, as well as the results of managerial and financial assessments (Zaman et al., 2021). The globalization of market structures has further introduced previously unknown mechanisms in financial oversight.

Several empirical studies suggest that boards with independent external directors perform more effectively in monitoring roles. Research by Zaman et al. (2021), Al-Matari(2022), and Hezabr et al. (2023) demonstrates that audit committee independence is associated with more effective management oversight. Hezabr et al. (2023) highlight the dual roles of external audit committee members in ensuring financial reporting quality: preserving auditors' reputations and mitigating shareholder litigation risks related to financial statements. Agency theory, which emphasizes the information asymmetry between principals and agents, underscores the significance of the AC in addressing this gap. The AC serves as a supervisor of management's performance and enhances internal control mechanisms within the company (Hezabr et al., 2020; Wang et al., 2023). This improves supervisory work and control quality, particularly in delivering environmental disclosure (ED) information, commonly found in annual and sustainability reports. The size of the AC is thought to decrease agency problems, as a larger committee can optimize corporate oversight, especially regarding information dissemination to stakeholders. It was found by Hassan et al. (2017) that environmental disclosure (ED) is positively related to the AC. Therefore, we propose the following hypothesis:

H1: Audit committees have a significant impact on environmental disclosure.

Audit Committee Size and Environmental Disclosure

Corporate governance, including environmental disclosures, is improved with the help of audit committees. Corporate governance includes overseeing non-financial aspects, such as environmental, social, and governance (ESG) disclosures, as part of financial reporting and compliance. Several studies suggested audit committee size could significantly influence quality and environmental disclosures extent. Larger audit committees may bring more diverse expertise, which is valuable for overseeing comprehensive disclosure practices, including environmental concerns (Liao et al., 2023). Moreover, audit committee size affects its ability to manage risks and responsibilities effectively. A larger audit committee can

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distribute work more efficiently and incorporate different perspectives, which are crucial for ensuring that companies adequately disclose their environmental impact (Barkemeyer et al., 2022). For example, companies with more members on their audit committee are likely to engage more in discussions regarding ESG and transparent environmental reporting (Smith et al., 2023).

Moreover, a larger committee may provide the necessary checks and balances to enhance environmental accountability. Members with varying backgrounds, such as environmental expertise or sustainability knowledge, can push for higher standards in environmental disclosures. In contrast, smaller audit committees may lack the diversity needed to address complex environmental issues effectively, leading to less detailed or insufficient environmental reporting (Khan & Akbar, 2023). Therefore, it is hypothesized:

H2: Environmental disclosure is greatly influenced by the size of the audit committee.

AC Members Independence and and Environmental Disclosure

Corporate reporting, including disclosures related to the environment, requires the independence of an audit committee. Independent members, free from executive influence, are more likely to push for comprehensive and transparent reporting practices, as they can exercise unbiased judgment in assessing a company's environmental risks and responsibilities (Chen et al., 2023).

Higher proportions of independent directors in audit committees are positively correlated with better environmental disclosure. Independent members often prioritize accountability and align corporate practices with stakeholder interests, which includes greater attention to environmental sustainability (Al-Hadi et al., 2022). They are also more likely to hold management accountable for disclosing accurate and complete information about the firm's environmental impact, improving transparency (Wang & Zhang, 2023). Thus, independence of audit committee contributes significantly to environmental reporting robustness, ensuring that companies adhere to higher environmental standards & mitigate green washing or incomplete disclosures risk.

H3: Independent audit committees positively improve environmental disclosure.

Gender Diversity & Environmental Disclosure

Diversity on audit committees is becoming increasingly important for corporate governance and environmental disclosure. Social and environmental issues are more likely to be discussed in gender-diverse committees. Women on audit committees often bring different

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values and ethical considerations, which can promote more thorough environmental reporting (Garcia-Sanchez et al., 2023).

Studies suggest that gender-diverse audit committees are positively associated with enhanced environmental disclosures, women generally sensitive related social plus environmental issues than their male counterparts (Bear & Wehman, 2023). This diversity contributes to a committee's ability to foster more inclusive decision-making, leading to better environmental accountability and transparency (Ahmed & Muttakin, 2023). Overall, audit committee gender diversity positively impacts of environmental disclosures quality, promoting more comprehensive sustainability reporting.

H4: Audit committee gender diversity has positive association to environmental disclosure.

Financial Expertise of Audit Committee & Environmental Disclosure

Audit committee financial expertise became critical for ensuring effective oversight of a company's reporting processes, including environmental disclosures. Members with strong financial backgrounds can better understand environmental risks and opportunities financial implications, which more comprehensive & accurate environmental reporting. Studies have shown that audit committees with financial experts are more likely to engage in thorough environmental disclosures due to ability that link environmental performance with financial outcomes (Li et al., 2023).

Financial experts on audit committees also tend to have a deeper understanding of regulatory requirements and stakeholder expectations, enabling them to advocate for enhanced transparency in environmental matters (Xu & Wang, 2023). This expertise helps the committee ensure that environmental disclosures align with both regulatory frameworks and investor interests, which enhances corporate accountability and sustainability reporting (Mansour et al., 2022). Thus, financial expertise within audit committee contributes to quality and environmental disclosure, ensuring that organizations comprehensively address their environmental impacts.

H5: Audit committee financial expertise has positive & significant association with environmental disclosure

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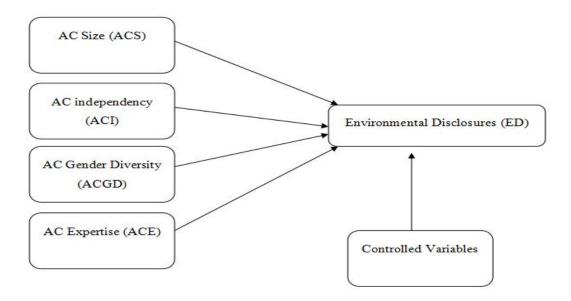


Figure 1 Conceptual Framework

Methodology

The study examines thirteen banks listed on the Pakistan Stock Exchange (PSX) for the financial year ending December 31, 2023. These banks are selected because they provide comprehensive and transparent disclosure of both financial and non-financial information. Given the relatively small number of registered banks, the study uses the entire population without the need for sampling. Data on Audit Committee (AC) characteristics and Environmental disclosures(ENDI) have been collected from the annual and sustainability reports issued by these banks, as well as from their published information on ENDI practices available on their websites.

Measurement of Variable

Independent Variables

Following previous empirical studies (Baxter & Cotter, 2009; Kantudu & Samaila, 2015; Thoopsamut & Jaikengkit, 2009; Allegrini & Greco, 2013), this study considers audit committee characteristics, including size, independence, gender diversity, and expertise, as independent variables. Audit committee size is measured by the number of members, independence by the number of independent members, and expertise by the percentage of members with financial expertise. These characteristics have been used in studies such as Nurhayati & Kurniati (2019), Tadros (2019), and Rahmawati & Budiarti (2018).

Dependent Variables

The independent variable of the study is ENDI. The content analysis method is used to obtain

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the value of ENDI. In examining each of these ENDI values, a dichotomous procedure was followed. Each company was awarded a score of "1" if the company appears to have disclosed the concerned reporting variable and "0" otherwise – the total score obtained by the company was deemed to be the net score of the company. ENDI is computed by using the following formula: ENDI = (Total score of the individual company/ Maximum score obtainable $(12) \times 100$.

Control Variables

Firm size, profitability, and leverage are included as control variables. Firm size is calculated as the natural logarithm of total assets, profitability is measured by return on assets (ROA), and leverage is determined as the ratio of debt to equity.

Model Specification

$$\begin{split} ED_{it} &= \alpha + \beta_2 ACS_{it} + \beta_5 ROA_{it} + \beta_8 FP_{it} + \beta_1 ACS_{it} + + \beta_3 ACI_{it} + \beta_4 ACGD_{it} + \beta_6 ACM_{it} + \beta_7 ACE_{it} + e_{it} \end{split}$$

Where ED on the left-hand side of the equation shows the environmental disclosures as a dependent variable, and on the right-hand side, variables show the Audit Committee characteristics as the independent variables. The panel regression analysis is chosen for its ability to provide robust insights into the relationships across multiple cross-sectional units over time.

Results

This chapter presents the empirical findings of the study, focusing on descriptive statistics, correlation analysis, and regression analysis. The goal is to assess the relationship between audit committee characteristics and environmental disclosure, with specific hypotheses tested throughout the analysis.

Descriptive Statistics

Descriptive statistics offer an overview of the variables used in the study. Data was collected from 2018 to 2023 and is summarized in Table 1. The mean CSR (environmental disclosure) score is -17.11, with a standard deviation of 24.99, indicating that the majority of firms in the sample perform better in CSR environmental disclosure than CSR reporting. However, there is considerable variation between industries. Audit Committee (AC) size has a mean of 4.15, with a standard deviation of 1.3, consistent with the Blue Ribbon Committee's 1999 recommendations. The female-to-male ratio in audit committees averages 48.39%, with notable variation across industries, as shown by a standard deviation of 25.63%. This

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indicates significant differences in gender representation in audit committees between sectors. Audit committee independence aligns with the Sarbanes-Oxley Act's requirements, with a mean of 0.99 and a standard deviation of 0.05. The average age of audit committee members is 48.38 years, indicating a generally older group of directors, while the average tenure is 3.4 years, varying by approximately two and a half years depending on the industry. Additionally, the average number of analysts covering firms in the sample is 8.54, suggesting that the industries studied are both substantial and well-recognized.

Table 1: Descriptive Analysis

Variables	Label	Mean	S.D
Environmental disclosure	ENDI	-17.11	24.99
Audit Committee Expertise	ACE	5.78	1.42
Audit Committee in dependency	ACI	0.99	0.05
Audit Committee Size	ACS	4.15	1.30
Audit Committee Gender Diversity	ACGD	3.4	2.5
Firm Performance (ROA)	FP	0.012	0.138
Firm Size	FS	7.064	0.818
Firmleverage	FL	0.628	1.879

Correlation Analysis

The dataset reveals significant relationships between environmental disclosure, audit committee characteristics, and firm-specific factors like performance, size, and leverage. Notably, environmental disclosure shows a strong positive correlation with audit committee expertise (0.73) and independence (0.79). This suggests that firms with more knowledgeable and independent audit committees are more likely to disclose environmental information, indicating that governance structures emphasizing expertise and independence contribute to greater transparency in sustainability reporting. Furthermore, audit committee size (0.65) and gender diversity (0.51) also exhibit positive relationships with environmental disclosure, implying that larger and more diverse committees may enhance environmental accountability. The interrelationships among audit committee characteristics are also notable. Audit committee expertise is positively correlated with independence (0.37) and size (0.33), suggesting that more expert audit committees may tend to be larger and more independent,

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reinforcing their role in promoting good governance. Gender diversity within audit committees is modestly correlated with other audit committee traits, like independence (0.21) and size (0.23), which hints at the broader governance benefits of having more diverse committees. However, the correlations between firm performance (ROA) and audit committee characteristics are generally low, with the highest being between ROA and audit committee expertise (0.13). This suggests that while expert audit committees might have some positive impact on performance, the overall influence of governance factors on firm performance in this dataset is relatively weak. Firm size and leverage also display interesting patterns. Firm size shows a slight negative correlation with environmental disclosure (-0.11) and audit committee gender diversity (-0.06), suggesting that larger firms might not necessarily prioritize environmental transparency or gender diversity in their audit committees. On the other hand, firm size is positively correlated with audit committee expertise (0.13), indicating that larger firms tend to have more experienced committees. Firm leverage is positively correlated with audit committee expertise (0.43), which could reflect the need for firms with higher debt levels to have more knowledgeable governance structures due to the scrutiny from creditors.

However, leverage is negatively correlated with environmental disclosure (-0.20), indicating that more leveraged firms tend to report less on environmental matters, possibly due to financial constraints or a focus on financial over non-financial disclosures. Overall, the data suggests that audit committee governance, particularly expertise and independence, plays a crucial role in promoting environmental disclosure. While firm size and leverage show mixed effects, it appears that larger and more leveraged firms may face trade-offs when it comes to balancing financial obligations and environmental transparency. These findings underscore the importance of robust audit committee structures in fostering both financial oversight and sustainability practices within firms.

Table 2: Correlation-Coefficient

	1.	2.	3.	4.	5.	6.	7.	8.
ENDI	1							
ACE	0.73	1						
ACI	0.79	0.37	1					
ACS	0.65	0.33	0.29	1				

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ACGD	0.51	0.33	0.21	0.23	1			
ROA	0.11	0.13	0.06	0.07	0.05	1		
FS	-0.11	0.13	=0/06	-0.10	-0.06	-0.13	1	
FL	-0.20	0.43	-0.10	0.27	0.00	0.10		1

Regression Analysis

Table 3 reveals multiple regression analysis that provides several insights intofactors influencing environmental disclosure (ENDI). Audit committee characteristics play a significant role, with audit committee independence showing a strong positive relationship with environmental disclosure ($\beta = 0.599$, t = 6.483, p < 0.01). This suggests that independent audit committees are more effective in promoting transparency. Similarly, larger audit committees ($\beta = 0.446$, t = 2.370, p < 0.01) and those with greater gender diversity ($\beta = 0.214$, t = 1.945, p < 0.05) are positively associated with increased environmental disclosure, indicating that these factors enhance the effectiveness of oversight and reporting. Firm performance also significantly influences environmental disclosure, with a positive coefficient ($\beta = 0.610$, t = 6.080, p < 0.01), suggesting that more successful firms are more likely to report on environmental matters. In contrast, firm size does not have a statistically significant impact ($\beta = 0.175$, t = 1.602), indicating that the size of the firm alone does not drive environmental disclosure. However, firm leverage shows a strong positive relationship $(\beta = 0.328, t = 6.591, p < 0.01)$, suggesting that firms with higher debt levels may be more transparent, possibly due to increased scrutiny from stakeholders. The model explains approximately 31.7% of the variance in environmental disclosure ($R^2 = 0.317$), indicating a moderate level of explanatory power. The high F-statistic (22.668) with a p-value less than 0.01 confirms the overall significance of the model. These findings highlight the importance of audit committee independence, size, and gender diversity, as well as firm performance and leverage, in shaping environmental disclosure practices, while firm size alone does not appear to be a significant determinant.

Table 3: Regression Analysis

ENDI	β	t
ACE	-0.347	-3.036***
ACI	0.599	6.483***
ACS	0.446	2.370***

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ACGD	0.214	1.945**
FP	0.610	6.0808***
FS	0.175	1.602
FL	0.328	6.591***

 $R^2=0.317$, F=22.668 p<0.01***, p<0.05**.

Discussion

The results indicate how AC characteristics affect ENDI performance. Moreover, study examines audit committee characteristics effect on environmental disclosure, focusing on listed banks in Pakistan. Research findings confirm significant positive relationship between key audit committee attributes—such as independence, size, financial expertise, and gender diversity, and environmental disclosure level. Specifically, audit committees with greater independence, larger membership, and increased gender diversity are associated with enhanced transparency in environmental reporting. The financial expertise presence within audit committee also plays crucial role in improving quality & comprehensiveness of environmental disclosures. Moreover, results highlight audit committee composition importance in ensuring effective governance and oversight of environmental reporting. Independent audit committees, free from executive influence, are better equipped to ensure accurate and complete disclosure of environmental information. Larger audit committees, with more diverse perspectives, contribute to a more thorough evaluation of corporate environmental responsibilities. Gender diversity concerning audit committee positively associated towards environmental matters, enhancing the overall quality of disclosures. Furthermore, financial experts presence on committee strengthens link between environmental performance and financial outcomes, leading to more detailed reporting. Overall, the study demonstrates that robust audit committee structures—characterized by independence, diversity, and financial expertise—are instrumental in promoting greater transparency and accountability in environmental disclosure practices. Moreover, findings provide valuable insight into governance mechanisms that can improve corporate environmental reporting.

Policy Recommendations

This study offers practical insights with important implications for enhancing the quality of environmental reporting. For standard-setters, shareholders, business decision-makers, and

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academics, the relevance and informativeness of environmental disclosures are critical. The findings provide a valuable opportunity to inform and refine corporate governance mechanisms related to environmental reporting, ensuring that these practices align with global standards and stakeholder expectations.

The analysis reveals that several audit variables have a stronger impact on the volume of environmental disclosure than its reliability. This carries significant policy implications for regulatory authorities, corporate governance bodies, and independent auditors. Policymakers can leverage these findings to promote consistent corporate governance practices internationally. By fostering collaborations with stakeholders, authorities can also encourage companies to enhance the transparency and comprehensiveness of their environmental disclosures. One key recommendation is to increase R&D intensity within industries. Strengthening R&D efforts can enable industries to operate more efficiently in a competitive landscape while simultaneously addressing environmental challenges. This would benefit not only the industries but also future generations by mitigating environmental risks. Companies that engage in environmental disclosure are more likely to gain economic advantages, including greater trust from governments and stakeholders, lower tax liabilities, and reduced costs, which can ultimately lead to increased profit margins. The study also suggests reducing the number of analysts monitoring environmental disclosures while promoting gender diversity, especially among female auditors. Encouraging gender equality in audit committees can improve governance and disclosure practices. Additionally, audit committee tenure should be shortened to ensure that audits remain efficient and responsive to evolving environmental and governance challenges over time. Furthermore, reducing board size is recommended to enhance the quality of human capital within organizations. A smaller, more specialized board with trained and experienced members can improve decision-making processes, reduce the burden on board members, and increase overall governance efficiency. This shift toward higher-quality board membership will likely result in more effective oversight of environmental reporting and corporate governance practices. In summary, these recommendations enhance transparency & environmental disclosures efficiency, while fostering innovation, diversity, and governance quality within industries. By adopting these measures, industries can improve both their environmental performance and stakeholder trust, leading to long-term economic and social benefits.

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