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Managerial Knowledge Heterogeneity and Sustainability Reporting: The Moderating Role of Internal and External Corporate Governance Forces

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ABSTRACT

This study examines the relationship between managerial knowledge heterogeneity and sustainability reporting as well as the moderating role of internal and external corporate governance mechanisms. Using panel data from 147 companies listed on the Tehran Stock Exchange over a ten-year period (2014–2023), the study employs multivariate regression analysis to test the research hypotheses. The findings indicate that managerial knowledge heterogeneity positively influences sustainability reporting. Moreover, internal corporate governance mechanisms, such as board structure and managerial ownership, positively moderate this relationship. In contrast, external governance mechanisms, including institutional ownership, auditor size, and free float, do not exhibit a significant moderating effect. These results suggest that sustainability disclosure is shaped more strongly by internal corporate factors than by external ones. The findings provide new insights into the role of executive leadership and underscore the importance of strategic management team composition in enhancing sustainability disclosure. Attention to internal governance mechanisms and top management diversity can therefore help organizations strengthen their environmental, social, and economic disclosures.

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Introduction

Modern reporting systems must evolve beyond traditional financial measures to address broader stakeholder expectations. Consequently, firms are increasingly adopting sustainability reporting as a tool to demonstrate accountability and transparency regarding environmental, social, and governance (ESG) issues. Sustainability reporting assures shareholders and stakeholders that non-financial risks and opportunities associated with operations are systematically identified and managed (Baumüller & Sopp, 2023; Loh et al., 2017).

Several theoretical frameworks explain why firms engage in sustainability reporting, including legitimacy theory, stakeholder theory, and institutional theory. Legitimacy and stakeholder theories, rooted in political economy perspectives, provide insight into corporate motivations for sustainability and social responsibility disclosures. In addition, agency theory and signaling theory explain managerial motivations for achieving sustainable financial and non-financial performance as well as investors' responses to such disclosures (Rezaee & Tuo, 2017).

Among these, institutional theory has received relatively less attention in sustainability reporting research. It views organizations as structured entities composed of diverse individuals and groups united by shared interests. Firms gain legitimacy, resources, and longevity by responding to institutional pressures. Institutional theory explains how consensus is built around the meaning of sustainability, how related practices diffuse across firms, and how these practices are linguistically and symbolically constructed, contested, and legitimized (Zanoni & Oliveira, 2023). Therefore, institutional theory plays a key role in promoting corporate sustainability by framing the adoption of social, environmental, and ethical governance practices as rational and necessary, while deeming their absence as illegitimate (Huafang & Jianguo, 2007).

However, a lack of unified governance or conflicting views among top executives can lead to inconsistencies in sustainability reporting. This challenges stewardship theory, which emphasizes collective goals over individual interests. In practice, the strategic decisions of top management are viewed as stewardship behaviors aimed at creating shared value and long-term benefits (Hernandez, 2012).

Drawing on human capital theory, managerial knowledge and capabilities play a crucial role in shaping organizational performance (Hitt & Ireland, 2000). Top executives constitute a key leadership team responsible for both decision-making and implementation. Diversity within this team—whether in knowledge, experience, or demographic background—can foster creativity and improve problem-solving (Wu et al., 2023). Prior research has examined top management team (TMT) heterogeneity from multiple perspectives (Lee et al., 2022; Ormiston et al., 2022).

Two competing perspectives dominate the literature on managerial knowledge heterogeneity. The positive view posits that heterogeneous teams possess broader perspectives, allowing them to better navigate complex environments and make more informed strategic decisions. This diversity enhances innovation, business performance, and sustainability reporting (Ma et al., 2022; Mukhibad et al., 2025; Murray, 2007; Wu et al., 2023). Conversely, the negative view suggests that excessive heterogeneity can hinder communication, reduce cohesion, and increase conflict within teams, ultimately impairing performance (Amazon et al., 2006; Barkema & Shvyrkov, 2007; Carpenter & Fredrickson, 2001; Wang et al., 2022). Accordingly, the relationship between managerial knowledge heterogeneity and sustainability reporting remains theoretically contested and empirically underexplored, making it a subject of substantial academic and practical importance.

Corporate governance refers to the system through which a company is directed, controlled, and held accountable to shareholders and other stakeholders. It plays a crucial role not only for the firm's internal stakeholders but also for the broader society (Imam & Malik, 2007). Generally, corporate governance mechanisms are divided into internal and external categories (Gillan, 2006). Effective governance can prevent or limit managerial misconduct and the misuse of authority, issues that often arise when managers pursue personal interests that conflict with those of shareholders or other stakeholders, thereby reducing organizational efficiency and performance (Guluma, 2021).

Accordingly, governance mechanisms should be designed to align managerial incentives with stakeholder interests. Through its disciplinary structures and continuous oversight, corporate governance can significantly influence the relationship between TMT heterogeneity and sustainability reporting.

Building on this premise, the present study seeks to address the following research questions:

- Does managerial knowledge heterogeneity affect corporate sustainability reporting?
- Do internal and external corporate governance mechanisms moderate this relationship?

While prior studies have explored the effect of managerial heterogeneity on financial performance (Carpenter et al., 2004), less is known about its implications for non-financial disclosure decisions, particularly sustainability reporting, and how corporate governance mechanisms may shape this relationship. This question is especially relevant in emerging economies such as Iran, where sustainability disclosure frameworks remain voluntary and underdeveloped, making theoretical and empirical investigation both timely and significant.

This study integrates upper echelons theory, legitimacy theory, and agency theory to explain how variations in managerial cognition and governance structures jointly influence sustainability disclosure. By examining both internal (e.g., board structure, managerial ownership) and external (e.g., institutional ownership, auditor size, free float) governance factors, the study demonstrates how managerial cognitive diversity can yield different outcomes under effective versus ineffective governance frameworks.

Hence, this research not only addresses a theoretical gap but also proposes an integrative model linking managerial cognitive heterogeneity, corporate governance, and sustainability reporting. The significance of the study lies in its potential to provide empirical evidence that informs stakeholders, regulators, and information users about the crucial role of managerial knowledge and governance oversight in enhancing sustainability disclosure.

Furthermore, given the growing body of literature on sustainability accounting in Iran, this research aims to bridge existing gaps and draw regulatory attention to the need for comprehensive standards and legal frameworks for sustainability reporting. To date, no prior Iranian study has directly investigated this specific relationship. Therefore, the present study contributes to accounting and management literature by being the first to examine how TMT knowledge heterogeneity influences sustainability reporting, while highlighting the moderating role of corporate governance. It is expected that the results will enrich theoretical understanding and provide insights into how managerial diversity and governance structures can jointly enhance sustainability disclosure.

The remainder of this paper is organized as follows: The next section presents the theoretical framework and hypothesis development, followed by the research methodology and results. The final sections provide the analysis, discussion, and practical recommendations.

Theoretical Framework and Hypothesis Development

Managerial Knowledge Heterogeneity and Sustainability Reporting

Sustainability reporting refers to the disclosure of environmental, social, and economic information provided by companies to stakeholders. Such disclosures enhance managerial decision-making, improve information usefulness, and strengthen corporate reputation (Burritt & Schaltegger, 2010; Palit, 2018). Increasingly, sustainability reporting is recognized as an essential component of corporate sustainability practices, attracting significant attention from regulators, standard setters, practitioners, and scholars (Sameni Malayeri et al., 2025).

Corporate sustainability represents a strategic approach to creating long-term stakeholder value through environmentally responsible and socially equitable business practices. It encompasses economic, cultural, social, environmental, and ethical dimensions, emphasizing that short-term financial gains should not come at the expense of long-term sustainability objectives. Accordingly, firms strive to strengthen their systems for measuring, managing, and transparently reporting their performance in addressing stakeholder needs and sustainability outcomes.

From a theoretical standpoint, sustainability reporting can be conceptualized as a mechanism for reducing information asymmetry between management and stakeholders. Drawing on legitimacy theory and stakeholder theory, firms disclose sustainability information to achieve social legitimacy and meet stakeholder expectations. However, the extent and quality of such disclosures largely depend on the cognitive and behavioral characteristics of the TMT, as sustainability reporting involves complex judgments that integrate ethical, strategic, and risk-related considerations.

Accordingly, heterogeneity in managerial knowledge and experience can expand the diversity of perspectives and enhance the cognitive capacity of the management team, enabling more informed and balanced decisions regarding sustainability disclosure (Hambrick & Mason, 1984; Kor & Mesko,

2013). In recent years, many companies have voluntarily reported on their economic, environmental, social, and governance (ESG) performance, recognizing the growing influence of sustainability disclosure on firm value (Soomiyol et al., 2024; Swarnapali & Le, 2018). Unlike financial reporting, however, sustainability disclosure is voluntary, and thus, depends heavily on managerial discretion, making factors such as top management knowledge heterogeneity particularly relevant.

According to the upper echelons theory (Hambrick & Mason, 1984), the demographic characteristics of top executives—such as age, education, and professional experience—shape the type and extent of information they utilize, which in turn influences strategic decision-making and firm performance (Kiyak et al., 2011). Building on this premise, differences among senior managers in cognitive frameworks, values, and social experiences can lead to variations in organizational outcomes (Xia & Liu, 2022). These differences across cognitive domains are collectively referred to as managerial heterogeneity (Pitcher, 2001).

From this theoretical perspective, managerial knowledge heterogeneity can have two opposing effects on sustainability reporting. On one hand, greater cognitive diversity may stimulate creativity, innovation, and heightened awareness of environmental and social responsibilities (Kozlowski & Klein, 2000). On the other hand, divergent viewpoints may hinder consensus, delay decisions, and weaken managerial cohesion (Carpenter & Fredrickson, 2001). Thus, determining the overall effect of knowledge heterogeneity requires a nuanced understanding of the organizational and institutional context.

Financial and business knowledge within the TMT can improve the quality of strategic judgments and enhance investor confidence (Yermack, 1996). However, educational heterogeneity may lead to inconsistent decision-making patterns (Knight et al., 1999), while tenure diversity can strengthen loyalty and organizational familiarity (Carpenter & Fredrickson, 2001). Moreover, gender diversity influences leadership styles and stakeholder engagement, as female managers often exhibit stronger communication skills and a greater emphasis on relationship-building, which may improve both team dynamics and sustainability outcomes (Wu et al., 2023). Similarly, financial literacy and background contribute to better analytical capability and more prudent resource management (Custódio & Metzger, 2014).

Despite these advantages, some studies (e.g., Carpenter & Fredrickson, 2001) have shown that managerial heterogeneity can increase decision-making complexity and slow organizational adaptation. Others (e.g., Carpenter et al., 2004) report mixed results, suggesting that the mechanisms through which heterogeneity influences firm performance are context-dependent and not yet fully understood.

While some organizational theorists attribute firm outcomes primarily to structural and environmental factors (e.g., product quality, human capital, or market conditions), top management remains central to strategic formulation and corporate direction (Agrawal & Chadha, 2005). Empirical evidence supports this view: executives with strong financial expertise tend to adopt more conservative and transparent reporting practices, reducing the likelihood of fraudulent or low-quality disclosures (Oradi et al., 2020). Cui et al. (2019) found that heterogeneity in managerial backgrounds and experiences positively affects firm performance, whereas educational heterogeneity shows a negative association. They further reported that ownership structure moderates this relationship. Chen et al. (2018) observed that older executives tend to be more risk-averse and conservative in their decisions. Additionally, Saghafi et al. (2025) found that managerial knowledge heterogeneity can influence the tone of annual reports and earnings management practices, underscoring its behavioral impact on disclosure.

Building on these theoretical and empirical insights, it is proposed that variation in managerial knowledge and experience influences managerial decision-making concerning sustainability reporting. Accordingly, the first hypothesis is formulated as follows:

H1: Managerial knowledge heterogeneity has a positive effect on sustainability reporting.

Moderating Role of Corporate Governance

According to agency theory, corporate governance systems can mitigate managerial decisions driven by cognitive biases or conflicts of interest through oversight, transparency, and accountability.

Consequently, higher-quality corporate governance, both internal and external, is expected to enhance the positive effect of managerial knowledge heterogeneity on sustainability reporting, as such systems provide a framework for the efficient utilization of managerial cognitive diversity while preventing it from escalating into dysfunctional conflicts.

Corporate governance refers to the system of mechanisms through which firms are directed and controlled. When effectively implemented, it enables companies to achieve objectives related to operational transparency, accountability to stakeholders, and the protection of stakeholder rights. Broadly speaking, corporate governance constitutes an ethical, organization-wide practice that addresses the needs and expectations of a broad range of stakeholders (e.g., shareholders, creditors, employees, customers, and regulators) within a cohesive framework (Al-Malkawi & Pillai, 2014).

In essence, corporate governance mechanisms aim to resolve conflicts of interest between management and shareholders, which often impose significant agency costs on the firm. Accordingly, governance structures are designed to reduce agency problems. However, the quality and effectiveness of such mechanisms can vary across firms. An effective governance system should not only motivate managers and board members to pursue goals aligned with shareholder and company interests but also promote the efficient use of organizational resources (Guterman, 2023). Moreover, due to its disciplinary nature involving continuous monitoring, corporate governance fosters firm efficiency and value maximization.

Corporate governance oversight can be internal and/or external. Internal governance refers to the routine processes through which senior managers supervise and evaluate lower-level executives. In contrast, external governance pertains to the monitoring role of influential market participants and major or institutional shareholders over managerial performance (He & Sommer, 2010).

Empirical studies further highlight the importance of governance in shaping sustainability-related decisions. Appiah-Kubi (2024) found that sustainability knowledge positively influences sustainability reporting and that stakeholder pressure positively moderates the relationship between perceived profitability and sustainability disclosure. Abdullah and Tursoy (2025) reported that corporate governance characteristics have a marginally negative effect on firm performance; moreover, larger board size and a higher frequency of board meetings were associated with weaker firm performance, while CEO duality had no statistically significant impact. Lin et al. (2024) observed that boards of directors can influence CEO power, thereby reducing agency costs and positively affecting ESG outcomes. However, the impact of political experience among managers varies across firms. Erben Yavuz et al. (2024) demonstrated that corporate governance mechanisms, particularly board characteristics and ownership structure, affect sustainability reporting performance, emphasizing the critical role of ownership structure and board composition in enhancing transparency in ESG disclosure.

Similarly, Younas and Zafar (2020) found that firm risk-taking has a significant negative impact on corporate sustainability, using board independence and board size as instrumental variables to control for excessive risk-taking. Zahid et al. (2020) highlighted the pivotal role of female directors in improving sustainability reporting. However, Husted and Sousa-Filho (2019) concluded that board size and board independence positively influence ESG disclosure, whereas board gender diversity and CEO duality exert negative effects.

Beyond internal governance, external corporate governance mechanisms may also influence managerial behavior and information disclosure through channels such as ownership, monitoring, and certification. In this study, institutional ownership, auditor type, and the proportion of free-float shares are employed as key indicators of external governance. Each of these mechanisms can strengthen or weaken the relationship between managerial knowledge heterogeneity and the quality or quantity of sustainability reporting through different pathways (i.e., pressure from professional investors, independent assurance and inspection, and market liquidity or risk sensitivity).

According to resource dependence theory (Pfeffer & Salancik, 1978), organizations rely on external actors to secure critical resources. Consequently, the presence of powerful institutional owners, reputable auditors, or a more dispersed ownership structure enhances corporate accountability to stakeholders. This, in turn, allows managerial knowledge heterogeneity to translate not into conflict but into more creative decision-making and more responsive sustainability reporting, as firms with greater dependence on external actors tend to reinforce legitimacy-enhancing mechanisms, such as sustainability disclosure.

From the perspective of agency theory, external governance mechanisms, such as active monitoring by institutional investors and high-quality auditing, are expected to reduce agency costs and improve the transparency of sustainability reports. Furthermore, drawing on legitimacy theory and stakeholder theory, companies are compelled to provide comprehensive and reliable sustainability information to maintain social legitimacy and respond to stakeholder expectations. Under such conditions, external governance is likely to strengthen accountability pressures, encouraging managers to converge toward more consistent sustainability reporting practices even in the presence of cognitive differences.

Finally, signaling theory suggests that the selection of a reputable auditor or the presence of a high level of institutional ownership serves as a credible signal of a firm's commitment to transparency and accountability in the ESG domain. Institutional investors, as knowledgeable and professional monitors, demand broader and more comparable sustainability disclosures, while auditors, through independent assurance, enhance the credibility and reliability of such reports. Likewise, a high proportion of free-float shares increases stock liquidity and market sensitivity, imposing additional monitoring pressure on managers and motivating them to engage in more comprehensive and standardized sustainability reporting.

Accordingly, both internal and external corporate governance mechanisms are expected to moderate the relationship between managerial knowledge heterogeneity and sustainability reporting. Hence, the following hypotheses are proposed:

H2: Internal corporate governance mechanisms strengthen the positive relationship between managerial knowledge heterogeneity and sustainability reporting.

H3: External corporate governance mechanisms strengthen the positive relationship between managerial knowledge heterogeneity and sustainability reporting.

Research Methodology

Research Design and Sample

This study adopts a descriptive-correlational approach with an ex post facto design. The statistical population comprises all companies listed on the Tehran Stock Exchange (TSE) during the period 2014–2023. The research sample was selected using a purposive method, as summarized in Table 1.

Table 1. Sample Selection Process

Description	Count
Total TSE-listed companies in 2023	663
Minus: Delisted companies	117
Minus: Companies with suspended stock trading for 6 months	59
Minus: Companies with fiscal year-end different from calendar year-end (March 20)	74
Minus: Companies listed after the research period began	67
Minus: Companies with incomplete data	37
Minus: Investment firms, banks, and insurance companies	162
Final research sample	147

As shown in Table 1, firms whose stock trading was suspended during the study period were excluded from the sample. This exclusion aimed to minimize the potential effects of business cycles on firm performance and financial condition, thereby enhancing the comparability of financial data and ensuring consistent access to market-based information.

Similarly, companies with fiscal years not aligned with the calendar year were removed because such firms are often subject to distinct economic, regulatory, and reporting environments at different points. These variations could introduce temporal heterogeneity and reduce the comparability of financial statements across firms. To maintain temporal consistency, such firms were excluded.

Moreover, investment firms, banks, and insurance companies were eliminated from the sample due to the unique characteristics of their financial structures, regulatory regimes, and operational models compared to manufacturing and service firms. After applying these criteria, a total of 147 companies over a 10-year period (yielding 1,470 firm-year observations) were selected as the final research sample.

To test the hypotheses, multivariate regression models using panel data were employed. Data analysis was conducted using Stata version 15.

Models and Variables

Based on the theoretical framework and literature review, this study employs the following multivariate regression models to test the proposed hypotheses.

$$SR_{it} = \alpha_0 + \beta_1 MKH_{it} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 GROWTH_{it} + \beta_6 MB_{it} + \beta_7 AGE_{it} + \varepsilon_{it} \quad H_1: (1)$$

$$SR_{it} = \alpha_0 + \beta_1 MKH_{it} + \beta_2 IND_{it} + \beta_3 (MKH_{it} \times IND_{it}) + \beta_4 ROA_{it} + \beta_5 SIZE_{it} + \beta_6 LEV_{it} + \beta_7 GROWTH_{it} + \beta_8 MB_{it} + \beta_9 AGE_{it} + \varepsilon_{it} \quad H_{2.1}: (2)$$

$$SR_{it} = \alpha_0 + \beta_1 MKH_{it} + \beta_2 Manag_{it} + \beta_3 (MKH_{it} \times MANAG_{it}) + \beta_4 ROA_{it} + \beta_5 SIZE_{it} + \beta_6 LEV_{it} + \beta_7 GROWTH_{it} + \beta_8 MB_{it} + \beta_9 AGE_{it} + \varepsilon_{it} \quad H_{2.2}: (3)$$

$$SR_{it} = \alpha_0 + \beta_1 MKH_{it} + \beta_2 IOWN_{it} + \beta_3 (MKH_{it} \times IOWN_{it}) + \beta_4 ROA_{it} + \beta_5 SIZE_{it} + \beta_6 LEV_{it} + \beta_7 GROWTH_{it} + \beta_8 MB_{it} + \beta_9 AGE_{it} + \varepsilon_{it} \quad H_{3.1}: (4)$$

$$SR_{it} = \alpha_0 + \beta_1 MKH_{it} + \beta_2 AUDTYPE_{it} + \beta_3 (MKH_{it} \times AUDTYPE_{it}) + \beta_4 ROA_{it} + \beta_5 SIZE_{it} + \beta_6 LEV_{it} + \beta_7 GROWTH_{it} + \beta_8 MB_{it} + \beta_9 AGE_{it} + \varepsilon_{it} \quad H_{3.2}: (5)$$

$$SR_{it} = \alpha_0 + \beta_1 MKH_{it} + \beta_2 FREEF_{it} + \beta_3 (MKH_{it} \times FreeF_{it}) + \beta_4 ROA_{it} + \beta_5 SIZE_{it} + \beta_6 LEV_{it} + \beta_7 GROWTH_{it} + \beta_8 MB_{it} + \beta_9 AGE_{it} + \varepsilon_{it} \quad H_{3.3}: (6)$$

Independent Variable: Managerial Knowledge Heterogeneity

Managerial knowledge heterogeneity (MKH) is the key independent variable of this research. Following Cui et al. (2019) and Herrmann and Datta (2005), managerial knowledge heterogeneity is measured using a composite index based on four dimensions: educational background, tenure, political background, and financial background. The measurement process involved three stages:

• Individual-Level Classification:

Each executive was assessed according to the following four criteria:

- Educational Background (EB): A dummy variable coded 1 if the executive holds a master's or PhD degree, and 0 otherwise.
- Tenure (TN): A dummy variable coded 1 if the executive's tenure exceeds the median tenure of all sampled executives, and 0 otherwise.
- Political Background (PB): A dummy variable coded 1 if the executive has political connections (defined as current or prior affiliations with governmental or quasi-governmental institutions, or when major institutional shareholders are state-owned entities), and 0 otherwise.
- Financial Background (FB): A dummy variable coded 1 if the executive has an educational background in finance, accounting, or economics, and 0 otherwise.

• Team-Level Aggregation:

For each firm-year, the aggregate values of all executives were computed for each criterion. If the firm's aggregate value for a given criterion was below the median across all firms, the top management team was classified as heterogeneous in that dimension (assigned a value of 1); otherwise, it was classified as homogeneous (assigned a value of 0). For example, if an automotive firm has five executives and two hold PhDs, while the remaining three hold bachelor's degrees, the firm would be considered educationally heterogeneous (EBH = 1).

• Composite Scoring:

The four heterogeneity dimensions were summed to compute the firm's overall MKH score, as shown below:

$$MKH_{i,t} = EBH_{i,t} + TH_{i,t} + PBH_{i,t} + FBH_{i,t} \quad (7)$$

where $EBH_{i,t}$ is educational background heterogeneity, $TH_{i,t}$ denotes tenure heterogeneity, $PBH_{i,t}$ represents political background heterogeneity, and $FBH_{i,t}$ signifies financial background heterogeneity.

Thus, the composite MKH score for firm i in year t ranges from 0 to 4, with higher values indicating greater heterogeneity among top executives in terms of their educational, experiential, political, and financial profiles.

Dependent Variable: Sustainability Reporting

In this study, the level of corporate sustainability reporting was measured based on established theoretical frameworks and the methodology proposed by Khuong et al. (2022). The indicators were adapted from the global reporting initiative standards and localized to the Iranian corporate and financial reporting context, drawing on the framework developed by Masoumi et al. (2018).

A total of 51 indicators were selected across three dimensions: economic, social, and environmental. The content analysis method was applied to assess corporate sustainability reporting disclosure. Each sustainability item received a score of 1 if disclosed in the firm's annual report, and 0 otherwise. All data were obtained from the board of directors' reports published by listed companies.

Table 2. Dimensions, Components, and Indicators of Corporate Sustainability Reporting

Dimension	Component	Indicators
Economic	Economic Performance	Economic value added Fulfillment of strategic goals and defined requirements Return on assets (ROA) Financial implications and risks/opportunities related to climate change Value-added statement
	Market Presence	Company's market share in the overall industry and local region Growth or change in market share and future outlook Trends in sales volume/value by product/region/customer Regulatory and technological developments affecting market and products Market changes and competitive landscape in the industry/region (competitive advantages/pressures)
	Indirect Economic Impacts & Responsible Investment	Significant indirect economic impacts (e.g., foreign exchange savings) Social investment and spending categorized by type and area Productivity indices (production and labor)
Social	Labor, Human Rights	Total number of employees by employment type, age group, region, and gender Full-time employee benefits not offered to part-time/temporary staff Employee stock ownership Retirement and end-of-service benefits Employee recreational and sports programs Workplace health and safety issues Average annual training hours per employee by gender and role Educational grants, scholarships, and related programs Whistleblowing and employee feedback mechanisms
	Community Engagement & Development	Support for small industries and entrepreneurship, especially local communities Social, cultural, environmental, educational, and athletic awards and certifications Cash/product/service contributions to social, educational, artistic activities Charitable and philanthropic donations Hiring of interns or student workers Sponsorship of educational conferences and art exhibitions Participation in social, cultural, and religious activities Membership in national/regional/international sustainability organizations Donations for disaster victims (e.g., earthquakes, floods)
		After-sales service Customer satisfaction and responsiveness R&D programs for products Corporate ethical and social codes or conduct charters
Environmental	Materials, Water, and Energy	Quantity and cost of direct/indirect raw materials Total water withdrawal by source Volume of recycled and reused water Direct and indirect energy consumption by source Renewable energy production and usage programs Energy-saving initiatives
	Emissions and Waste Management	Initiatives for reducing greenhouse gas emissions and removal methods/results Procedures for hazardous/non-hazardous waste reduction and eco-friendly disposal Total waste weight by type and disposal method
	Environmental	Actions to mitigate the environmental impact of products/services (e.g., on soil or forests)

Impact of Products & Services	Customer/supplier-focused environmental practices Eco-friendly product and infrastructure design Customer guidance and advice on environmentally conscious use and impact reduction
Compliance with Environmental Laws	Corporate environmental policies and codes Legal claims arising from environmental issues

Moderating Variables: Internal and External Corporate Governance Mechanisms

Consistent with John and Senbet (1998), Sohail et al. (2017), and Amri et al. (2023), internal and external corporate governance mechanisms were operationalized as follows:

- Internal Corporate Governance Mechanisms
 - Board Independence (BIND): A dummy variable equal to 1 if the board chair is independent, and 0 otherwise.
 - Managerial Ownership (MANAG): The percentage of company shares held by board members.
- External Corporate Governance Mechanisms
 - Institutional Ownership (INST): Following Bushee (1998), institutional investors include large entities such as banks, insurance companies, and investment firms primarily engaged in equity trading. According to Article 1, Clause 27 of Iran's Securities Law, institutional investors are defined as individuals or entities holding more than 5% or IRR 50 billion in nominal securities. Ownership percentages were extracted from financial statement notes.
 - Auditor Type (AUDTYPE): A dummy variable equal to 1 if the firm's financial statements were audited by the Iranian Audit Organization or Mofid Rahbar Audit Firm, and 0 otherwise.
 - Free Float Shares (FREEF): The percentage of the company's publicly traded (floating) shares.

Control Variables

Drawing on the theoretical framework and prior empirical evidence (Abdul-Latif et al., 2019; Appiah-Kubi, 2024; Bae et al., 2018), the following control variables were included in the model:

- Return on Assets (ROA): Controls for firm financial performance, which may influence sustainability reporting and managerial decision-making. Calculated as the ratio of net profit to total assets.
- Firm Size (SIZE): Controls for organizational scale, as larger firms are typically better resourced to engage in sustainability reporting. Measured as the natural logarithm of total assets.
- Sales Growth (GROWTH): Captures growth opportunities and market dynamics that may affect managerial behavior and reporting practices. Computed as the difference between current-year and previous-year sales, divided by previous-year sales.
- Firm Age (AGE): Controls for organizational maturity and stability, as more established firms may demonstrate more consistent reporting behavior. Calculated as the natural logarithm of the number of years from establishment to the observation year.
- Financial Leverage (LEV): Controls for capital structure and financial risk, which can influence transparency and disclosure practices. Measured as the ratio of total debt to shareholders' equity.
- Market-to-Book Ratio (MB): Accounts for the firm's market valuation relative to book value, reflecting investor expectations and managerial incentives for disclosure. Calculated as the sum of market value of equity and book value of total liabilities divided by the book value of total assets.

Findings

Descriptive Statistics

Table 3 presents the descriptive statistics for all variables. The results indicate a relatively high tendency toward sustainability reporting among the sampled firms. In addition, the distribution of variables approximates normality.

Table 3. Descriptive Statistics

Variable	Symbol	N	Mean	Std. Dev.	Min	Max
Sustainability Reporting	SR	1,470	0.705	0.050	0.393	0.934
Managerial Knowledge Heterogeneity	MKH	1,470	2.050	0.871	1	4
Managerial Ownership	MANAG	1,470	0.535	0.288	0	0.954
Institutional Ownership	IOWN	1,470	0.662	0.210	0	0.981
Free Float Shares	FREEF	1,470	0.278	0.176	0.050	0.950
Return on Assets	ROA	1,470	0.153	0.162	-0.367	0.699
Firm Size	SIZE	1,470	15.254	1.741	11.128	21.899
Financial Leverage	LEV	1,470	0.522	0.213	0.031	1.805
Sales Growth	GROWTH	1,470	0.389	0.493	-0.909	3.744
Market-to-Book Ratio	MB	1,470	2.837	2.215	0.622	14.142
Firm Age	AGE	1,470	3.652	0.354	2.639	4.276

Table 4. Frequency Distribution of Dummy Variables

Variable	Symbol	% of 0s	% of 1s	N
Board Chair Independence	BIND	64.63	35.37	1470
Type of Auditor	AUDITTYPE	79.46	20.54	1470

As shown in Table 4, out of 1,470 firm-year observations, 520 (35.37%) had an independent board chair, and 302 (20.54%) were audited by the Iranian Audit Organization or Mofid Rahbar Audit Firm.

Inferential Statistics

Panel Unit Root Test (Hadri Test)

Before estimating the panel data regression model, the stationarity of all variables was tested using the Hadri panel unit root test. The results presented in Table 5 confirm that all variables are stationary at the 5% significance level.

Table 5. Hadri Stationarity Test Results

Variable	Symbol	Test Statistic	p-value	Result
Sustainability Reporting	SR	2.0359	0.0209	Stationary
Managerial Knowledge Heterogeneity	MKH	15.7178	0.0000	Stationary
Managerial Ownership	MANAG	29.3697	0.0000	Stationary
Institutional Ownership	IOWN	31.8233	0.0000	Stationary
Free Float Shares	FREEF	40.7642	0.0000	Stationary
Return on Assets	ROA	24.2162	0.0000	Stationary
Firm Size	SIZE	55.8231	0.0000	Stationary
Financial Leverage	LEV	27.4942	0.0000	Stationary
Sales Growth	GROWTH	9.6746	0.0000	Stationary
Market-to-Book Ratio	MB	11.7469	0.0000	Stationary
Firm Age	AGE	60.2157	0.0000	Stationary

Subsequently, the Chow and Hausman tests were conducted to determine the appropriate panel estimation technique. The Chow test supported the use of a panel data model, while the Hausman test results indicated the suitability of a fixed effects model.

To test for homoscedasticity, the Breusch-Pagan test was applied; its results indicated the presence of heteroskedasticity in the error terms. Accordingly, Generalized Least Squares (GLS) estimation was used to correct for this issue, providing more efficient and unbiased coefficient variance estimates.

The Breusch-Godfrey test was then employed to detect serial correlation among residuals. The test results confirmed the presence of autocorrelation, which was corrected in the final estimations using an appropriate procedure to eliminate serial dependence. The results of these diagnostic tests are reported at the end of the hypothesis testing results table.

Hypothesis Testing

Testing Hypothesis 1

The first hypothesis examines the effect of managerial knowledge heterogeneity (MKH) on sustainability reporting (SR). The results of the multivariate panel regression are presented in Table 6. The estimated coefficient for MKH is 0.239, with a z-value of 54.47, which is statistically significant

at the 1% level. This finding indicates that greater heterogeneity in managerial knowledge exerts a positive and significant influence on corporate sustainability reporting.

Table 6. Regression Results—H1: Managerial Knowledge Heterogeneity and Sustainability Reporting Disclosure

Variable	Symbol	Coefficient	Std. Error	z-stat	p-value	VIF
Managerial Knowledge Heterogeneity	MKH	0.239	0.004	54.47	0.000	1.06
Return on Assets	ROA	-0.029	0.028	-1.05	0.293	1.61
Firm Size	SIZE	-0.008	0.269	-0.03	0.976	1.17
Financial Leverage	LEV	-0.020	0.020	-1.00	0.318	1.29
Sales Growth	GROWTH	0.029	0.007	4.00	0.000	1.16
Market-to-Book Ratio	MB	0.005	0.001	3.55	0.000	1.31
Firm Age	AGE	-0.016	0.010	-1.51	0.132	1.04
Constant	C	0.084	0.068	1.23	0.219	—

R-squared: 0.6414

Wald Chi-square: 4343.60, $p = 0.0000$

Chow Test: 5.52, $p = 0.0000$ → Panel data model accepted

Hausman Test: 32.13, $p = 0.0000$ → Fixed effects model preferred

Breusch-Pagan Test: 153.85, $p = 0.0000$ → Heteroskedasticity present

Breusch-Godfrey Test: 180.654, $p = 0.0000$ → Serial correlation present

The results support Hypothesis 1, confirming that managerial knowledge heterogeneity significantly and positively affects sustainability reporting. Among the control variables, sales growth (GROWTH) and market-to-book ratio (MB) also exhibit positive and statistically significant effects on sustainability reporting.

The R-squared value suggests that approximately 64% of the variation in sustainability reporting is explained by the independent and control variables. The Wald Chi-square statistic confirms the overall significance of the model, and the Variance Inflation Factor (VIF) values indicate no major multicollinearity concerns.

Testing Hypothesis 2

The second hypothesis proposes that internal corporate governance mechanisms, specifically board chair independence (BIND) and managerial ownership (MANAG), moderate the relationship between managerial knowledge heterogeneity and sustainability reporting. To test this hypothesis, two interaction models were estimated:

- **Model 2:** Interaction between MKH and BIND
- **Model 3:** Interaction between MKH and MANAG

As shown in Tables 7 and 8, the coefficients of MKH remain positive and statistically significant across both models (0.230, $z = 47.92$ in Model 2; 0.213, $z = 19.61$ in Model 3; both $p < 0.01$). Moreover, the interaction terms ($MKH \times BIND$ and $MKH \times MANAG$) also have positive coefficients with p-values below 0.05, demonstrating that both internal governance factors positively moderate the relationship between managerial knowledge heterogeneity and sustainability reporting.

Table 7. Regression Results—H2.1: Moderating Role of Board Chair Independence

Variable	Symbol	Coeff.	Std. Error	z-stat	p-value	VIF
Managerial Knowledge Heterogeneity	MKH	0.230	0.004	47.92	0.000	1.52
Board Chair Independence	IND	-0.030	0.016	-1.85	0.064	7.10
$MKH \times IND$ (Interaction)	$MKH \times IND$	0.013	0.006	2.04	0.042	7.63
Return on Assets	ROA	-0.039	0.022	-1.76	0.078	1.62
Firm Size	SIZE	-0.033	0.244	-0.14	0.892	1.18
Financial Leverage	LEV	-0.031	0.017	-1.84	0.066	1.30
Sales Growth	GROWTH	0.029	0.005	5.10	0.000	1.16
Market-to-Book Ratio	MB	0.006	0.001	4.83	0.000	1.31
Firm Age	AGE	-0.025	0.012	-2.08	0.037	1.04
Constant	C	0.143	0.067	2.11	0.035	—

R-squared: 0.6922

Wald Chi-square: 3881.53, $p = 0.0000$

Chow Test: 5.42, $p = 0.0000$ → Panel data model accepted

Hausman Test: 47.47, $p = 0.0000$ → Fixed effects model selected

Breusch-Pagan Test: 144.16, $p = 0.0000$ → Heteroskedasticity present

Breusch-Godfrey Test: 173.734, $p = 0.0000$ → Serial correlation present

Table 8. Regression Results—H2.2: Moderating Role of Managerial Ownership

Variable	Symbol	Coeff.	Std. Error	z-stat	p-value	VIF
Managerial Knowledge Heterogeneity	MKH	0.213	0.010	19.61	0.000	2.79
Managerial Ownership	MANAG	-0.116	0.038	-3.05	0.002	2.48
MKH × Manag (Interaction)	MKH×MANAG	0.042	0.016	2.66	0.008	4.61
Return on Assets	ROA	-0.032	0.022	-1.44	0.150	1.66
Firm Size	SIZE	-0.030	0.247	-0.12	0.901	1.17
Financial Leverage	LEV	-0.023	0.016	-1.41	0.160	1.33
Sales Growth	GROWTH	0.030	0.006	4.67	0.000	1.17
Market-to-Book Ratio	MB	0.005	0.001	4.15	0.000	1.31
Firm Age	AGE	-0.027	0.012	-2.18	0.030	1.07
Constant	C	0.183	0.075	2.45	0.014	—

R-squared = 0.6938

Wald Chi-square = 6288.31, p = 0.0000

Chow Test = 5.43, p = 0.0000 → Panel data model accepted

Hausman Test = 31.93, p = 0.0002 → Fixed effects model selected

Breusch–Pagan = 125.29, p = 0.0000 → Heteroskedasticity present

Breusch–Godfrey = 179.709, p = 0.0000 → Serial correlation present

The findings confirm Hypothesis 2. Both board independence and managerial ownership strengthen the positive relationship between managerial knowledge heterogeneity and sustainability reporting ($p < 0.05$). Among the control variables, sales growth and market-to-book ratio (MB) remain positively and significantly related to sustainability reporting, whereas firm age (AGE) shows a significant negative association ($p < 0.05$).

The R-squared value indicates that approximately 69% of the variance in sustainability reporting is explained by the variables in the model. The Wald Chi-square statistics confirm model validity, and VIF values indicate the absence of serious multicollinearity issues.

Testing Hypothesis 3

The third hypothesis posits that external corporate governance mechanisms, namely institutional ownership (IOWN), auditor type (AUDTYPE), and free float shares (FREEF), moderate the relationship between managerial knowledge heterogeneity and sustainability reporting.

To examine this, three separate interaction models were estimated:

- **Model 4:** Interaction between MKH and IOWN
- **Model 5:** Interaction between MKH and AUDTYPE
- **Model 6:** Interaction between MKH and FREEF

Table 9. Regression Results—H3.1: Interaction with Institutional Ownership

Variable	Symbol	Coeff.	Std. Error	z-stat	p-value	VIF
Managerial Knowledge Heterogeneity	MKH	0.240	0.009	26.52	0.000	5.02
Institutional Ownership	IOWN	-0.011	0.009	-1.24	0.215	2.08
MKH × IOWN (Interaction)	MKH×IOWN	-0.0002	0.010	-0.03	0.978	6.34
Return on Assets	ROA	-0.025	0.026	-0.95	0.340	1.70
Firm Size	SIZE	-0.011	0.268	-0.04	0.967	1.17
Financial Leverage	LEV	-0.017	0.018	-0.90	0.368	1.36
Sales Growth	GROWTH	0.028	0.006	4.38	0.000	1.18
Market-to-Book Ratio	MB	0.005	0.001	3.59	0.000	1.32
Firm Age	AGE	-0.018	0.011	-1.61	0.107	1.06
Constant	C	0.096	0.066	1.46	0.146	—

R-squared = 0.6421

Wald Chi-square = 3695.59, p = 0.0000

Chow Test = 5.42, p = 0.0000 → Panel data model accepted

Hausman Test = 33.59, p = 0.0001 → Fixed effects model selected

Breusch–Pagan = 131.87, p = 0.0000 → Heteroskedasticity present

Breusch–Godfrey = 186.175, p = 0.0000 → Serial correlation present

Table 10. Regression Results—H3.2: Interaction with Auditor Type

Variable	Symbol	Coeff.	Std. Error	z-stat	p-value	VIF
Managerial Knowledge Heterogeneity	MKH	0.240	0.004	53.16	0.000	1.35
Auditor Type	AUDITTYPE	0.008	0.034	0.24	0.811	6.12
MKH × Audit Type	MKH× AUDITTYPE	-0.004	0.012	-0.34	0.735	6.59
Return on Assets	ROA	-0.030	0.028	-1.09	0.277	1.61
Firm Size	SIZE	0.008	0.261	0.03	0.973	1.20
Financial Leverage	LEV	-0.021	0.020	-1.03	0.303	1.29
Sales Growth	GROWTH	0.029	0.007	4.00	0.000	1.16
Market-to-Book Ratio	MB	0.005	0.001	3.54	0.000	1.32
Firm Age	AGE	-0.016	0.010	-1.51	0.130	1.04
Constant	C	0.080	0.066	1.22	0.224	—

R-squared = 0.6424

Wald Chi-square = 4549.84, p = 0.0000

Chow Test = 5.45, p = 0.0000 → Panel data model accepted

Hausman Test = 38.26, p = 0.0000 → Fixed effects model selected

Breusch–Pagan = 157.62, p = 0.0000 → Heteroskedasticity present

Breusch–Godfrey = 173.532, p = 0.0000 → Serial correlation present

Table 11. Regression Results—H3.3: Interaction with Free Float

Variable	Symbol	Coeff.	Std. Error	z-stat	p-value	VIF
Managerial Knowledge Heterogeneity	MKH	0.239	0.004	52.26	0.000	3.32
Free Float	FREEF	-0.0004	0.008	-0.05	0.958	5.97
MKH × Free Float	MKH×FREEF	0.001	0.010	0.12	0.908	7.08
Return on Assets	ROA	-0.030	0.028	-1.06	0.289	1.70
Firm Size	SIZE	-0.006	0.269	-0.02	0.980	1.17
Financial Leverage	LEV	-0.020	0.020	-1.00	0.318	1.37
Sales Growth	GROWTH	0.029	0.007	4.01	0.000	1.19
Market-to-Book Ratio	MB	0.005	0.001	3.54	0.000	1.35
Firm Age	AGE	-0.016	0.011	-1.45	0.146	1.05
Constant	C	0.084	0.068	1.24	0.215	—

R-squared = 0.6420

Wald Chi-square = 4835.80, p = 0.0000

Chow Test = 5.44, p = 0.0000 → Panel data model accepted

Hausman Test = 34.53, p = 0.0001 → Fixed effects model selected

Breusch–Pagan = 128.95, p = 0.0000 → Heteroskedasticity present

Breusch–Godfrey = 183.742, p = 0.0000 → Serial correlation present

As presented in Tables 9, 10, and 11, the coefficients for MKH remain positive and highly significant across all models (0.240, $z = 26.52$ in Model 4; 0.240, $z = 53.16$ in Model 5; 0.239, $z = 52.26$ in Model 6; all $p < 0.01$). However, none of the interaction terms (MKH × IOWN, MKH × AUDTYPE, MKH × FREEF) are statistically significant ($p > 0.05$). This indicates that external governance mechanisms do not significantly moderate the relationship between managerial knowledge heterogeneity and sustainability reporting. Therefore, Hypothesis 3 is rejected.

Among the control variables, sales growth and market-to-book ratio (MB) consistently show positive and significant effects across all three models, reinforcing their strong direct association with sustainability reporting.

The R-squared values across Models 4-6 indicate that approximately 64% of the variance in the dependent variable is explained by the independent and control variables. The Wald Chi-square values confirm the overall validity of the models, and the VIF diagnostics show no evidence of problematic multicollinearity.

Discussion and Conclusion

In today's increasingly complex business environment, companies are expected to be accountable not only to their stakeholders but also to society at large (Islam, 2009). As the gap between corporate behavior and societal expectations widens, organizations face growing pressure to disclose non-financial information that reflects their broader social and environmental impact (Cormier et al., 2011).

Traditional financial reporting and auditing systems, however, are inadequate for capturing these dimensions due to the absence of relevant standards. In response, sustainability reporting has emerged as an essential mechanism for enhancing transparency and fostering more effective stakeholder communication (Ferreira et al., 2025). It enables firms to measure, manage, and communicate their economic, environmental, social, and governance performance (Ershadi et al., 2024).

Both external stakeholders and internal governance mechanisms exert pressure on firms to improve the quality of their sustainability disclosures (Rudyanto & Siregar, 2018). Prior research (e.g., Anyigbah et al., 2023; Naseem et al., 2017) further demonstrates that the characteristics of top managers significantly affect the nature and quality of sustainability reporting. Managerial heterogeneity, in particular, may shape disclosure practices by influencing how executives process information and make strategic decisions. Heterogeneity is generally categorized into two dimensions: relations-oriented and task-oriented (Jackson et al., 1995). Relations-oriented heterogeneity reflects observable demographic differences such as age or ethnicity, which can lead to social categorization and in-group or out-group distinctions (Joshi & Roh, 2009; Ormiston et al., 2022). In contrast, task-oriented heterogeneity relates to variations in cognitive styles, knowledge, and expertise resulting from differences in education, functional background, and tenure (Joshi & Roh, 2009; van der Vegt et al., 2005). This dimension is closely linked to strategic decision-making quality and overall organizational performance (Finkelstein et al., 2009).

According to management entrenchment theory, robust corporate governance mechanisms can constrain managerial self-interest and prevent power misuse. Effective governance structures protect stakeholder interests, enhance transparency, and improve firm performance by reducing agency conflicts and information asymmetry. They can also strengthen financial reporting quality and lower firms' cost of equity by increasing investor confidence. Numerous studies (e.g., Al-Maeni et al., 2024; Ledi & Ameza, 2023; Fahad & Mubarak Rahman, 2020) have emphasized the critical role of corporate governance in shaping sustainability reporting. Building on this foundation, the present study examined the moderating influence of corporate governance on the relationship between managerial knowledge heterogeneity and sustainability reporting.

The findings related to the first hypothesis indicate that managerial knowledge heterogeneity exerts a significant positive effect on sustainability reporting. This implies that greater diversity in managers' educational, professional, and political-financial backgrounds enhances the breadth and quality of sustainability disclosures. A management team with diverse experiences and perspectives is better equipped to identify and address complex sustainability issues, thereby strengthening corporate transparency and accountability. Since managers are responsible for providing both financial and non-financial information for decision-making and accountability purposes, they may disclose sustainability information strategically—to build trust with shareholders, attract investors, or preserve their competitive position—even when internal governance inconsistencies or agency conflicts exist. This finding aligns with cost-benefit theory, which holds that firms pursue activities whose perceived benefits exceed their costs.

The results are consistent with previous studies (Appiah-Kubi, 2024; Basile et al., 2025; Cui et al., 2019; Cucari et al., 2018; Erin et al., 2022; Haji, 2013; Hasan et al., 2022; Husted & Souza-Filho, 2019) but differ from those reported by Amidjaya et al. (2023) and Rauf et al. (2021).

The findings related to the second hypothesis reveal that internal corporate governance mechanisms positively moderate the relationship between managerial knowledge heterogeneity and sustainability reporting. Specifically, higher board chair independence and greater managerial ownership strengthen this positive association. This indicates that an independent board leadership structure and active managerial shareholding foster trust and goal alignment, encouraging executives to utilize their diverse knowledge when identifying and disclosing sustainability risks and opportunities.

These results highlight that enhancing internal oversight—particularly through independent leadership and managerial equity participation—can serve as a critical driver of corporate transparency and accountability in environmental and social domains. In firms with independent board chairs or higher levels of managerial ownership, greater managerial knowledge heterogeneity is associated with more extensive sustainability disclosures. This may be attributed to reduced agency conflicts and improved supervisory mechanisms, where an independent chair plays an active role in oversight functions. The strength and effectiveness of these mechanisms may vary across firms depending on

governance structures and contextual factors. These findings are consistent with those of Erin et al. (2022), Hasan et al. (2022), García-Sánchez et al. (2022), and Noor et al. (2025).

The results of the third hypothesis indicate that external corporate governance mechanisms do not significantly affect the relationship between managerial knowledge heterogeneity and sustainability reporting. In other words, variations in institutional ownership, auditor type, and free float do not moderate the positive link between managerial knowledge heterogeneity and sustainability disclosure. This may stem from the relative weakness of external oversight mechanisms, as managers may still choose to disclose sustainability information based on personal or reputational incentives. Institutional investors, auditors, and minority shareholders often exert limited influence over managerial decisions and, consequently, may have little impact on disclosure practices.

These findings suggest that managerial diversity remains the primary catalyst for enhanced sustainability disclosure, even in the presence of formal monitoring structures. The results also point to potential deficiencies or the limited effectiveness of external oversight in shaping sustainability-related practices, aligning with prior evidence that underscores the constraints of external governance in emerging reporting contexts (e.g., Aguilera et al., 2021; Luo & Tang, 2023). Strengthening regulatory frameworks and improving the quality of external monitoring are therefore essential to reinforce the institutional foundations that support credible sustainability reporting. These findings are consistent with those of Erin et al. (2022), Pandapotan (2023), and Velte (2023).

This study examined managerial knowledge heterogeneity, board chair independence, and managerial ownership as determinants of sustainability reporting. While prior research has largely focused on corporate characteristics and individual managerial traits, the attributes of top management teams have received limited scholarly attention. Accordingly, this study provides a novel perspective by emphasizing the strategic role of managerial diversity in shaping sustainability disclosure practices.

The results contribute to the literature on strategic leadership and sustainability by demonstrating that internal governance mechanisms amplify the positive effects of managerial knowledge heterogeneity, while external mechanisms appear less effective in emerging market contexts. Future research could explore additional organizational and contextual factors, such as internal control environments and capital structure, that may influence sustainability reporting. Further studies may also investigate the moderating role of managerial power and capability in the relationship between knowledge heterogeneity and sustainability reporting. Moreover, since a firm's financing method may affect its disclosure behavior, examining how different financing structures interact with managerial and governance factors could yield valuable insights for both theory and practice.

References

- Abdul Latif, R., Taufil Mohd, K. N., Kamardin, H., & Mohd Ariff, A. H. (2023). Determinants of sustainability disclosure quality among plantation companies in Malaysia. *Sustainability*, 15(4), 3799. <https://doi.org/10.3390/su15043799>
- Abdullah, H., and Tursoy, T. (2023). The effect of corporate governance on financial performance: Evidence from a shareholder-oriented system. *Interdisciplinary Journal of Management Studies*, 16(1), 79-95. [10.22059/IJMS.2022.321510.674798](https://doi.org/10.22059/IJMS.2022.321510.674798)
- Agrawal, A., & Chadha, S. (2005). Corporate governance & accounting scandals. *Journal of Law & Economics*, 48(2), 371-406. <https://doi.org/10.1086/430808>
- Aguilera, R. V., Aragón-Correa, J. A., Marano, V., & Tashman, P. A. (2021). The corporate governance of environmental sustainability: A review and proposal for more integrated research. *Journal of Management*, 47(6), 1468–1497. <https://doi.org/10.1177/0149206321991212>
- Al-Maeeni, F., Ellili, N.O.D., & Nobanee, H. (2024). Impact of corporate governance on corporate social responsibility disclosure of the UAE listed banks. *Journal of Financial Reporting and Accounting*, 22(4), 769-795. <https://doi.org/10.1108/JFRA-11-2021-0424>
- Al-Malkawi, H-A. N., Pillai, R., & Bhatti, M.I. (2014). Corporate governance practices in emerging markets: The case of GCC countries, *Economic Modelling*, Elsevier, 38(C), 133-141. <https://doi.org/10.1016/j.econmod.2013.12.019>
- Amason A. C., Shrader R. C., & Thompson G. H. (2006). Newness and novelty: Relating top management team composition to new venture performance. *Journal of Business Venturing*, 21(1), 125–148. <https://doi.org/10.1016/j.jbusvent.2005.04.008>
- Amidjaya, P. G., Yau, J. T. H., & Cheuk, S. C. S. (2023). Board diversity and sustainability reporting: Empirical evidence from Indonesian listed banks. *International Journal of Academic Research in Accounting Finance and Management Sciences*, 13(2). <https://doi.org/10.6007/ijarafms/v13-i2/17795>
- Amri, K., Ben Mrad Douagi, F. W., & Guedrib, M. (2023). The impact of internal and external corporate governance mechanisms on tax aggressiveness: Evidence from Tunisia. *Journal of Accounting in Emerging Economies*, 13(1), 43-68. <https://doi.org/10.1108/JAEE-01-2021-0019>
- Anyigbah, E., Kong, Y., Edziah, B. K., Ahoto, A. T., & Ahiaku, W. S. (2023). Board characteristics and corporate sustainability reporting: Evidence from Chinese listed companies. *Sustainability*, 15(4), 3553. <https://doi.org/10.3390/su15043553>
- Appiah-Kubi, E. (2024). Management knowledge and sustainability reporting in SMEs: The role of perceived benefit and stakeholder pressure. *Journal of Cleaner Production*, 43, 140067. <https://doi.org/10.1016/j.jclepro.2023.140067>
- Bae, S. M., Masud, M. A. K., & Kim, J. D. (2018). A cross-country investigation of corporate governance and corporate sustainability disclosure: A signaling theory perspective. *Sustainability*, 10(8), 2611. <https://doi.org/10.3390/su10082611>
- Barkema, H. G., & Shvyrkov, O. (2007). Does top management team diversity promote or hamper foreign expansion? *Strategic Management Journal*, 28(7), 663–680. <https://doi.org/10.1002/smj.604>
- Basile, V., Serino, L., Ambra, A. D., & Campanella, F. (2025). Board characteristics and effects on ESG performance: Empirical evidence from the European banking system. *Quality & Quantity*, 60, 2121-2138. <https://doi.org/10.1007/s11135-025-02338-w>
- Baumüller, J., & Sopp, K. (2022). Double materiality and the shift from non-financial to European sustainability reporting: Review, outlook and implications. *Journal of Applied Accounting Research*, 23(1), 8–28. <https://doi.org/10.1108/jaar-04-2021-0114>
- Burritt, R.L., & Schaltegger, S. (2010). Sustainability accounting and reporting: Fad or trend? *Account Audit. Account. J.* 23(7), 829–846. <https://doi.org/10.1108/09513571011080144>
- Bushee, B.J. (1998). The influence of institutional investors on Myopic R&D investment behavior. *The Accounting Review*, 73(3), 305–333.
- Carpenter, M. A., & Fredrickson, J. W. (2001). Top management teams, global strategic posture, and the moderating role of uncertainty. *The Academy of Management Journal*, 44(3), 533–545. <https://doi.org/10.5465/3069368>
- Carpenter, M. A., Geletkanycz, M. A., & Sanders, W. G. (2004). Upper echelons research revisited: Antecedents, elements, and consequences of top management team composition. *Journal of Management*, 30(6), 749–778. <https://doi.org/10.1016/j.jm.2004.06.001>
- Chen, H., Hua, Sh. & Sun, X. Ch. (2018). CEO age and the persistence of internal control deficiencies. *Journal of Accounting and Finance*, 18(7), 24-49. <https://doi.org/10.33423/jaf.v18i7.459>
- Cormier, D., Ledoux, M. J. & Magnan, M. (2011). The informational contribution of social and environmental disclosures for investors. *Management Decision*, 49(8), 1276-1304. <https://doi.org/10.1108/00251741111163124>

- Cucari, N., Esposito De Falco, S., & Orlando, B. (2018). Diversity of board of directors and environmental social governance: Evidence from Italian Listed companies, corporate social responsibility and environmental management. *John Wiley & Sons*, 25(3), 250-266. <https://doi.org/10.1002/csr.1452>
- Cui, Y., Zhang, Y., Guo, J., Hu, H., & Meng, H. (2019). Top management team knowledge heterogeneity, ownership structure and financial performance: Evidence from Chinese IT listed companies, technological forecasting and social change. *Elsevier*, 140(C), 14-21. <https://doi.org/10.1016/j.techfore.2018.12.008>
- Custódio, C., & Metzger, D. (2014). Financial expert CEOs: CEO's work experience and firm's financial policies. *Journal of Financial Economics*, 114(1), 125-154. <https://doi.org/10.1016/j.jfineco.2014.06.002>
- Erben Yavuz, A., Kocaman, B. E., Doğan, M., Hazar, A., Babuşcu, Ş., & Sutbayeva, R. (2024). The impact of corporate governance on sustainability disclosures: A comparison from the perspective of financial and non-financial firms. *Sustainability*, 16(19), 8400. <https://doi.org/10.3390/su16198400>
- Erin, O., Adegboye, A., & Bamigboye, O. A. (2022). Corporate governance and sustainability reporting quality: Evidence from Nigeria. *Sustainability Accounting, Management and Policy Journal*, 13(3), 680-707. <https://doi.org/10.1108/SAMPJ-06-2020-0185>
- Ershadi, M., Hajiha, Z., Safa, M., & Moghadam, H. (2024). The effect of sustainability reporting on financial performance. *Interdisciplinary Journal of Management Studies*, 17(3), 967-982. <https://doi.org/10.22059/IJMS.2023.359572.675880>
- Fahad, P., & Mubarak Rahman, P. (2020). Impact of corporate governance on CSR disclosure. *International Journal of Disclosure and Governance*, Palgrave Macmillan, 17(2), 155-167. <https://doi.org/10.1057/s41310-020-00082-1>
- Ferreira, D., Pereira, C., Queirós, M., & Monteiro, A. P. (2025). Impact of sustainability reporting on accounting information quality. *Cogent Business & Management*, 12(1). <https://doi.org/10.1080/23311975.2025.2468875>
- Finkelstein, S., Hambrick, D. C., & Cannella, A. A. (2009). *Strategic leadership: Theory and research on executives, top management teams, and boards*. Oxford University Press.
- García-Sánchez, I.-M., Hussain, N., Khan, S.-A., & Martínez-Ferrero, J. (2022). Assurance of corporate social responsibility reports: Examining the role of internal and external corporate governance mechanisms. *Corporate Social Responsibility and Environmental Management*, 29(1), 89–106. <https://doi.org/10.1002/csr.2186>
- Gillan, S. L. (2006). Recent developments in corporate governance: An overview. *J Corp Finan*, 12(3), 381–402. <https://doi.org/10.1016/j.jcorpfin.2005.11.002>
- Guluma, T. F. (2021). The impact of corporate governance measures on firm performance: The influences of managerial overconfidence. *Future Business Journal*, 7(1), Article 50. <https://doi.org/10.1186/s43093-021-00093-6>
- Gutterman, A. (2023). *Introduction to corporate governance* (June 22, 2023). SSRN. <http://dx.doi.org/10.2139/ssrn.4488485>
- Haji, A. (2013). Corporate social responsibility disclosures over time: Evidence from Malaysia. *Managerial Auditing Journal*, 28(7), 647–676. <https://doi.org/10.1108/MAJ-07-2012-0729>
- Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9(2), 193–206. <https://doi.org/10.5465/amr.1984.4277628>
- Hasan, A., Hussainey, K., & Aly, D. (2022). Determinants of sustainability reporting decision: Evidence from Pakistan. *Journal of Sustainable Finance & Investment*, 12(1), 214–237. <https://doi.org/10.1080/20430795.2021.1964813>
- He, E., & Sommer, D. W. (2010). Separation of ownership and control: Implications for board composition. *The Journal of Risk and Insurance*, 77(2), 265–295. <https://doi.org/10.1111/j.1539-6975.2010.01351.x>
- Hernandez, M. (2012). Toward an understanding of the psychology of stewardship. *Academy of Management Review*, 37(2), 172–193. <https://doi.org/10.5465/amr.2010.0363>
- Herrmann, P., & Datta, D. K. (2005). Relationships between top management team characteristics and international diversification: An empirical investigation. *British Journal of Management*, 16(1), 69–78. <https://doi.org/10.1111/j.1467-8551.2005.00429.x>
- Hitt, M. A., & Ireland, R. D. (2000). The intersection of entrepreneurship and strategic management research. In D. L. Sexton & H. A. Landström (Eds.), *Handbook of entrepreneurship* (pp. 22–60). Blackwell Publishing.
- Huafang, X., & Jianguo, Y. (2007). Ownership structure, board composition and corporate voluntary disclosure: Evidence from listed companies in China. *Managerial Auditing Journal*, 22(6), 604–619. <https://doi.org/10.1108/02686900710759406>
- Husted, B. W., & Sousa-Filho, J.-M. D. (2019). Board structure and environmental, social, and governance disclosure in Latin America. *Journal of Business Research*, 102, 220–227. <https://doi.org/10.1016/j.jbusres.2018.01.017>

- Imam, M. O., & Malik, M. (2007). Firm performance and corporate governance through ownership structure: Evidence from Bangladesh stock market. *International Review of Business Research Papers*, 3(4), 88–110. <https://ssrn.com/abstract=2256480>
- Islam, M. A. (2009). Social and environmental reporting practices of organisations operating in, or sourcing products from, a developing country: Evidence from Bangladesh. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2878254>
- Jackson, S. E., May, K. A., & Whitney, K. (1995). Understanding the dynamics of diversity in decision making teams. In R. A. Guzzo & E. Salas (Eds.), *Team decision making effectiveness in organizations* (pp. 204–261). Jossey-Bass.
- John, K., & Senbet, L. W. (1998). Corporate governance and board effectiveness. *Journal of Banking & Finance*, 22(3), 371–403. [https://doi.org/10.1016/S0378-4266\(98\)00005-3](https://doi.org/10.1016/S0378-4266(98)00005-3)
- Joshi, A., & Roh, H. (2009). The role of context in work team diversity research: A meta-analytic review. *Academy of Management Journal*, 52(3), 599–627. <https://doi.org/10.5465/AMJ.2009.41331491>
- Khuong, N. V., Rahman, A. A. A., Meero, A., Anh, L. H. T., Liem, N. T., Thuy, C. T. M., & Ly, H. T. N. (2022). The impact of corporate social responsibility disclosure and accounting comparability on earnings persistence. *Sustainability*, 14(5), Article 2752. <https://doi.org/10.3390/su14052752>
- Kiyak, M., Bozaykut, T., Gorpinar, G., & Aktas, E. (2011). Strategic leadership styles and organization financial performance: A qualitative study on private hospitals. In *7th International Strategic Management Conference, Procedia Social and Behavioral Sciences*, 24, 1521–1529. <https://doi.org/10.1016/j.sbspro.2011.09.090>
- Knight, D., Pearce, C. L., Smith, K. G., Olian, J. D., Sims, H. P., Smith, K. A., & Flood, P. (1999). Top management team diversity, group process, and strategic consensus. *Strategic Management Journal*, 20, 445–465. https://www.researchgate.net/publication/252523842_Top_Management_Team_Diversity_Group_Process_and_Strategic_Consensus
- Kor, Y. Y., & Mesko, A. (2013). Dynamic managerial capabilities: Configuration and orchestration of top executives' capabilities and the firm's dominant logic. *Strategic Management Journal*, 34(2), 233–244. <https://doi.org/10.1002/smj.2000>
- Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. *Journal of Management*, 26(3), 516–531. https://www.researchgate.net/publication/232580888_A_multilevel_approach_to_theory_and_research_in_organizations_Contextual_temporal_and_emergent_processes
- Ledi, K. K., & Ameza-Xemalordzo, E. (2023). Rippling effect of corporate governance and corporate social responsibility synergy on firm performance: The mediating role of corporate image. *Cogent Business & Management*, 10(2). <https://doi.org/10.1080/23311975.2023.2210353>
- Lee, H. J., Park, J. M., & Chung, C. (2022). CEO compensation, governance structure, and foreign direct investment in conflict-prone countries. *International Business Review*, 31(6), Article 102031. <https://doi.org/10.1016/j.ibusrev.2022.102031>
- Lin, O., Zhang, X., Guan, J., Lei, X., & Deng, L. (2024). Differences in board independence's impact on ESG with respect to power constraints: Evidence from a heterogeneity perspective. *Polish Journal of Environmental Studies*, 33(4), 3771–3782. <https://doi.org/10.15244/pjoes/177165>
- Loh, L., Thomas, T., & Wang, Y. (2017). Sustainability reporting and firm value: Evidence from Singapore-listed companies. *Sustainability*, 9(11), Article 2112. <https://doi.org/10.3390/su9112112>
- Luo, L., & Tang, Q. (2022). The real effects of ESG reporting and GRI standards on carbon mitigation: International evidence. *Business Strategy and the Environment*. Advance online publication. <https://doi.org/10.1002/bse.3281>
- Ma, R., Lv, W., & Zhao, Y. (2022). The impact of TMT experience heterogeneity on enterprise innovation quality: Empirical analysis on Chinese listed companies. *Sustainability*, 14(24), Article 16571. <https://doi.org/10.3390/su142416571>
- Masoumi, S. R., Salehnejad, S. H., & Zabihi Zarinkalaei, A. (2018). Investigating the impact of some inter-organizational factors on sustainability reporting of the pharmaceutical companies listed on the Tehran Stock Exchange. *Journal of Health Accounting*, 7(1), 103–126. <https://doi.org/10.30476/JHA.2018.40601>
- Mukhibad, H., Jayanto, P. Y., Budiantoro, R. A., Khafid, M., & Hapsoro, B. B. (2024). Corporate governance and firm performance: The case of gender diversity in Indonesia. *Interdisciplinary Journal of Management Studies*, 18(1), 195–208. <https://doi.org/10.22059/IJMS.2024.374159.676623>
- Murray, A. I. (2007). Top management group heterogeneity and firm performance. *Strategic Management Journal*, 10(S1), 125–141. <https://doi.org/10.1002/smj.4250100710>

- Naseem, M. A., Rehman, R. U., Ikram, A., & Malik, F. (2017). Impact of board characteristics on corporate social responsibility disclosure. *Journal of Applied Business Research (JABR)*, 33(4), 801–810. <https://doi.org/10.19030/jabr.v33i4.10001>
- Noor, A., Hassan, R., Fortea, C., & Antohi, V. M. (2025). A greener paradigm shift: The moderating role of board independence in sustainability reporting. *Sustainability*, 17(11), Article 4776. <https://doi.org/10.3390/su17114776>
- Oradi, J., Asiaei, K., & Rezaee, Z. (2020). CEO financial background and internal control weaknesses. *Corporate Governance: An International Review*, 28(2), 119–140. <https://doi.org/10.1111/corg.12305>
- Ormiston, M. E., Wong, E. M., & Ha, J. (2022). The role of CEO emotional stability and team heterogeneity in shaping the top management team affective tone and firm performance relationship. *The Leadership Quarterly*, 33(3), Article 101543. <https://doi.org/10.1016/j.leaqua.2021.101543>
- Palit, S. (2018). Emerging significance of sustainability accounting and reporting in India: A conceptual study. *International Journal of Accounting, Finance and Management Research*, 8(4), 1–6. <https://doi.org/10.24247/ijafmroct20181>
- Pandapotan, F. (2023). Role of institutional ownership in moderating profitability and board of directors on sustainability report disclosure. *Asian Journal of Economics and Business Management*, 2(2), 291–299. <https://doi.org/10.53402/ajeblm.v2i2.356>
- Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective*. Harper & Row.
- Pitcher, P., & Smith, A. D. (2001). Top management team heterogeneity: Personality, power, and proxies. *Organization Science*, 12(1), 1–18. <https://doi.org/10.1287/orsc.12.1.1.10120>
- Rauf, F., Voinea, C. L., Naveed, K., & Fratostiteanu, C. (2021). CSR disclosure: Effects of political ties, executive turnover and shareholder equity. Evidence from China. *Sustainability*, 13(7), Article 3623. <https://doi.org/10.3390/su13073623>
- Rezaee, Z., & Tuo, L. (2017). Voluntary disclosure of non-financial information and its association with sustainability performance. *Advances in Accounting*, 39, 47–59. <https://doi.org/10.1016/j.adiac.2017.08.001>
- Rudyanto, A., & Siregar, S. V. (2018). The effect of stakeholder pressure and corporate governance on the sustainability report quality. *International Journal of Ethics and Systems*, 34(2), 233–249. <https://doi.org/10.1108/IJOES-05-2017-0071>
- Saghafi, M., Pouryousof, A., & Dastgerdi, F. (2025). Heterogeneity of managerial knowledge and the tone of explanatory reports: The mediating role of earnings management. *Empirical Studies in Financial Accounting*, 22(86), 177–220. <https://doi.org/10.22054/qjma.2025.83390.2645>
- Sameni Malayeri, S., Hematfar, M., & Karami, G. (2025). The contributing factors to sustainability reporting in Iran's banking industry. *Interdisciplinary Journal of Management Studies*, 18(2), 349–368. <https://doi.org/10.22059/IJMS.2024.375587.676694>
- Sohail, S., Rasul, F., & Fatima, U. (2017). Is internal and external mechanism of governance enriching the performance of the banking sector of Pakistan? *Corporate Governance*, 17(4), 629–642. <https://doi.org/10.1108/CG-05-2016-0116>
- Soomiyol, M. T., Tyondun, J. T., & Yua, H. (2024). Effect of sustainability reporting on market performance of listed consumer goods companies in Nigeria. *Advance Journal of Management, Accounting and Finance*, 9(7), 61–78. <https://aspjournals.org/ajmaf/index.php/ajmaf/article/view/100>
- Swarnapali, R. M. N. C., & Le, L. (2018). Corporate sustainability reporting and firm value: Evidence from a developing country. *International Journal of Organizational Innovation*, 10(4), 69–78. https://www.researchgate.net/publication/331087982_Corporate_Sustainability_Reporting_and_Firm_Value_Evidence_from_a_Developing_Country
- Van der Vegt, G. S., Van de Vliert, E., & Huang, X. (2005). Location-level links between diversity and innovative climate depend on national power distance. *Academy of Management Journal*, 48(6), 1171–1182. <https://doi.org/10.5465/amj.2005.19573116>
- Velte, P. (2023). Sustainable institutional investors, corporate sustainability performance, and corporate tax avoidance: Empirical evidence for the European capital market. *Corporate Social Responsibility and Environmental Management*. Advance online publication. <https://doi.org/10.1002/csr.2492>
- Wang, H., He, W., & Yang, Y. (2022). Is heterogeneity better? The impact of top management team characteristics on enterprise innovation performance. *Behavioral Sciences*, 12(6), Article 164. <https://doi.org/10.3390/bs12060164>
- Wu, Y., Ding, L., Song, X., & Chen, J. (2023). Top management team heterogeneity and the performance of cross-border M&A. *Sage Open*, 13(2). <https://doi.org/10.1177/21582440231182649>
- Xia, T., & Liu, X. (2022). The innovation paradox of TMT political capital in transition economy firms. *Journal of Business Research*, 142, 775–790. <https://doi.org/10.1016/j.jbusres.2022.01.011>

- Yermack, D. (1996). Higher market valuation of companies with a small board of directors. *Journal of Financial Economics*, 40(2), 185–211. [https://doi.org/10.1016/0304-405X\(95\)00844-5](https://doi.org/10.1016/0304-405X(95)00844-5)
- Younas, Z. I., & Zafar, A. (2019). Corporate risk taking and sustainability: A case of listed firms from USA and Germany. *Journal of Global Responsibility*, 10(1), 2–15. <https://doi.org/10.1108/JGR-07-2018-0027>
- Zahid, M., Rahman, H. U., Ali, W., Khan, M., Alharthi, M., Imran Qureshi, M., & Jan, A. (2020). Boardroom gender diversity: Implications for corporate sustainability disclosures in Malaysia. *Journal of Cleaner Production*, 244, Article 118683. <https://doi.org/10.1016/j.jclepro.2019.118683>
- Zanoni, B. L., & Oliveira, S. A. d. (2023). Reflections on sustainability's meaning in organizations. *Revista De Administração De Empresas*, 63(2), 1–20. <https://doi.org/10.1590/s0034-759020230203x>