SCIENTIFIC CULTURE
www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 2.1, (2026), pp. 8123-8141
Open Access. Online & Print

DOI: 10.5281/zenodo.19746547

CORPORATE GOVERNANCE MECHANISMS AND THE SUSTAINABLE DEVELOPMENT GOALS ADOPTION (SDGs) IN MENA

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Received: 20/10/2025
Accepted: 25/12/2025

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ABSTRACT

The growing importance of Sustainable Development Goals (SDGs) has generated increasing interest in internal governance mechanisms that facilitate SDG adoption, especially within the less-explored Middle East and North Africa (MENA) region. This research investigates the impact of board quality, sustainability committees, and the presence of an environmental management team (EMT) on the adoption of SDGs by publicly listed companies in ten MENA countries from 2014 to 2023. Grounded in agency and stakeholder theories, this study utilizes an integrated theoretical framework to analyze panel data, employing fixed-effects regression models to examine both the direct and moderating effects of governance structures on SDG adoption. The empirical results reveal that enhanced board quality, the existence of a sustainability committee, and an EMT have a significant effect on organizational progress toward SDG integration. Furthermore, sustainability committees and EMTs strengthen the influence of board quality on SDG adoption by translating board-level commitments into operational environmental actions. By combining these three governance elements into a cohesive model and offering empirical evidence from an emerging market region, this study advances the literature on sustainability governance and addresses a crucial gap. The findings provide practical insights for corporate leaders and policymakers in the MENA region, guiding efforts to reinforce governance frameworks and promote better organizational alignment with the 2030 Agenda.

KEYWORDS: Sustainable Development Goals (SDGs), Corporate Governance, Board Quality, Sustainability Committee, Environmental Management Team (EMT), MENA Region
JEL Classification : G34, M14, Q01, Q56, O53.

1. INTRODUCTION

The Sustainable Development Goals (SDGs) established by the United Nations in 2015 have become a universal reference for promoting a more equitable, environmentally sound, and resilient global society (United Nations, 2023). To meet these 17 interconnected objectives by 2030, it is essential for organizations to integrate environmental, social, and governance (ESG) principles into their strategies, moving beyond mere compliance or charitable activities to achieve genuine sustainable value creation (Seeds for Sustainability, 2024; World Economic Forum, 2024a). Consequently, corporate governance structures have garnered increased attention from scholars and policymakers as vital components for the credible implementation of SDGs, especially as accountability demands grow among regulators, investors, and stakeholders (OECD, 2024).

Recent studies highlight that board characteristics, including independence, diversity, and size, play a significant role in how companies engage in sustainability agendas. These attributes enhance the effective oversight of SDG initiatives and help anticipate global sustainability risks (Taglialatela et al., 2023). Boards with a wide range of expertise are particularly adept at recognizing ESG risks, reducing managerial focus on short-term goals, and aligning management with comprehensive sustainability objectives. Sustainability committees further supports this integration by institutionalizing ESG oversight, encouraging cross-functional collaboration, and embedding environmental and social goals into strategic decision-making (Ali et al., 2023; Orazalin et al., 2023). In parallel, many firms also establish dedicated Environmental Management Teams (EMTs) or departments that coordinate environmental initiatives and support the implementation of formal Environmental Management Systems (EMS) such as ISO 14001, which provide operational frameworks for systematic measurement, reporting, and continuous improvement in environmental performance (Ofori et al., 2024).

While governance mechanisms are well-documented in developed economies, there is limited evidence regarding their effectiveness in emerging markets, particularly in the Middle East and North Africa (MENA) region. Although numerous MENA countries have initiated ambitious national strategies, such as Saudi Vision 2030 and UAE Net Zero 2050, they continue to face structural governance issues, such as concentrated ownership, insufficient board independence, and regulatory fragmentation (Alodat et al., 2023; OECD, 2019). To date, most studies in the region have concentrated on ESG disclosure or CSR, with insufficient exploration of how specific internal structures, board quality, sustainability committees, and EMT collectively influence firm-level SDG adoption (Abu Khalaf, 2024).

Furthermore, there has been limited investigation into how sustainability committees and EMT serve as moderating factors in the relationship between board effectiveness and the integration of SDGs, despite emerging studies indicating that these mechanisms can greatly enhance the board's influence on sustainability (Ali et al., 2023; Al-Jaifi et al., 2024). This highlights a notable gap, both globally and regionally: the need to comprehend how specific governance structures contribute to authentic, rather than merely symbolic, corporate sustainability outcomes, especially in institutional environments characterized by changing regulatory and stakeholder demands.

To address these gaps, this study employs a dual theoretical approach that incorporates agency theory (Jensen & Meckling, 1976) and stakeholder theory (Freeman, 1984). According to agency theory, effective governance aligns managerial decisions with stakeholder interests. Stakeholder theory emphasizes a company's responsiveness to various societal demands. This study utilizes panel data analysis from 2014 to 2023 for listed firms in the MENA region to empirically examine both the direct and interactive effects of these governance mechanisms.

The findings indicate that the effectiveness of boards, along with sustainability committees and Environmental Management Teams (EMTs), plays a crucial role in advancing SDG adoption. The latter two elements also have moderating effects that enhance a board's influence. These results offer a nuanced, evidence-based understanding of the internal governance processes that move firms beyond compliance toward authentic sustainability performance (Orazalin et al., 2023; Taglialatela et al., 2023; Al-Jaifi et al., 2024).

By combining these theoretical perspectives, this study enhances the academic understanding of sustainable corporate governance in less-studied settings, provides practical insights for practitioners aiming to create effective governance frameworks, and suggests policy implications for promoting the 2030 Agenda, both in the MENA region and worldwide.

The rest of the article is structured as follows: Section 2 reviews the literature and hypotheses;

Section 3 outlines the theoretical and methodological framework; Section 4 presents the results; Section 5 discusses the implications; and Section 6 concludes with recommendations and future research directions.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Corporate Governance and Sustainable Development Goals (SDGs): Conceptual Foundations

This study is based on a dual-theoretical framework that combines agency theory and stakeholder theory to elucidate how internal governance mechanisms affect firms' adoption of Sustainable Development Goals (SDGs), especially in the MENA region. Agency theory (Jensen & Meckling, 1976) suggests that conflicts can occur when managers (agents) pursue goals that differ from those of shareholders (principals) due to information asymmetry and differing objectives. In terms of sustainability, strong internal governance mechanisms such as effective boards, diverse expertise, and oversight structures are crucial for aligning managerial actions with shareholder interests and ensuring management accountability in SDG performance. Stakeholder theory (Freeman, 1984) expands the focus beyond shareholders to include a wider set of factors, such as employees, regulators, communities, and the environment, whose interests must be balanced. This theoretical perspective views SDG adoption not merely as a corporate duty to investors but as a strategic response to increasing pressures and expectations from various stakeholder groups, who are increasingly demanding social and environmental responsibility and transparent reporting. By integrating these perspectives, this study conceptualizes board effectiveness, sustainability committees, and Environmental Management Team (EMT) as direct drivers of SDG adoption, with the latter two moderating the relationship between board effectiveness and SDG outcomes. This integrative approach provides a nuanced theoretical rationale for the conceptual model and hypotheses developed in subsequent sections.

2.2. Sustainable Development Goals (SDGs) and the MENA Context

The Sustainable Development Goals (SDGs) established by the United Nations in 2015 provide a comprehensive global framework to address complex social, economic, and environmental challenges by 2030 (United Nations, 2023). For businesses, SDGs serve as an essential guide for integrating sustainability into strategic management, fostering innovation, attracting ethical investments, and enhancing corporate legitimacy (Seeds for Sustainability, 2024).

The Middle East and North Africa region (MENA) faces significant challenges and distinct complexities in achieving the SDGs. These include environmental concerns, such as water scarcity and climate vulnerability, alongside socio-economic issues, such as youth unemployment and gender inequality (Göll et al., 2019; World Economic Forum, 2024b). The region's heavy reliance on hydrocarbons further complicates the shift to sustainable economic models that align with SDG principles centered on industry, innovation, and responsible consumption (Demir et al., 2025).

Progress in integrating SDGs within MENA governments and businesses is becoming increasingly evident through national visions and policies (Ben Hassen & Ei Bilali, 2024). However, the crucial role of corporate governance mechanisms in translating these policy goals into effective firm-level practices remains underexplored, particularly concerning internal governance structures, such as board functions, sustainability committees, and Environmental Management Team (EMT) (Abu Khalaf, 2024; Kateb & Alahdal, 2024). This study aims to fill this gap by examining how these governance elements impact SDG adoption of SDGs in the MENA region.

2.3. Board Quality and Sustainable Development Goals (SDG) Adoption

Board quality is recognized as a fundamental aspect of corporate governance, essential for a company's capacity to establish a strategic direction, manage risks, and incorporate sustainability goals (Taglialatela et al., 2023). Important board characteristics such as independence, gender, expertise diversity, and size are consistently associated with improved sustainability oversight and increased engagement with SDG priorities. Research indicates that independent boards, especially those with non-executive directors, are better equipped to challenge managerial short-termism, align management with stakeholder expectations, and ensure that long-term sustainability goals receive sufficient focus (Farah et al., 2021; Taglialatela et al., 2023). Board diversity further enhances sustainability outcomes, with diverse backgrounds and gender-balanced compositions linked to heightened ethical awareness,

responsiveness to stakeholder needs, and improved ESG disclosures (Taglialatela et al., 2023; Al-Jaifi et al., 2024). Functional diversity, including members with expertise in environmental science, law, or social policy, enables the board to more effectively identify and address the risks and opportunities related to the SDGs. Regular, well-attended board meetings enhance diligence, while board expertise promotes a more thorough integration of sustainability into a company's core strategy (Alodat et al., 2023). Despite these benefits, firms in the MENA region often display concentrated ownership, entrenched board structures, and limited functional diversity, which can hinder significant board-led progress on the SDGs (Farah et al., 2021; Alodat et al., 2023). Nevertheless, boards that integrate independence, diversity, and expertise are crucial in driving genuine sustainability transformation in the region. Therefore, this study proposes the following hypothesis:

H1. Board effectiveness is positively associated with the adoption of Sustainable Development Goals (SDGs).

2.4. Sustainability Committee and SDG Adoption

Establishing sustainability committees at the board level is increasingly being recognized as the best practice in advanced corporate governance. These committees are essential for embedding sustainability into a company's strategy and decision-making processes (Zampone et al., 2024). They are tasked with overseeing ESG risks, sustainability performance, regulatory compliance, and alignment with SDGs, often serving as an institutional foundation for the systematic monitoring and follow-up of non-financial goals (Hummel & Szekely, 2022; Hussain et al., 2018). Research indicates that the existence and effectiveness of a sustainability or CSR committee are directly linked to improved sustainability reporting, ESG performance, and environmental disclosure (Javeed et al., 2022; Mosgaard & Kristensen, 2023; Zampone et al., 2024). These committees help direct boards' focus toward sustainability priorities, enhance accountability both vertically (to shareholders and regulators) and horizontally (to employees and communities), and support the development of more comprehensive SDG strategies. International studies further reveal that a well-organized sustainability committee can mediate the positive impacts of board diversity and expertise on SDG disclosure and assist in integrating sustainability metrics into company performance assessments (Zampone et al., 2024). From the perspective of stakeholders, these committees improve the flow of information between management and the board and address stakeholder demands, enabling firms to respond more effectively to sustainability pressure (Freeman, 1984). In the MENA region, where ESG reporting requirements are still developing and institutional frameworks are less mature, having an active sustainability committee indicates a company's commitment to aligning with global best practices and meeting the expectations of both domestic and international stakeholders (Ben Hassen & Ei Bilali, 2024). This capacity for internalization of sustainability oversight is vital for credible SDG progress in the region.

H2. The effectiveness of a sustainability committee is positively associated with SDG adoption.

2.5. Environmental Management Team and SDG Adoption

Environmental management is a crucial aspect of corporate sustainability, involving strategies, policies, and practices aimed at reducing the environmental impact, improving resource efficiency, and adhering to changing regulations. Many firms adopt formal Environmental Management Systems (EMS), such as ISO 14001, which provide a structured approach to monitor, assess, and enhance environmental performance, thereby helping companies align their actions with global sustainability objectives (Ofori et al., 2024). Prior research shows that EMS adoption can improve energy efficiency, waste management, and emissions reduction while supporting several SDGs, notably SDG 6 (Clean Water and Sanitation), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action) (Ikram et al., 2019; Mosgaard & Kristensen, 2023). Building on this evidence, more recent studies emphasize the importance of dedicated internal structures, such as Environmental Management Teams (EMTs) or departments, which coordinate environmental initiatives, oversee compliance, and integrate environmental considerations into day-to-day operations and reporting (Asiri et al., 2020; Suchman, 1995). By allocating specific human resources to environmental issues, EMTs can facilritate the implementation of EMS where they exist, translate board-level sustainability commitments into concrete actions, and support the achievement of SDG-related targets, especially in emerging markets with complex environmental challenges (World Economic Forum,

2024b). In the MENA region, where issues such as water scarcity, desertification, and air pollution are significant and regulatory enforcement is often uneven, firms that invest in strong environmental management teams, eco-innovation, and transparent environmental reporting are better positioned to gain stakeholder trust and contribute meaningfully to regional SDG progress (OECD, 2019).

H3: The presence of an Environmental Management Team (EMT) is positively associated with the adoption of Sustainable Development Goals (SDGs).

2.6. Moderating Role of the Sustainability Committee

The success of board governance in advancing the adoption of Sustainable Development Goals (SDGs) often depends on the existence and quality of specialized board committees focused on sustainability. Sustainability committees (SCs) play a pivotal role by formalizing environmental, social, and governance (ESG) oversight; aligning the board's strategic direction with sustainability goals; and offering ongoing monitoring mechanisms (International Finance Corporation, 2023; Zampone et al., 2024). These committees act as structured platforms that link corporate strategy with global SDG objectives, ensuring that sustainability principles are systematically integrated into decision-making (Orazalin et al., 2023). Research shows that companies with dedicated sustainability committees tend to have better SDG disclosures and enhanced ESG performance, especially when the committee includes independent directors and diverse members with expertise in sustainability (Abdullah et al., 2024; Zampone et al., 2024). The committee serves as a knowledge center, providing the board with specialized analytical insights and ensuring that sustainability goals are translated into measurable objectives and performance indicators (Abdullah et al., 2024). By promoting horizontal coordination among departments and vertical accountability to shareholders and regulators, SCs enhance the board's capacity to implement more coherent and transparent sustainability strategies (International Finance Corporation, 2023). From a theoretical perspective, both agency and stakeholder theories explain how sustainability committees reinforce governance's effectiveness in achieving SDG outcomes. According to agency theory (Jensen & Meckling, 1976), these committees mitigate information asymmetry and managerial opportunism through enhanced monitoring, whereas stakeholder theory (Freeman, 1984) highlights how SCs enhance corporate responsiveness to societal and environmental expectations. In emerging markets such as MENA, where sustainability governance infrastructures are still developing, the presence of SCs indicates a stronger institutional commitment and assists firms in overcoming regulatory gaps by demonstrating adherence to global sustainability standards (World Economic Forum 2024a).

H4. The effectiveness of a sustainability committee moderates the positive relationship between board effectiveness and SDG adoption.

2.7. Moderating Role of the Environmental Management Team

Environmental Management Teams (EMTs) do not only play a direct role in achieving improved sustainability results but also enhance the efficiency of governance frameworks in promoting the adoption of SDGs. By coordinating environmental initiatives, monitoring performance, and following up on board directives, EMTs provide the organizational infrastructure required to execute sustainability strategies issued by the board, thereby facilitating systematic oversight, adherence, and continuous improvement (Naciti, 2019; Hussain et al., 2018). From an institutional and stakeholder perspective, EMTs help firms respond to regulatory and normative pressures by aligning internal practices with external expectations, helping to convert sustainability pledges into operational activities (Alodat et al., 2023; Taglialatela et al., 2023). In emerging markets, such as the MENA region, where environmental regulations may be inconsistent, strong environmental management teams enhance the credibility of sustainability efforts and signal voluntary commitment to SDG principles (Alshbili et al., 2021). By strengthening governance structures and supporting the implementation of environmental policies, EMTs increase the board's impact on sustainability results and promote the adoption of Sustainable Development Goals (SDGs).

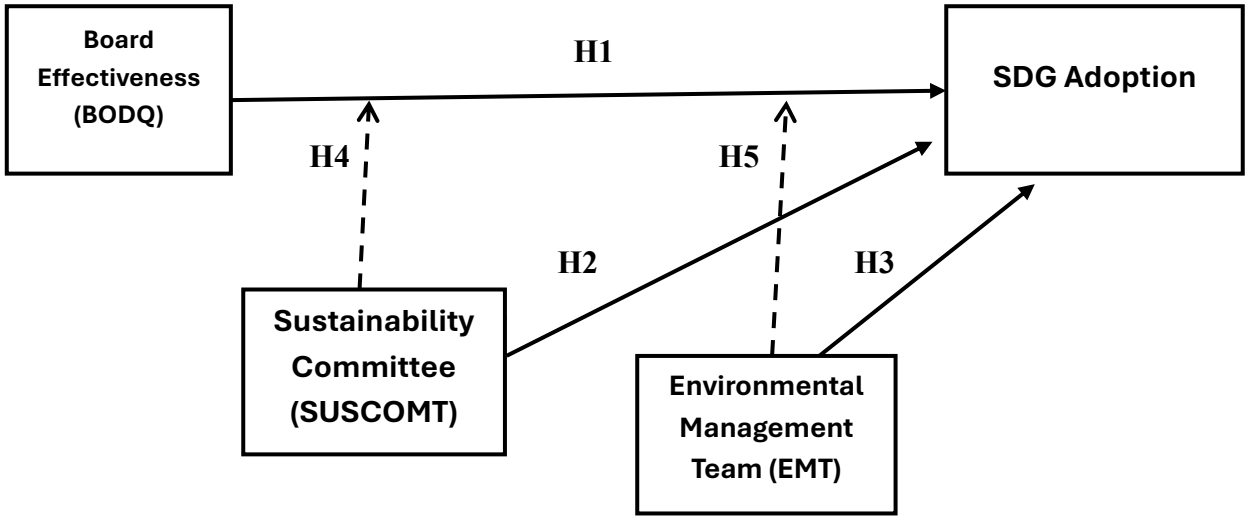
H5. The presence of an Environmental Management Team (EMT) positively moderates the relationship between board effectiveness and SDG adoption.

2.8. Conceptual Framework

Grounded in the integrated perspectives of agency and stakeholder theories, this study developed the conceptual model depicted in Figure 1. This framework posits that board effectiveness directly influences SDG adoption (H1). Both the

sustainability committee and the Environmental Management Team (EMT) are hypothesized to have direct effects on SDG adoption (H2, H3) as well as moderating effects on the relationship between board effectiveness and SDG adoption (H4, H5). This dual role reflects the view that internal governance mechanisms can interact synergistically to drive substantive integration of sustainability goals at the organizational level. Thus, the conceptual model provides a comprehensive basis for empirically testing both the main and interaction effects among core governance constructs and SDG outcomes.

Figure 1. Conceptual framework



3. METHODOLOGY

3.1. Sample and Data Collection

This empirical study utilizes a panel dataset of all publicly listed firms in the Middle East and North Africa (MENA) region from 2014 to 2023. Companies with substantial missing data for the key variables were omitted. The final dataset includes 2,042 firm-year observations from 471 distinct companies across 11 MENA countries (Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, Turkey, and the UAE). This extensive coverage ensures the generalizability and robustness of the findings as the sample spans a diverse array of industries and geographic contexts.

Data were gathered from Refinitiv Eikon and supplemented with firms' annual sustainability reports. Table 1 details the sampling process, and shows the distribution of firms by year, country, and sector. The sample indicates a significant rise in SDG-related disclosures post-2020, reflecting increased sustainability reporting trends spurred by regional ESG reforms (e.g., Saudi Arabia's CMA regulatory circulars and the UAE's COP28 initiatives). The diversity of sectors further enhances representativeness, covering high-emission sectors (energy, industrials) and knowledge-intensive industries (technology, healthcare), with Financials (33.69%), Industrials (10.72%), Real Estate (10.77%), and Consumer Non-Cyclicals (10.68%) making up the highest proportions. Geographically, most observations came from Turkey (27.77%), followed by Saudi Arabia (15.38%), the United Arab Emirates (15.28%), and Qatar (12.10%).

Table 1: Sampling Process.

Panel A: Sample selection					
Total observations for MENA firms with data for sustainability goals over 2014 to 2023				2179	
Less: Missing data				(137)	
Final observations for main analysis				2042	
Unique firms				471	
Panel B: Sample distribution by years, industry, and countries					
Year	**%**	**Industry**	**%**	**Country**	**%**
2014	03.13	Academic & Educational Services	00.54	Bahrain	03.72
2015	04.11	Basic Materials	10.43	Egypt	07.15
2016	04.75	Consumer Cyclicals	10.04	Jordan	01.37
2017	05.00	Consumer Non-Cyclicals	10.68	Kuwait	05.88
2018	05.93	Energy	04.11	Lebanon	00.10
2019	07.88	Financials	33.69	Morocco	07.20

2020	09.95	Healthcare	02.15	Oman	03.97
2021	15.87	Industrials	10.72	Qatar	12.10
2022	20.57	Real Estate	10.77	Saudi Arabia	15.38
2023	23.02	Technology	04.41	Tunisia	00.10
		Utilities	02.45	Turkey	27.77
				United Arab Emirates	15.28

3.2. Variables Measurement

3.2.1. SDG Adoption (SDG)

SDG Adoption (SDG) evaluates the degree to which firms implement and publicly report activities that align with the 17 United Nations Sustainable Development Goals (SDGs). Following Rosati and Faria (2019), this variable is formulated as a composite score by aligning firm-level sustainability disclosures with each of the 17 SDGs using the UN's global indicator framework. Each SDG dimension receives a score of 1 if the company provides clear evidence of commitment, measurable targets, or actions related to a specific goal and 0 otherwise. Thus, the overall SDG Adoption score captures both the scope and intensity of a firm's involvement in the global SDG agenda. This methodology is consistent with recent research highlighting scoring systems that capture explicit strategic alignments, progress reporting, and the integration of SDGs into core business operations (Gabrielli et al., 2025; Hummel & Szekely, 2022). This approach allows for a thorough and comparable evaluation of firm-level SDG integration, ensuring methodological rigor and alignment with international reporting standards.

3.2.2. Board Effectiveness (BODQ)

Board Effectiveness (BODQ) was measured using a composite score that captures the multidimensional nature of a well-functioning board of directors. This score incorporates essential board attributes commonly acknowledged in the academic literature, such as the size of the board, independence of directors, gender diversity, board expertise and competence, and the power or duality of the CEO. By constructing a comprehensive board effectiveness score, the combined effects of various governance mechanisms are captured rather than focusing on individual elements (Hakovirta et al., 2020; Lu et al., 2022).

Recent empirical studies strongly support the inclusion of these variables together, as board independence and gender diversity, in particular, have been demonstrated to improve board oversight and the strategic orientation of firms toward sustainability (Arora, 2024; Bartolomé Pascual-Fuster & Crespí-Cladera, 2022).

3.2.3. Sustainability Committee (SUSCOMT)

The Sustainability Committee (SUSCOMT) variable is defined as a binary indicator, marked as 1 if a company has a dedicated committee for sustainability, CSR, or ESG, and 0 if it does not. The presence of such a committee signifies a formal dedication to incorporating sustainability into corporate governance, and is empirically linked to enhanced ESG performance and the quality of non-financial disclosures (Ali et al., 2024; Tumewang et al., 2025). In line with our research hypotheses, we investigated both the direct influence of the sustainability committee on SDG adoption and its role in moderating the relationship between board quality and SDG adoption.

3.2.4. Environmental Management Team (EMT)

The Environmental Management Team (EMT) is represented as a binary variable, assigned a value of 1 if a company has an established environmental management team or department and 0 otherwise. This variable signifies the existence of dedicated internal resources for environmental responsibility in accordance with regulatory and stakeholder demands (Ali et al., 2024; Shaikh, 2022). Consistent with our hypotheses, we examined both the direct and moderating impacts of the environmental management team on SDG adoption and the relationship between board governance and SDG outcomes.

3.2.5. Control Variables

To minimize omitted variable bias and strengthen the reliability of our empirical results, we incorporated a wide range of control variables that reflect essential firm-level attributes and temporal influences (Mändli & Rönkkö, 2023). We include firm-specific controls, such as firm size (SIZE), R&D intensity (LNRD), profitability (ROA), inventory ratio (INVONT), leverage (LEV), operating cash flow (OCFASS), and current liquidity (CURATIO) due to their established links with firms' ability and inclination to participate in sustainability efforts and non-financial performance. Additionally, year fixed effects (YEAR) are added to account for unobservable macroeconomic trends and period-specific shocks

that may uniformly influence firm behavior over time.

Table 2: Variable Definitions.

Variables	Definition
SDG	Sustainable Development Goals score, composite score of the 17 Sustainable Development Goals, computed as the sum of all SDG indicators.
BODQ	Board Quality, composite score reflecting board effectiveness, based on board size, independence, gender diversity, expertise, and CEO power.
SUSCOMT	Sustainability Committee, indicator variable equals 1 if the firm has sustainability committee and 0 otherwise.
EMT	Environmental Management Team, indicator variable equal to 1 if the firm has an EMT and 0 otherwise.
SIZE	Firm size, measured as the natural logarithm of total assets.
LNRD	R&D intensity, measured as the natural logarithm of total research and development expenses.
ROA	Profitability, measured as net income scaled by total assets.
INVONT	Inventory intensity, measured as inventories scaled by total assets.
LEV	Leverage, measured as total liabilities scaled by total assets.
OCFASS	Operating cash flow, measured as net operating cash flow scaled by total assets.
CURATIO	Liquidity, measured as the current ratio (current assets scaled by current liabilities).
YEAR	Year fixed effects, indicator variables for each year.
BODSZ	Board size, measured as the total number of directors on the board.
BODIND	Board independence, measured as the proportion of independent non-executive directors on the board.
BODEXP	Board expertise, measured as the proportion of directors with financial or sustainability expertise.
BODDIV	Board diversity, measured as the proportion of female directors on the board.
BODCH	Board chairperson indicator, equal to 1 if the roles of CEO and board chair are separated and 0 otherwise.
REC	Receivables ratio, calculated as trade receivables scaled by total assets.
MVBV	Market-to-book value ratio, calculated as market value of equity divided by book value of equity.
ADFEE	Audit Fees, measured as audit fees scaled by total assets.
ACIND	Audit committee independence, measured as the proportion of independent directors on the audit committee.
ACEXPDUMY	Audit committee expertise, indicator variable equal to 1 if at least one audit committee member has accounting or auditing expertise and 0 otherwise
ADTYPE	Audit type, indicator variable equal to 1 if the firm is audited by a Big 4 audit firm and 0 otherwise.
IAF	Internal audit function, indicator variable equal to 1 if the firm has a dedicated internal audit unit and 0 otherwise.

3.3. Econometric Model Specification

We employ a panel data regression model to assess the impact of board quality, sustainability committees, and environmental management on the adoption of Sustainable Development Goals (SDGs). The basic model, designed to investigate the direct effects described in Hypotheses 1, 2, and 3, is expressed as follows.

$$\mathrm{SDG_{it}} = \beta_0 + \beta_1\,\mathrm{BODQ_{it}} + \beta_2\,\mathrm{SUSCOMT_{it}} + \beta_3\,\mathrm{EMT_{it}} + \beta_4\,\mathrm{Controls_{it}} + \mu_i + \lambda t + \varepsilon_{it}$$

In this context, SDG refers to the extent of Sustainable Development Goals adoption of SDGs, BODQ denotes the quality of the board, SUSCOMT indicates the existence of a sustainability committee, and EMT signifies the presence of an environmental management team. Control represents the vector of control variables, while μ and λ stand for firm and year fixed effects, respectively. Indices i and t represent the firm and time components, respectively.

To examine the moderating effects proposed in Hypotheses 4 and 5, interaction terms are added to the baseline regression model. Specifically, the interaction between BODQit and SUSCOMTit captures the moderating effect described in Hypothesis 4, whereas the interaction between BODQit and EMTit illustrates the moderating effect

outlined in Hypothesis 5. The complete model that incorporates these moderating variables is presented as follows:

$$SDG_{it} = \beta_0 + \beta_1 BODQ_{it} + \beta_2 SUSCOMT_{it} + \beta_3 EMT_{it} + \beta_4 (BODQ_{it} \times SUSCOMT_{it}) + \beta_5 (BODQ_{it} \times EMT_{it}) + \beta_6 Controls_{it} + \mu_i + \lambda t + \varepsilon_{it}$$

Coefficients β_4 and β_5 capture the moderating influence of sustainability committees and the Environmental Management Team (EMT), respectively, on the relationship between board effectiveness and SDG adoption.

3.4. Robustness Analysis

To ensure the reliability and robustness of our results, we implement several complementary robustness checks. Initially, we investigated different metrics of SDG adoption by analyzing the link between board effectiveness and each SDG using logistic regression models. We also evaluated robustness by separately examining each aspect of board effectiveness, such as board size, independence, expertise, diversity, and CEO power. Moreover, we examined the consistency of our results by including extended governance and audit-related control variables such as auditor reputation, market-to-book ratio, audit fees, audit committee independence and expertise, audit type, and the existence of an internal audit function. These supplementary analyses ensure that our conclusions are not reliant on particular variables or model specifications but remain robust across various measurement options and control setups.

4. EMPIRICAL RESULTS AND ROBUSTNESS TESTS

4.1. Descriptive Statistics

Table 3 presents a detailed summary of the descriptive statistics of all variables included in our study. The SDG Adoption Score (SDG) has an average of 3.98 and a standard deviation of 5.59, with scores ranging from 0.00 to 9.00. This broad range reflects considerable differences in the level of SDG integration among firms in the MENA region, indicating varying degrees of commitment and advancement toward sustainability objectives. The median SDG score of 0.00 further suggests that a significant number of firms may have little to no reported SDG adoption, pointing to the early stage of SDG integration for some organizations. The Board Quality (BODQ) composite score averages 3.18 with a standard deviation of 0.93, and scores between 2.00 and 4.00. This indicates a moderate level of board quality across the sample with some variability. The Sustainability Committee (SUSCOMT) indicator shows an average of 0.48 (standard deviation of 0.50), meaning that around 48% of the firms sampled have a dedicated sustainability committee. Similarly, the Environmental Management Team (EMT) indicator has an average of 0.38 (standard deviation of 0.49), suggesting that about 38% of firms have a formal environmental management team. These statistics highlight the different adoption rates of specific governance mechanisms aimed at promoting sustainability in the region. Regarding the control variables, the average firm size is substantial (mean log assets ≈ 22), leverage is moderate (LEV mean = 0.63), and short-term liquidity is relatively high (CURATIO mean = 3.00). The significant variation in R&D expenses (LNRD SD: 4.18; median: 0.00) illustrates the disparity between knowledge and resource-based firms. Overall, these descriptive statistics demonstrate considerable variation in both sustainability strategy and governance quality among MENA firms, setting the stage for subsequent multivariate analyses.

Table 3: Descriptive results

Variables	N	Mean	SD	p25	Median	p75
SDG	2042	3.98	5.59	0.00	0.00	9.00
BODQ	2042	3.18	0.93	2.00	3.00	4.00
SUSCOMT	2042	0.48	0.50	0.00	0.00	1.00
EMT	2042	0.38	0.49	0.00	0.00	1.00
SIZE	2042	21.99	1.97	20.62	22.04	23.23
LNRD	2042	1.31	4.18	0.00	0.00	0.00
ROA	2042	0.05	0.11	0.01	0.03	0.08
INVONT	2042	0.07	0.43	0.00	0.00	0.02
LEV	2042	0.63	0.25	0.47	0.66	0.85
OCFASS	2042	0.21	4.51	-0.00	0.00	0.05
CURATIO	2042	3.00	9.80	1.00	1.10	1.91
See Table 2 for variable definitions.						

4.2. Correlation Analysis

Table 4 presents the pairwise correlations among the variables. The analysis supports our main hypotheses, showing statistically significant positive correlations between our SDG Adoption Score (SDG) and the three primary governance mechanisms: Board Quality (BODQ) ($r = 0.21$, $p < 0.05$), Sustainability Committee (SUSCOMT) ($r = 0.47$, $p < 0.05$), and the Environmental Management Team (EMT) ($r = 0.33$, $p < 0.05$). These results provide preliminary evidence that robust governance structures are linked to higher levels of SDG engagement in the MENA region.

The correlations among the independent variables indicated a synergistic relationship. Specifically, the presence of a Sustainability Committee (SUSCOMT) is strongly associated with having an Environmental Management Team (EMT) ($r = 0.52$, $p < 0.05$), suggesting that firms often implement governance and operational structures together. Similar

complementarities were observed by Li and Mahmood (2024) and Benlemlih and Bitar (2018), who noted that sustainability governance mechanisms reinforce each other to enhance firms' environmental accountability.

Importantly, the correlation coefficients among the independent variables were all well below the commonly accepted threshold for multicollinearity (e.g., 0.70), with the highest being 0.52. This indicates that our regression models are unlikely to be affected by multicollinearity, allowing for a more reliable interpretation of the individual effects of each variable. Several control variables also exhibited significant correlations with the adoption of SDGs. Firm Size (SIZE), Research and Development Expenses (LNRD), and Return on Assets (ROA) are all positively correlated with the SDG score, suggesting that larger, more innovative, and profitable firms are more inclined to adopt and report on SDGs.

Table 4: Pairwise Correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) SDG	1.00									
(2) BODQ	0.21*	1.00								
(3) SUSCOMT	0.47*	0.21*	1.00							
(4) EMT	0.33*	0.17*	0.52*	1.00						
(5) SIZE	0.06*	0.01	0.22*	0.12*	1.00					
(6) LNRD	0.06*	0.11*	0.10*	0.14*	-0.08*	1.00				
(7) ROA	0.08*	0.02	0.05*	0.09*	-0.04*	0.08*	1.00			
(8) INVONT	-0.03	0.02	-0.05*	0.01	-0.19*	0.04	-0.02	1.00		
(9) LEV	0.04	0.07*	0.16*	0.05*	0.46*	-0.08*	-0.26*	-0.14*	1.00	
(9) OCFASS	-0.02	0.00	-0.03	-0.02	-0.08*	-0.01	0.00	0.07*	-0.07*	1.00
(10) CURATIO	0.01	-0.02	0.03	0.01	0.04	-0.03	0.02	-0.02	-0.06*	-0.01
** Shows significance at p<0.05; See Table 2 for variable definitions.*										

4.3. Fixed-Effects Regression Results: Direct Effects

Table 5 displays the results of the fixed effects regression analysis, highlighting the direct impacts of board quality, sustainability committees, and the Environmental Management Team (EMT) on the adoption of SDGs. The model explains a significant amount of the variation within companies (R^2 = 0.42 – 0.44), demonstrating its strong explanatory power.

Model (1) reveals a significant negative relationship between Board Quality (BODQ) and SDG adoption (β = -0.26, $p < 0.01$). This result implies that a higher overall score for board characteristics, when evaluated independently, does not necessarily enhance the adoption of SDGs. This suggests that while individual attributes are crucial, their collective influence, as measured by BODQ, might be complex or dependent on other factors. This result further implies that, in the MENA region, effective boards may focus more on financial oversight and compliance rather than strategic sustainability integration, a view supported by previous evidence showing that board monitoring in emerging markets with high ownership concentration often prioritizes short-term control over a long-term sustainability focus (Javeed et al., 2022; Orazalin et al., 2023).

Conversely, Model (2) revealed a strong positive and highly significant relationship between the presence of a Sustainability Committee (SUSCOMT) and SDG adoption (β = 2.18, $p < 0.01$). This finding provides robust support for Hypothesis 2, indicating that firms with dedicated sustainability committees are significantly more likely to adopt and integrate SDGs into their operations. This highlights the essential role of specialized governance structures in promoting sustainability initiatives, consistent with the findings of Elamer et al. (2024) and Shaukat et al. (2016).

Similarly, Model (3) demonstrates that the Environmental Management Team (EMT) is positively and significantly associated with SDG adoption (β = 1.10, $p < 0.01$). This supports Hypothesis 3, suggesting that the formal establishment of an environmental management team enhances a firm's commitment to and implementation of the SDGs. This highlights the importance of operational-level structures in translating sustainability aspirations into concrete actions (Ikram et al., 2019; Mosgaard & Kristensen, 2023).

Model (4) included all three independent variables. The results remained consistent: BODQ was negatively significant (β = -0.29, $p < 0.01$), SUSCOMT was positively significant (β = 2.06, $p < 0.01$), and EMT was positively significant (β = 0.53, $p < 0.05$). The persistent impact of these factors, even when considered together, underscores their distinct contributions to the implementation of SDGs.

In terms of control variables, Firm Size (SIZE) consistently shows a positive and highly significant effect across all models (e.g., $\beta = 1.85$, $p < 0.01$ in Model 1), suggesting that larger companies are more inclined to implement SDGs. Conversely, Inventory (INVONT), Operating Cash Flow to Assets (OCFASS), and Current Ratio (CURATIO) exhibit negative and significant relationships, indicating that companies with greater inventory levels, reduced operational cash flow efficiency, or lower liquidity might encounter challenges in adopting SDGs.

Table 5: Fixed-effect model results for the direct effect.

Variables	(1)	(2)	(3)	(4)
	SDG			
BODQ	-0.26***			-0.29***
	(-3.00)			(-3.48)
SUSCOMT		2.18***		2.06***
		(9.65)		(10.71)
EMT			1.10***	0.53*
			(3.61)	(1.95)
SIZE	1.85***	1.57***	1.82***	1.56***
	(3.20)	(2.88)	(3.18)	(2.89)
LNRD	0.00	0.04	0.02	0.05
	(0.07)	(0.69)	(0.40)	(0.82)
ROA	0.73	0.83*	0.58	0.69
	(1.42)	(1.66)	(1.26)	(1.42)
INVONT	-0.13***	-0.14***	-0.14***	-0.12***
	(-25.93)	(-13.62)	(-19.36)	(-17.76)
LEV	-1.07	-0.57	-0.99	-0.58
	(-1.45)	(-0.85)	(-1.39)	(-0.90)
OCFASS	-0.00**	-0.00	-0.00	-0.00**
	(-2.39)	(-1.59)	(-1.47)	(-2.05)
CURATIO	-0.01***	-0.01**	-0.01***	-0.01**
	(-2.96)	(-2.53)	(-2.83)	(-2.18)
YEAR	YES			
_cons	-40.69***	-35.98***	-40.95***	-35.15***
	(-3.39)	(-3.16)	(-3.43)	(-3.14)
Observations	2042	2042	2042	2042
Within R^2	42%	44%	42%	44%

*t-values are in parentheses; *** p<.01, ** p<.05, * p<.1; See Table 2 for variable definitions.*

4.4. Moderating Effects

The moderating hypotheses (H4 and H5) were tested by employing interaction terms between board quality and the two sustainability governance mechanisms. The results in Table 6 confirm both moderating effects.

Model (1) introduced the interaction term BODQ_SUSCOMT. The coefficient of this interaction was positive and highly significant ($\beta = 0.65$, $p < 0.01$). This result supports hypothesis 4, suggesting that the existence of a sustainability committee positively influences the relationship between board quality and SDG adoption. Specifically, a sustainability committee strengthens the positive impact (or reduces the negative effect) of board quality on SDG integration, indicating that these committees serve as vital connections, converting board-level governance into effective sustainability strategies (Orazalin et al., 2023).

Model (2) included the interaction term BODQ_EMT. The coefficient of this term was also positive and highly significant ($\beta = 0.87$, $p < 0.01$). This supports Hypothesis 5, which indicates that an environmental management team has a positive impact on the connection between board quality and the adoption of SDGs. This suggests that the effectiveness of board quality in advancing the SDGs is enhanced when a dedicated environmental management team implements and monitors sustainability practices.

These moderating effects highlight the significance of complementary governance mechanisms. While board quality alone may not consistently drive SDG adoption, its impact becomes more significant and positive when supported by specialized committees and operational teams that focus on sustainability and environmental issues (Ali et al., 2023; Javeed et al., 2022).

Table 6: Fixed-Effect Model Results for the Moderating Effect.

Variables	(1)	(2)
	SDG	
BODQ	-0.54***	-0.51***
	(-4.79)	(-5.59)
SUSCOMT	2.29***	
	(10.54)	
EMT		1.01***
		(3.07)
BODQ_SUSCOMT	0.65***	
	(2.72)	
BODQ_EMT		0.87***
		(4.35)
SIZE	1.56***	1.80***
	(2.93)	(3.18)
LNRD	0.02	0.01
	(0.40)	(0.16)
ROA	0.80	0.34
	(1.60)	(0.70)
INVONT	-0.10***	-0.15***
	(-7.62)	(-10.28)
LEV	-0.48	-1.18
	(-0.73)	(-1.59)
OCFASS	-0.00**	-0.00*
	(-2.21)	(-1.83)
CURATIO	-0.01***	-0.01***
	(-2.61)	(-2.95)
YEAR	YES	
_cons	-36.16***	-40.56***
	(-3.23)	(-3.44)
Observations	2042	2042
Within R^2	44%	43%

*t-values are in parentheses; *** p<.01, ** p<.05, * p<.1; See Table 2 for variable definitions.*

4.5. Alternative Specifications and Robustness Checks

For robustness, the models are re-estimated using alternative measures of board effectiveness (board size, board independence, board expertise, board diversity, and board chairperson) and an extended set of governance-related controls, including receivables ratio, market-to-book ratio, audit fees, audit committee independence and expertise, audit type, and the existence of an internal audit function. All additional variables are defined in Table 2.

4.5.1. Alternative Measures of SDG Adoption

Table 7 displays logistic regression results using different measures of each specific SDG (SDG1–SDG17) as dependent variables. The purpose of this analysis is to determine if the effect of board quality (BODQ) differs across specific SDGs. The findings reveal that BODQ does not significantly influence all SDGs. For example, despite being unrelated to most distinct goals, it is positively and significantly associated with SDG16 ($\beta = 0.68$, $p < 0.05$). This suggests that while BODQ may not directly affect the adoption of all SDGs, it could be influential in specific areas such as peace, justice, and strong institutions. The overall inconsistency in the significance of BODQ across individual SDGs further highlights the complex nature of board quality's influence, suggesting that its effects may be mediated or moderated by other factors.

Table 7: Results for alternative measures for each SDG using logistic regression

Panel A: Results for SDG1-SDG9									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
	SDG1	**SDG2**	**SDG3**	**SDG4**	**SDG5**	**SDG6**	**SDG7**	**SDG8**	**SDG9**
BODQ	0.13	0.13	0.14	-0.05	-0.05	0.10	-0.14	-0.66	-0.34
	(0.35)	(0.34)	(0.39)	(-0.16)	(-0.12)	(0.24)	(-0.43)	(-1.45)	(-0.82)
CONTROLS	YES								
YEAR	YES								
Observations	518	423	833	880	932	625	872	965	908
Pseudo R^2	60%	62%	73%	70%	79%	70%	68%	86%	81%
Panel B: Results for SDG10-SDG17									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	
	SDG10	**SDG11**	**SDG12**	**SDG13**	**SDG14**	**SDG15**	**SDG16**	**SDG17**	
BODQ	0.18	-0.59	0.09	-0.47	-0.38	-0.20	0.68**	-0.17	
	(0.48)	(-1.51)	(0.20)	(-1.08)	(-1.04)	(-0.56)	(1.99)	(-0.48)	
CONTROLS	YES								
YEAR	YES								
Observations	890	729	929	976	464	574	720	865	
Pseudo R^2	76%	71%	80%	84%	58%	60%	63%	70%	

*t-values are in parentheses; *** p<.01, ** p<.05, * p<.1; CONTROLS is an indicator for including our control variables; See Table 2 for variable definitions.*

4.5.2. Alternative Measures of Board Effectiveness

Table 8 presents the results using different metrics for board effectiveness, disaggregating the composite BODQ score into individual components. Model (1) indicates that Board Size (BODSZ) positively and significantly affects SDG adoption ($\beta = 0.11$, $p < 0.05$). This finding suggests that larger boards can leverage a wider array of viewpoints and resources to promote sustainability efforts (Cucari et al., 2018; Shaukat et al., 2016). Model (2) shows that Board Independence (BODIND) is negatively and significantly associated with SDG adoption ($\beta = -0.02$, $p < 0.01$), an unexpected result that requires further exploration. This finding may reflect underlying agency issues or a tendency among independent directors in emerging markets to prioritize short-term financial outcomes. Particularly in the MENA region, board independence does not necessarily equate to sustainability expertise or long-term ESG commitment unless supported by specific sustainability governance structures (Kateb & Alahdal, 2024; Alodat et al., 2023). Model (3) indicates that Board Expertise (BODEXP) is negatively and significantly associated with SDG adoption ($\beta = -2.46$, $p < 0.01$), suggesting that boards with high specialization might focus more on traditional financial metrics rather than broader sustainability issues. On the other hand, Board Diversity (BODDIV) (Model 4) demonstrates a positive and highly significant relationship ($\beta = 0.05$, $p < 0.01$), highlighting the advantages of various perspectives on sustainability. Model (5) shows that the board chairperson (BODCH) has no significant effect. Model (6) incorporates multiple alternative measures, reaffirming the negative impact of

BODIND and BODEXP and the positive impact of BODDIV.

These detailed results suggest that the overall negative effect of the composite BODQ in Table 5 might be attributed to specific components, such as board independence and expertise, while diversity has a positive contribution. This in-depth analysis underscores the importance of closely examining individual board characteristics rather than relying solely on a composite score.

Table 8: Results for Alternative Measures for Board Effectiveness.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	SDG					
BODSZ	0.11**					0.08*
	(2.34)					(1.78)
BODIND		-0.02***				-0.02***
		(-3.27)				(-3.28)
BODEXP			-2.46***			-2.42***
			(-5.28)			(-5.44)
BODDIV				0.05***		0.05***
				(3.97)		(4.46)
BODCH					0.83	0.74
					(0.97)	(0.80)
CONTROLS	YES					
YEAR	YES					
_cons	-42.43***	-40.00***	-40.90***	-40.49***	-42.21***	-39.77***
	(-3.45)	(-3.42)	(-3.54)	(-3.42)	(-3.44)	(-3.62)
Observations	2042	2042	2042	2042	2042	2042
Within R^2	42%	42%	44%	42%	42%	44%

*t-values are in parentheses; *** p<.01, ** p<.05, * p<.1; CONTROLS is an indicator for including our control variables; See Table 2 for variable definitions.*

4.5.3. Extended Control Variables

Table 9 presents the results after adding more control variables to validate the robustness of our primary findings. The addition of variables, such as Market Value to Book Value (MVBV), Audit Fees (ADFEE), and Internal Audit Function (IAF), does not change the main conclusions. The negative and significant impact of Board Quality (BODQ) (e.g., β = -0.26, $p < 0.01$ in Model 1), along with the positive and significant effects of the Sustainability Committee (SUSCOMT) (e.g., β = 2.14, $p < 0.01$ in Model 2) and the Environmental Management Team (EMT) (e.g., β = 1.07, $p < 0.01$ in Model 3), remain unchanged. Additionally, the positive and significant moderating effects of BODQ_SUSCOMT (β = 0.62, $p < 0.05$ in Model 4) and BODQ_EMT (β = 0.84, $p < 0.01$ in Model 5) were also consistent. The main coefficients retain their magnitude and significance, thus underscoring their robustness. Most audit-related variables are insignificant, except for IAF, which has a positive and significant coefficient (β = 0.53, $p < 0.05$), suggesting that firms with established internal audit units demonstrate stronger sustainability compliance and reporting quality (Amoako et al., 2023; Tumwebaze et al., 2021). These consistent results across different specifications and additional controls strengthen the robustness of our findings, providing greater assurance of the established relationships between governance mechanisms and SDG adoption in the MENA region.

Table 9: Fixed-effect results after adding further control variables.

Variables	(1)	(2)	(3)	(4)	(5)
	SDG				
BODQ	-0.26***			-0.53***	-0.50***
	(-2.98)			(-4.50)	(-5.37)
SUSCOMT		2.14***		2.24***	
		(10.00)		(10.95)	
EMT			1.07***		0.99***
			(3.56)		(3.04)
BODQ_SUSCOMT				0.62**	
				(2.45)	
BODQ_EMT					0.84***
					(4.11)
REC	-0.36	-0.35	-0.37	-0.25	-0.26
	(-1.51)	(-1.55)	(-1.61)	(-1.02)	(-1.06)
MVBV	0.00***	0.00**	0.00***	0.00	0.00***
	(3.42)	(2.00)	(3.07)	(1.53)	(3.91)
ADFEE	0.00***	0.00***	0.00***	0.00***	0.00***
	(4.11)	(3.53)	(4.06)	(3.25)	(3.86)
ACIND	0.00	0.00	0.00	0.00	0.00
	(0.65)	(0.56)	(0.64)	(0.47)	(0.60)
ACEXPDUMY	-0.08	-0.10	-0.06	-0.08	-0.08
	(-0.68)	(-0.84)	(-0.54)	(-0.70)	(-0.70)
ADTYPE	0.02	-0.04	0.01	-0.10	-0.02
	(0.08)	(-0.16)	(0.04)	(-0.38)	(-0.07)
IAF	0.71***	0.35*	0.55***	0.35**	0.53***
	(3.34)	(1.93)	(2.63)	(2.01)	(2.68)
CONTROLS	YES				
YEAR	YES				
_cons	-39.80***	-35.57***	-40.26***	-35.84***	-40.06***
	(-3.24)	(-3.04)	(-3.29)	(-3.11)	(-3.32)
Observations	2042	2042	2042	2042	2042
Within R^2	42%	44%	43%	44%	43%

*t-values are in parentheses; *** p<.01, ** p<.05, * p<.1; CONTROLS is an indicator for including our control variables; See Table 2 for definitions.*

5. DISCUSSION

The empirical results of this study provide valuable insights into the governance of SDG implementation in the MENA region, largely affirming our hypotheses. From both agency and stakeholder perspectives, board quality remains theoretically central for SDG adoption (H1). From an agency perspective, effective boards, especially those with independent and diverse members, are better positioned to oversee managerial actions and ensure the pursuit of long-term sustainability goals, including SDGs, thus reducing potential agency

conflicts (KaoDui et al., 2025). From a stakeholder perspective, diverse boards are more inclined to consider the interests of a wider range of stakeholders, resulting in a stronger focus on social and environmental issues represented by the SDGs (Hummel & Szekely, 2022; Kateb & Alahdal, 2024; Shaukat et al., 2016). The findings highlight that a well-governed board is essential for integrating sustainability into a corporate strategy within the MENA context.

However, our results also show that the Board Quality (BODQ) variable exhibits a negative and significant coefficient in the fixed effects models, contrary to the predictions of Agency Theory, which requires contextualization within the MENA region's institutional environment. In many MENA countries, corporate governance reforms, including those promoting board independence and diversity, are often adopted as a form of symbolic conformity or 'window dressing' to satisfy external pressures from international investors or regulatory bodies, rather than reflecting a deep, long term commitment to sustainability (Jamali, 2010). As a result, firms with formally high BODQ may prioritize compliance, monitoring, and short term financial performance over the costly and long term nature of SDG initiatives. The negative sign thus suggests that, in the absence of strong and enforced regulatory pressure for sustainability, high quality boards remain primarily focused on traditional shareholder wealth maximization, leading to a decoupling of formal governance quality from actual SDG performance. This highlights the importance of the regional institutional context and the need for complementary mechanisms, such as the specialized focus of the Sustainability Committee and the operational capabilities of the Environmental Management Team (EMT), to translate formal governance structures into tangible sustainability outcomes.

The substantial positive impact of a sustainability committee on the adoption of SDGs (H2) reinforces the committee's strategic importance. According to Stakeholder Theory, such a committee offers a formal channel for addressing stakeholder concerns about sustainability, ensuring that these issues are not marginalized but actively incorporated into corporate decision-making (Kateb & Alahdal, 2024; Shaukat et al., 2016). From an agency perspective, the committee functions as a specialized monitoring mechanism, reducing information asymmetry and ensuring that management's actions are in line with the firm's declared sustainability objectives, thereby improving accountability (Ali et al., 2023; Javeed et al., 2022). This finding is particularly pertinent to the MENA region, where the formalization of sustainability governance is still developing and where board-level sustainability structures are crucial in shaping long-term ESG and SDG priorities.

Our results also confirm the essential impact of environmental management on the adoption of the SDGs (H3). Firms with a dedicated Environmental Management Team (EMT) exhibit a stronger propensity to integrate SDGs, consistent with prior evidence on the benefits of robust environmental management systems, including ISO 14001 certification (Ikram et al., 2019; Mosgaard & Kristensen, 2023). This is consistent with Stakeholder Theory, as effective environmental management addresses the demands of environmental interest groups, regulatory bodies, and local communities. It also aligns with the view, grounded in Agency Theory, that proactive environmental strategies enhance operational efficiency and strengthen corporate reputation, thereby contributing to long-term firm value.

Moderating influences offer a profound understanding of how these governance mechanisms interact. The sustainability committee's positive effect on the relationship between board effectiveness and SDG adoption (H4) indicates that, while a competent board establishes the overall direction, a specialized committee enhances this impact. The committee serves as a catalyst, converting the board's general commitment into targeted actions by offering expertise, dedicated oversight, and integration across various functions (Kateb & Alahdal, 2024; Orazalin et al., 2023). This highlights how general board supervision, when supported by specialized sustainability committees, forms a synergistic governance system that improves strategic sustainability outcomes.

Similarly, the significant positive influence of environmental management on the relationship between board effectiveness and the adoption of the SDGs (H5) indicates the importance of operational capabilities in achieving strategic goals. When a board is dedicated to sustainability, this commitment is more successfully converted into concrete SDG results when supported by a dedicated Environmental Management Team (EMT) and robust environmental management practices (Albitar et al., 2019; Ikram et al., 2019; Mosgaard & Kristensen, 2023). This suggests that the board's strategic vision of sustainability becomes actionable and effective through specific environmental management efforts. This dynamic is especially crucial in the MENA region, where environmental issues are urgent and

necessitate both strategic direction and effective operational execution.

This study significantly contributes to the existing literature by integrating Agency Theory and Stakeholder Theory to clarify the factors influencing the adoption of SDGs in the MENA region. While previous studies have often used these theories separately, our results reveal their complementary roles in comprehending corporate sustainability governance. Agency theory helps elucidate how the quality of a board through its monitoring and advisory roles reduces conflicts of interest between managers and shareholders, thereby ensuring the pursuit of long-term sustainability objectives. For instance, the positive effects of board independence and gender diversity on SDG adoption support the agency perspective that effective oversight leads to better alignment with broader societal expectations that ultimately enhance firm value (Jensen & Meckling, 1976; Kateb & Alahdal, 2024; Post et al., 2011).

At the same time, Stakeholder Theory provides a robust framework for understanding firms' proactive engagement with the SDGs. The central role of sustainability committees and environmental management practices underscores the importance of addressing the concerns of a diverse set of stakeholders, including employees, customers, local communities, and the natural environment. These mechanisms serve as formal and operational channels through which firms respond to stakeholder demands and incorporate their interests into corporate strategy, thereby enhancing legitimacy and ensuring long-term sustainability (Freeman, 1984; Rosati & Faria, 2019). Our study extends these theoretical perspectives by showing how the interaction between board effectiveness, specialized sustainability committees, and the Environmental Management Team (EMT) creates a comprehensive governance architecture for SDG adoption, particularly in regions characterized by distinct institutional and cultural conditions.

The results of this study provide several actionable insights for corporate leaders, board members, and policymakers in the MENA region.

These findings underscore the imperative for corporate executives and boards to enhance overall board quality. Firms should prioritize strengthening board independence, promoting gender diversity, and appointing directors with substantive expertise in sustainability issues. Establishing and ensuring the effective operation of a dedicated sustainability committee is essential as it offers specialized oversight and strengthens the board's influence on the adoption of Sustainable Development Goals (SDGs). Additionally, firms should develop and support a dedicated Environmental Management Team (EMT) that can coordinate environmental initiatives and, where appropriate, oversee the implementation of comprehensive Environmental Management Systems, such as ISO 14001 certification, to actualize their sustainability commitments and convert strategic intentions into measurable improvements in environmental performance. These measures are not just about compliance but are strategic necessities for creating long-term value and resilience in a rapidly evolving global environment.

This study highlights the importance for policymakers and regulators in the MENA region to adopt policies that encourage and reinforce robust sustainability-related corporate governance practices. This could involve mandating or encouraging board diversity quotas, requiring the formation of sustainability committees, and offering incentives for environmental management certifications. Regulators should also consider creating standardized reporting frameworks for SDG adoption tailored to the MENA context to improve transparency and comparability across firms. Such policies would not only accelerate the region's progress toward the 2030 Agenda but also cultivate a more responsible and sustainable business environment, attract foreign investment, and enhance regional competitiveness.

6. CONCLUSION

This research examined the multifaceted factors shaping SDG implementation within the unique socioeconomic and environmental landscape of the Middle East and North Africa (MENA) region. By focusing on the roles of board quality, sustainability committees, and the environmental management team and using the complementary lenses of Agency Theory and Stakeholder Theory, we aimed to identify the internal corporate governance strategies that drive firms' dedication to the 2030 Agenda.

Our empirical results provide strong evidence that board quality, reflected in board size, independence, and gender diversity, plays a significant and positive role in driving SDG adoption among MENA firms. This finding underscores the crucial importance of an effective and well-governed board in steering corporate strategies toward sustainability, ensuring alignment between managerial decisions, long-term value creation, and broader societal expectations. Moreover, the presence and effectiveness of a dedicated

sustainability committee emerge as vital governance components, exerting a direct and positive influence on SDG adoption. This highlights the importance of specialized supervision and expertise in transforming broad sustainability commitments into concrete corporate actions.

The finding that strong environmental management practices are positively associated with higher SDG adoption levels is equally important. This suggests that firms with a dedicated Environmental Management Team (EMT), supported by established environmental management systems and proactive strategies, are more capable of integrating and reporting their contributions to environmental sustainability goals. Notably, our study identified significant moderating effects: both the sustainability committee and the EMT enhanced the relationship between board effectiveness and SDG adoption. This indicates a synergistic interaction in which the specialized focus of a sustainability committee and the operational capabilities provided by effective environmental management enhance the strategic direction and oversight offered by a high-quality board.

These findings make significant theoretical contributions by illustrating the combined applicability of agency and stakeholder theories to explain corporate SDG engagement. Agency Theory helps explain how board quality mitigates conflicts of interest and fosters alignment toward long-term sustainability; conversely, Stakeholder Theory emphasizes how sustainability committees and the Environmental Management Team (EMT) respond to diverse stakeholder expectations, enhance organizational legitimacy, and support comprehensive SDG integration. Our research adds to the corporate governance literature by offering region-specific insights into these dynamics in the underexplored MENA context.

From a managerial perspective, this study strongly recommends that firms in the MENA region focus on improving board quality by enhancing independence, diversity, and expertise. Creating and empowering dedicated sustainability committees is crucial for targeted oversight and strategic integration of SDGs. Additionally, investing in and empowering a dedicated Environmental Management Team (EMT) is vital for implementing sustainability commitments and coordinating environmental initiatives, including the design and operation of comprehensive environmental management systems where appropriate. For policymakers and regulators, our findings underscore the need to promote, and potentially mandate, governance structures and practices that support sustainability, alongside the development of standardized reporting frameworks to enhance transparency and accelerate the region's progress toward the 2030 Agenda.

Although this study offers valuable insights, it has certain limitations. The thorough assessment of SDG adoption depends on self-reported data, which might be influenced by reporting biases. Future studies could consider alternative approaches, such as evaluations by independent parties or metrics based on impacts. Moreover, although our research concentrates on publicly listed non-financial firms, future investigations could extend the analysis to private companies or specific industries within the MENA region to capture more detailed insights. Further exploration of causal mechanisms through qualitative approaches or quasi-experimental designs could also yield a more comprehensive and nuanced understanding of these processes. Finally, examining how national culture and institutional pressures affect these dynamics would further enhance our comprehension of SDG governance in different contexts.

Acknowledgements: The author gratefully acknowledges the financial support from the General Directorate of Scientific Research & Innovation, Dar Al Uloom University, through the Research Projects Funding Program.

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