

Article

Environmental, Social and Governance (ESG) Performance and Financial Outcomes in the Middle East and Africa (MEA) Region: A Novel Decision Support Framework

Muhammad Ikram * and Khaoula Degga

School of Business Administration, Al Akhawayn University in Ifrane, Avenue Hassan II, P.O. Box 104, Ifrane 53000, Morocco; deggakhaoula@gmail.com

* Correspondence: i.muhammad@aui.ma

Abstract

The global landscape of sustainability challenges has become increasingly complex, characterized by varying regulatory frameworks and market maturity across different nations. The financial significance of environmental, social, and governance (ESG) factors is influenced by industry and firm-specific attributes. Therefore, this study employs an integrated decision support framework that combines grey relational analysis (GRA) models including Deng's GRA, absolute GRA, and a second synthetic grey relational analysis (SSGRA) with firm-level panel regressions to compare ESG and financial performance linkages across 11 Middle East and Africa (MEA) countries and industrial sectors. Furthermore, the study utilized a sensitivity analysis to check the robustness of SSGRG. Results indicate considerable variability in the relationships between ESG and financial performance across the region. The economies of the Gulf Cooperation Council (GCC) showed the most robust positive relationship between ESG factors and financial performance based on SSGRG, with Kuwait (0.82), Qatar (0.81), and Saudi Arabia (0.80) predominantly influenced by the social and governance dimensions. Conversely, a weak correlation was demonstrated in Egypt (0.54), Nigeria (0.53), and Kenya (0.56). Moreover, financials, communication services, and materials sectors exhibit the greatest integration of ESG factors into financial performance, with composite SSGRG values ranging from 0.75 to 0.78. In contrast, the information technology and energy sectors demonstrate weak association, with composite SSGRG values falling below 0.60. Furthermore, a conservative maximin analysis reveals that corporate governance in Kenya and environmental performance in Oman are identified as the weakest relationship at the country level, while governance in the information technology and energy sectors, environmental management in real estate, and social performance in consumer discretionary sectors are highlighted as weak connections. This study addresses a gap in the literature by developing a novel decision-support framework, providing fresh empirical evidence from emerging markets, and offering theoretical insights into the influence of stakeholder and institutional factors on ESG value creation. This study provides implications for investors, corporate managers, and policymakers on sustainable finance in emerging markets and presents a decision-making framework that emphasizes ESG initiatives to enhance financial performance.

Academic Editors: Cristina Raluca Gh. Popescu and Camelia Delcea

Received: 21 February 2026

Revised: 27 March 2026

Accepted: 7 April 2026

Published: 9 April 2026

Copyright: © 2026 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

Keywords: ESG; final performance; Middle East and Africa; sustainable development; sustainable finance; emerging markets

1. Introduction

In recent decades, climate change, environmental degradation, social inequalities, and ineffective governance have exposed the limitations of development models that prioritize short-term financial gains over long-term sustainability [1]. Investors, regulators, and civil society increasingly recognize that firms operate within broader ecological and social systems, and that unsustainable practices pose material risks. In response, environmental, social and governance (ESG) considerations have emerged as a central framework for assessing corporate behaviour and performance [2]. ESG metrics translate complex sustainability issues into measurable indicators that guide investment decisions, regulatory oversight, and corporate strategy, offering a pathway toward more resilient and responsible business conduct [3].

This global shift has been reinforced by the rise of sustainable finance instruments and regulatory initiatives. Internationally, asset managers and institutional investors have integrated ESG criteria into portfolio construction, stewardship, and risk management, reflecting both ethical imperatives and the view that unmanaged ESG risks can undermine long-run returns [4]. Stock exchanges and financial regulators have introduced listing rules, disclosure requirements, and taxonomy frameworks aimed at channelling capital toward sustainable economic activities. These developments suggest that ESG considerations are no longer peripheral but increasingly central to financial analysis and corporate valuation. Nevertheless, the extent to which ESG commitments translate into tangible economic benefits remains the subject of ongoing debate in emerging and developing markets where data constraints, institutional gaps, and transitional costs are more pronounced [5]. The Middle East and Africa (MEA) region stands at the forefront of the tension between global sustainability imperatives and national development needs. Several MEA countries face high exposure to physical climate risks while simultaneously relying on carbon-intensive sectors such as energy, materials, and utilities for employment, export revenue, and fiscal stability [6,7]. In recent years, several countries have launched ambitious reform agendas, such as the Vision 2030 strategies in the Gulf and various green growth initiatives in African economies that seek to integrate sustainability, economic diversification, and private-sector development [8]. Regional financial markets have also begun to respond: major stock exchanges have introduced ESG indices and reporting guidelines, and banks are issuing green bonds and sustainability-linked loans [9,10]. In this regard, ESG is increasingly viewed in MEA as both a risk management tool and a lever for attracting investment and supporting long-term economic resilience [11].

Despite these positive developments, firm-level ESG performance in MEA remains highly heterogeneous and, in most countries, largely voluntary. Cross-country benchmarking indicates that MEA listed companies often lag behind their counterparts in advanced economies in overall ESG scores, transparency of disclosures, and adoption of third-party assurance [12]. Sectoral disparities are pronounced such as energy and materials firms facing heightened environmental scrutiny and pressure to decarbonize; banks must strengthen governance and manage climate-related credit risks; and consumer-oriented sectors are increasingly expected to address labour standards and product responsibility [13]. These differences raise an important empirical question: when firms in MEA improve their ESG profiles, do they experience enhanced financial performance, and how does this relationship depend on sector and country context?

The current empirical literature offers valuable yet insufficient insights into these questions. An increasing body of research on emerging markets indicates that higher ESG ratings correlate with enhanced financial performance metrics, including Return on Assets (ROA) and Return on Equity (ROE) [11,14,15]. Prior studies have analyzed firms across various countries and sectors without clearly distinguishing between country-specific and sector-specific patterns, which may obscure the heterogeneity essential for

informed policy and managerial decisions [16]. Conventional econometric approaches generally presume the availability of long, balanced panel datasets and well-behaved error distributions. These conditions are frequently ignored in MENA ESG research, where ESG data coverage has only recently emerged, resulting in unbalanced panels and prominent missing observations [17]. The methodological challenges hinder the ability to derive generalizable conclusions regarding ESG and financial performance in the region.

This study has two primary objectives. This study investigates the correlation between firms' ESG performance, as assessed through their environmental (E), social (S), and governance (G) pillars, along with composite ESG scores, and various financial outcomes for publicly traded companies across diverse countries and industries in the MEA region from 2015 to 2024. The evaluation of financial performance incorporates various profitability metrics, including ROE, ROA, net income, total assets, and market capitalization. This approach provides a thorough understanding of the relationship between ESG factors and both internal performance and external investor assessment. This study systematically compares the relationship between ESG and financial performance across various sectors and national contexts, identifying the configurations of countries and sectors that demonstrate the strongest associations with financial success, as well as those where such associations are weaker or absent. This approach seeks to identify the areas in which ESG initiatives produce significant financial returns and those where they currently do not, thereby emphasizing the contextual factors that may enhance or hinder the relationship between ESG efforts and financial performance.

This study presents a comprehensive framework for analyzing the comparative and granular aspects of the ESG–financial performance relationship in the MEA region. This research distinguishes itself from previous studies that typically concentrate on a single country or consider the region as homogeneous by simultaneously examining cross-country and cross-sector variations within a cohesive analytical framework. This study ranks the strength of ESG scores and financial performance relationships by individual ESG pillar, sector, and country, thereby providing specific insights into which ESG dimensions are most significant for firms across different industries and country contexts and their respective locations. This method produces a comprehensive empirical representation of the interconnections between ESG and finance in the MEA region, offering decision-makers nuanced, context-specific insights to guide targeted policy formulation, regulatory emphasis, and sector-specific investment approaches.

The study period (2015–2024) coincides with several major global and regional developments that have shaped the broader context of ESG and financial performance, including oil-price volatility, the COVID-19 shock, the post-pandemic recovery phase, and the global expansion of ESG-related disclosure and regulatory expectations. These developments are particularly relevant in the MEA, where the pace of institutional adaptation, market maturity, and sectoral exposure differs substantially across countries.

The theoretical foundation of this study is grounded in stakeholder theory and institutional theory. Stakeholder theory suggests that firms can strengthen long-term performance by responding effectively to the expectations of key stakeholders, including investors, employees, customers, communities, and regulators. In this respect, ESG engagement reflects a firm's commitment to broader social and economic responsibilities, which may enhance legitimacy, trust, and reputational standing, thereby improving financial outcomes [18]. Institutional theory complements this perspective by emphasizing that firm behaviour is shaped by the regulatory, normative, and governance conditions of the environment in which it operates [19]. Accordingly, the financial relevance of ESG is expected to vary across contexts rather than remain uniform. While prior studies in other regions such as Europe and Turkey [20]—MENAT banking sector El Khoury et al. [21] have documented mixed or positive ESG and financial links—our study offers a novel

perspective by examining these relationships across multiple countries and industries in MEA simultaneously. Moreover, Caldeira and Pereira [22] suggested that categorizing ports into distinct grades based on their ESG scores can provide a useful foundation for guiding responsible investment decisions in port operations, particularly within the American market. The findings reveal that ESG's financial relevance is highly contingent on regional and sectoral conditions, a point that advances theory beyond general statements of ESG benefits.

This study extends the ESG and financial performance literature by providing a context-sensitive analysis of the MEA region, where substantial cross-country and cross-sector differences exist in institutional development, sustainability regulation, and stakeholder pressure. By examining multiple countries and sectors simultaneously, this study shows that the ESG and financial performance nexus is institutionally contingent. Stronger associations in some contexts may reflect more supportive institutional environments and stronger stakeholder alignment, whereas weaker associations in other settings may indicate less mature ESG ecosystems and weaker institutional support.

Our study's contribution is fourfold. First, we offer a methodological innovation by integrating grey relational analysis with conventional panel regressions, enabling robust multi-criteria comparison of ESG and financial performance connection. The integrated GRA addresses the data limitations and heterogeneity present in MEA ESG datasets. GRA is well-suited for the analysis of complex systems that exhibit incomplete, uncertain, or small-sample data, allowing for the evaluation of association strength without the stringent parametric assumptions typical of conventional regression methods. The proposed framework integrates Deng's GRA, absolute GRA, and a second synthetic grey relational analysis (SSGRG) measure, effectively capturing both the association and influence of the relationship between ESG indicators and financial performance across various firms, sectors, and countries. Second, we utilize a conservative maximin decision method to determine the country–sector combinations in which ESG factors have the most significant association with financial outcomes. This approach offers a reliable comparative assessment in scenarios where traditional regression-based methods may fail to provide dependable insights. Third, we provide novel empirical evidence from the MEA region, analyzing multiple countries and sectors simultaneously, an approach that has not been previously applied in this context. Fourth, we advance theory by applying stakeholder and institutional perspectives to interpret cross-country and cross-sector differences in ESG effectiveness. These contributions fill a gap in the literature on global ESG and financial performance relationships and deliver actionable insights for managers and policymakers in emerging economies.

This paper is organized as follows. Section 2 provides a literature review on ESG and financial performance, focusing on findings from MEA economies, the sectoral variability of ESG associations, and methodological approaches pertinent to data-constrained environments. Section 3 establishes the data and variables while outlining the research methodology, which encompasses the application of Deng's GRA, the absolute GRA, the SSGRA, and the maximin decision model. Section 4 presents the empirical findings regarding the relationships between ESG and financial performance across different countries and sectors in the MEA region. Section 5 analyzes these results in relation to existing evidence and outlines implications for investors, firms, and policymakers. The conclusion along with limitations and proposed directions for future research are presented in the last section of the paper.

2. Literature Review

The relationship between environmental, social, and governance performance and financial outcomes for firms has emerged as a pivotal subject in sustainable finance, with

growing demands from investors and regulators for demonstrable evidence that ESG commitments generate economic value. Stakeholder theory posits that companies generating value for employees, customers, communities, and regulators establish more sustainable competitive advantages, ultimately improving long-term profitability and resilience [23]. Moreover, ESG indicators offer a systematic approach to assess how companies handle non-financial risks and opportunities that may influence cash flows, risk profiles, and firm valuation. Resource-based views indicate that proactive ESG practices can foster intangible assets, including brand reputation and social capital, which enhance a firm's financial performance by reducing risks and creating new opportunities [24].

The ESG framework consists of three interconnected pillars. The environmental pillar assesses a firm's performance regarding carbon emissions, resource efficiency, pollution control, and environmental management elements particularly significant for carbon-intensive industries and organizations facing climate-related and resource scarcity risks [25]. The social pillar encompasses labour relations, workforce diversity, health and safety, community engagement, and product responsibility, reflecting the management of human capital and societal relationships by companies [26]. The governance pillar includes corporate governance practices such as board structure and diversity, ownership and control, transparency and disclosure, shareholder rights, and anti-corruption mechanisms. Governance establishes the institutional framework that dictates the effectiveness of oversight and implementation of environmental and social initiatives [27]. Effective governance mechanisms can guarantee that environmental and social commitments are credible and consistent with shareholder interests [28].

The theoretical underpinning of our study is rooted in stakeholder theory and institutional theory. The stakeholder theory by Freeman [29] argued that firms creating value for a broad set of stakeholders, such as customers, employees, communities, investors, and regulators, are more likely to achieve superior long-term performance. By engaging in ESG initiatives, firms respond to stakeholder expectations, strengthen legitimacy and trust, and build reputational capital that may be associated with improved financial outcomes. This view is consistent with empirical evidence showing that companies committed to both social responsibilities and economic objectives often outperform those that neglect these dimensions. Institutional theory complements this perspective by emphasizing that corporate behaviour is shaped by the regulatory, normative, and governance environment in which firms operate. In this sense, the effectiveness and financial relevance of ESG practices depend not only on internal commitment, but also on the broader institutional conditions that encourage, reward, or constrain responsible business conduct [30]. Integrating stakeholder theory and institutional theory therefore provides a robust explanation for why effective ESG performance is expected to be positively associated with firm performance, while also recognizing that this relationship may vary across institutional contexts.

Prior research from emerging markets indicates that the direction and strength of the relationship between ESG factors and financial performance are significantly influenced by contextual factors. Factors such as firm size, industry sector, institutional quality, and the regulatory environment can affect the financial benefits of ESG [31]. The concept of ESG materiality indicates that only certain environmental or social issues hold financial relevance within specific industry or country contexts [32]. Moreover, the quality of governance serves as a more significant determinant of bank performance, while environmental performance holds greater relevance in the manufacturing sector [31,33]. Therefore, a thorough evaluation of the linkages between ESG and financial performance must consider sector-specific attributes and country-level factors, rather than presuming uniform influence across all companies.

The banking sector in the MEA region gained significant focus in ESG research due to its dual role as corporate entities possessing distinct ESG profiles and as financial intermediaries that allocate capital to various businesses. Banks face increasing regulatory and stakeholder examination concerning sustainability practices. Recent evidence from the Gulf Cooperation Council (GCC) countries demonstrates a bidirectional relationship between ESG performance and bank financial performance. A higher ESG score correlates with improved profitability and stability, while robust financial performance facilitates increased ESG investment [34]. However, specific frictions, such as financing constraints or the costs associated with ESG compliance, may diminish this relationship in practice [35].

Moreover, recent research indicates that ESG engagement enhances the stability of banks and leads to improved risk management outcomes. A study on MENA banks indicates that increased ESG engagement is associated with lower credit risk and provides a safeguard for profitability in relation to non-performing loans [36]. An examination of 159 banks in 42 countries, including emerging economies, reveals that the national sustainability infrastructure comprising the robustness of regulations and investor protections affects the relationship between ESG and profitability [4]. The sustainability frameworks are associated with more favourable outcomes [36]. The findings indicate that bank-level ESG strategies in the MEA region should correspond with the institutional maturity of each country. In contexts characterized by robust governance and sustainability support, the benefits of ESG are more pronounced, while in less favourable environments, the relationship may be less evident or postponed.

Recent studies within the MENAT (Middle East, North Africa, and Turkey) region indicate that ESG performance positively impacts bank profitability and stability, with the environmental and governance pillars demonstrating the most significant influence on these outcomes [20,37]. Governance quality, indicated by factors such as board independence and risk oversight, demonstrates a positive correlation with bank stability measures, including Z-scores, in GCC banks [38]. Furthermore, banks that correlate executive compensation with ESG objectives tend to improve their ESG ratings over time, thereby reinforcing the relationship between ESG performance and both financial return on assets (ROA) and market valuation metrics [39]. This suggests that internal governance mechanisms, such as incentive structures and board oversight, can enhance the financial advantages of pursuing ESG objectives.

Additionally, the unique circumstances of Islamic banks functioning in the region warrant attention. Islamic financial institutions prioritize social justice, ethical conduct, and governance, particularly in terms of Sharia compliance, resulting in a unique ESG profile. Empirical evidence from GCC Islamic banks demonstrates that social and governance dimensions are significant in elucidating their financial performance, reflecting regulatory requirements and stakeholder expectations within the Islamic finance framework [40]. Banks, whether conventional or Islamic, that encounter negative ESG events, such as significant environmental incidents or governance scandals, frequently experience a decline in franchise value and are subjected to elevated risk premiums. This highlights the importance for banks to monitor ESG-related controversies and concentrate on material ESG issues, as immaterial ESG activities are less likely to produce financial benefits and may divert or misallocate resources [41].

Country-level analyses within MENA markets demonstrate significant variability in the relationship between ESG and financial performance, highlighting the impact of local context. Being Moroccan listed indicates a positive correlation between higher overall ESG scores and financial metrics such as ROE, ROA, and net profit margin, with governance identified as the most significant factor influencing these financial outcomes [42]. This finding corresponds with Morocco's recent initiatives in renewable energy and green

finance, potentially fostering advantageous market conditions for firms demonstrating strong governance and sustainability practices. In Egypt, analysis of panel data from publicly listed firms reveals that the social and governance dimensions exhibit a more significant positive correlation with financial performance compared to the environmental dimension, particularly at this stage of market development [43]. An analysis of 173 listed companies in Jordan reveals a positive correlation between the quality of ESG disclosure and market valuation (Tobin's Q). This highlights the significance of transparent sustainability reporting in transforming ESG initiatives into enhanced investor confidence and increased firm value [44].

Prior studies highlight industry-specific cases of ESG adding financial value. In the food industry, stronger sustainability reporting has been linked to enhanced financial performance [45]. Similarly, in banking, key ESG factors, especially governance and social responsibility, have been shown to improve Islamic banks' profitability in GCC countries [13]. These studies illustrate that, at an industrial level, effective ESG initiatives such as robust governance frameworks or improved social policies contribute to better financial outcomes. By incorporating such cases, our review underscores that positive ESG and performance links are documented in specific sectors, reinforcing the practical relevance of our investigation in the MEA context.

Research on manufacturing and service firms in various African markets indicates that a comprehensive array of sustainability practices, encompassing environmental, social, and economic dimensions, is positively correlated with profitability and value creation [46]. In South Africa, enhanced sustainability reporting correlates with improved market metrics, underscoring the significance of ESG performance and reliable disclosure in realizing financial advantages [46]. In the MEA region, financial institutions, including banks and insurance companies, generally outperform non-financial firms in sustainability reporting and ESG integration, likely attributable to heightened regulatory pressure and increased international exposure [12].

H1: *Firms with higher overall ESG performance achieve better financial outcomes than firms with lower ESG performance.*

H2: *Firms' environmental (E) performance is positively associated with its financial performance.*

H3: *Firms' social (S) performance is positively associated with its financial performance.*

H4: *Firms' governance (G) performance is positively associated with its financial performance.*

The hypothesis H1 reflects the expectation that comprehensive engagement in ESG (covering environmental, social, and governance aspects) contributes positively to firm performance through improved stakeholder relations and resource advantages. Companies that excel in environmental sustainability H2, such as reducing emissions and improving resource efficiency, exhibit lower operational costs and regulatory risks while enhancing brand value, leading to improved returns [47]. Strong social performance H3 such as fair labour practices, community investment, and customer welfare increase employee morale and customer loyalty, which in turn can drive profitability [48]. High governance quality H4 such as transparent reporting, shareholder rights, and board effectiveness reduces agency costs and builds investor trust, contributing to better financial results. Each of these hypotheses posits that excelling in the respective ESG dimension yields financial benefits [49]. We anticipate all three pillars (E, S, and G) to have positive effects, though their relative influence may vary.

The proposed analytical framework of this study is based on the prior discussed theories and findings that ESG can generate financial value through stakeholder

relationships, risk mitigation, and resource advantages, although these effects differ significantly depending on the context. Prior research in emerging markets reveals that the influence of ESG on financial performance is inconsistent; it is generally more pronounced in contexts with advanced sustainability infrastructures and institutional backing. This highlights the need for a methodology that accommodates contextual variability instead of presuming uniform effects.

To address these gaps, this study applies GRA to a multi-country, multi-sector MEA dataset. GRA is an analytical method derived from grey systems theory, designed for multi-criteria analysis in contexts characterized by limited or incomplete information. In contrast to traditional regression methods that seek to isolate the association of ESG with financial performance through averaging across various contexts, GRA assesses the extent of association and influence between two series such as ESG score series and a financial performance series by computing grey relational grades. This method presents two significant advantages in our context: (1) it facilitates the comparative ranking of the strength of ESG and financial associations across 11 MEA countries and sectors without the need of a specific functional form or distribution, and (2) it demonstrates robustness to small sample sizes, non-normal data, and missing values, which are commonly encountered in ESG data from emerging markets. Previous applications of GRA in related domains, such as environmental management and forecasting, illustrate its effectiveness in extracting insights from complex datasets [50–52]. Utilizing GRA, we seek to identify complex patterns regarding the significance of specific pillars for various outcomes in distinct contexts that may be missed by conventional approaches.

The literature indicates that ESG can improve financial performance and reduce risks when conditions are favourable; however, these outcomes vary across the MEA region owing to disparities in governance, disclosure practices, industry dynamics, and institutional contexts. This study employs flexible, comparative GRA methods to systematically map the ESG financial performance landscape of MEA with precision.

3. Methodology

This study employs a firm-level panel dataset collected from Bloomberg, encompassing companies listed on stock exchanges across the Middle East and Africa from 2015 to 2024. The sample encompasses 11 MEA countries: Saudi Arabia, Qatar, Kuwait, South Africa, Morocco, United Arab Emirates, Kenya, Nigeria, Jordan, Egypt, and Oman. The countries exhibit a variety of regulatory frameworks and stages of market development. The dataset exhibits an imbalance, as firms enter or exit the sample contingent upon the availability of ESG data, which mirrors the progressive growth of ESG reporting in the region over the past decade. The sample comprises firms from 11 major industries, including financials, energy, materials, utilities, industrials, consumer staples, consumer discretionary, communication services, information technology, real estate, and healthcare. This extensive coverage enables the observation of the evolution of ESG reporting and performance across various contexts in MEA, facilitating the comparison of ESG performance linkages. For each firm-year observation, we gather both ESG metrics and financial metrics. The primary independent variable is the overall ESG score for each firm per year. E, S, and G refer to the scores associated with the environmental, social, and governance pillars. Table 1 presents the details of ESG and financial indicators along with a description, measurement units and data source.

Table 1. Summary of ESG and financial performance indicators.

Variables (Codes)	Description of Variables	Measurement Unit	Data Sources
E	(Environmental Sustainability Score): The Bloomberg Environmental Pillar Score assesses a firm's performance in various aspects of environmental risk management, including carbon emissions reduction, energy efficiency, resource utilization, waste management, water usage, pollution prevention, and the implementation of environmental policies.	Score (0–10)	[53]
S	(Social Sustainability Score): The Bloomberg Social Pillar Score assesses firm performance across various dimensions, including human capital development, workforce diversity and inclusion, employee health and safety, labour practices, stakeholder relations, community engagement, product responsibility, and social impact.	Score (0–10)	
G	(Governance Score): The Bloomberg Governance Pillar Score assesses the quality of corporate governance by evaluating board structure and independence, the effectiveness of audit committees, alignment of executive compensation, transparency and disclosure practices, protection of shareholder rights, and anti-corruption measures.	Score (0–10)	
ESG	(Composite ESG Score): The Bloomberg overall ESG performance score integrates the environmental (E), social (S), and governance (G) dimensions into a weighted aggregate measure of sustainability performance.	Score (0–10)	
ROE	(Return on Equity): Net income divided by the average total equity for the year, expressed as a percentage. This metric indicates the efficiency with which a company uses shareholders' equity to generate profit.	Percentage (%)	
ROA	(Return on Assets): Firm profitability is assessed by dividing net income by total assets, reflecting the efficiency of asset utilization in generating earnings.	Percentage (%)	
NETINC	(Net Income): The annual net income of a firm, calculated by subtracting all operating expenses, interest, taxes, depreciation, and costs from total revenue, serves as an indicator of absolute profitability performance.	Million USD	
TA	(Total Assets): The total of all current and non-current assets owned and controlled by the firm, as presented in the balance sheet, encompasses cash, inventories, property, equipment, and intangible assets, reflecting the organization's size and resource base.	Million USD	
MCAP	(Market Capitalization): Market capitalization refers to the total market value of a firm's outstanding equity shares, which is calculated by multiplying the current share price by the total number of outstanding shares. This metric reflects both investor valuation and the size of the firm within capital markets.	Million USD	

The ESG metrics employ Bloomberg's proprietary methodology to aggregate diverse indicators, such as carbon emissions, waste recycling, workforce diversity, and board composition, into pillar scores and an overall comprehensive score. The scores are regarded as fixed, without analysis of their sub-components, and the focus is on their correlation with financial outcomes. The dependent variables utilized to assess financial performance and firm value include the following: Return on Equity (ROE) is determined by dividing net income by the average total equity for the year, functioning as an indicator of profitability. Return on Assets (ROA) is determined by dividing net income by average total assets, functioning as a measure of profitability that takes into account the asset base. Net income (NETINC) denotes the net profit post-tax, expressed in millions of U.S. dollars, functioning as a definitive performance indicator. Total assets (TA) denotes the book value of total assets, quantified in millions of U.S. dollars, and acts as an indicator of firm size and operational scale. Market Capitalization (MCAP) denotes the market value of equity, quantified in millions of U.S. dollars, reflecting the firm's valuation as perceived by investors.

These financial metrics provide a comprehensive view, including profitability, operational scale, and market valuation. This approach is significant as improvements in ESG influence multiple performance dimensions; for example, strong ESG practices may reduce risk and consequently impact market value more than short-term accounting profits, or vice versa. Through the analysis of multiple indicators, we reduce the probability of

drawing conclusions that are swayed by a singular metric. The selection of these metrics is informed by prior research on ESG performance in emerging markets [54,55] to ensure comparability.

3.1. Grey Relational Analysis (GRA) Models

Grey relational analysis (GRA) emerged during the early conceptual evolution of grey system theory, which was formalized by Ju-Long [56]. The approach was developed to support inference and decision-making in contexts where observations are limited, system mechanisms are partially understood, or information is incomplete. A practical strength of GRA is that it can deliver meaningful comparative insights even when the sample size is small, which explains its continued adoption across disciplines. In 1985, Deng advanced the framework by introducing the concept of the grey relational grade (GRG), enabling more systematic evaluation of complex systems under data scarcity.

Prior studies emphasize that grey modelling can perform competitively in situations where conventional statistical approaches are constrained by strict assumptions or extensive data requirements. In addition to emphasizing predictive reliability, grey approaches are often valued for preserving the timeliness of information supporting analysis when complete datasets are not available at the moment decisions must be made [57]. Moreover, GRA quantifies association by examining the geometric similarity of sequences: when two series evolve with more comparable shapes, their relationship is interpreted as stronger.

Within the broader family of GRA methods, closeness is typically discussed through multiple perspectives. Absolute GRA captures overall proximity between two sequences, whereas synthetic GRA aims to represent a more comprehensive notion of similarity by combining different relational aspects. Deng's original formulation, however, focuses primarily on local/partial proximity, measuring relational strength through pointwise comparison along the sequences [58].

3.2. Deng's GRA Model

Although a variety of GRA variants have been introduced in the literature, Deng's 1985 specification remains the most widely used reference model and is therefore central to grey-system applications [59]. The model has been implemented in many applied settings because it provides an interpretable way to rank or compare alternatives under uncertainty, while remaining computationally straightforward. Let X_0 and X_1 denote the reference sequence for Deng's grey model prediction.

Step 1. Compute the initial outputs of X_0 and X_i , where $i = 1, 2, \dots, m$ is calculated in the first stage, where:

$$X'_i = X_i/x_i(1) = (x'_i(1), x'_i(2), \dots, x'_i(n)); i = 0, 1, 2, 3, \dots, m \quad (1)$$

Step 2. Calculate the absolute deviation between X'_0 and X'_i and $i = 1, 2, \dots, m$, the reference sequence and each comparative sequence:

$$\Delta i(l) = \|x'_0(l) - x'_i(l)\|, \Delta = (\Delta i(1), \Delta i(2), \dots, \Delta i(n)), i = 1, 2, 3, \dots, m \quad (2)$$

Step 3. Identify the global maximum and minimum deviations:

$$\begin{aligned} M &= \max_i \max_l \Delta_i(l), \\ m &= \min_i \min_l \Delta_i(l) \end{aligned} \quad (1)$$

Step 4. Construct the grey relational (incidence) coefficients using the following expression:

$$\gamma_{0i}(l) = \frac{m + \xi M}{\Delta i(l) + \xi M}; \xi \in (0, 1); l = 1, 2, \dots, n; i = 1, 2, \dots, m \quad (2)$$

Here, ξ is the distinguishing coefficient, commonly set to $\xi = 0.5$ to balance resolution and stability.

Step 5. Obtain the grey incidence degree, also called Deng's grey relational grade, by aggregating coefficients across the sequence:

$$\gamma_{0i} = \frac{1^n}{n_{l=1}} (\gamma_{0i}(L)); i = 1, 2, \dots, m \quad (3)$$

A weighted form can be written by expressing $1/n$ via weights w_l :

$$\gamma_{0i} = \sum L = 1n(\gamma_{0i}(L) \times w_l); i = 1, 2, 3, \dots, m \quad (4)$$

If different factors contribute unequally to the system, weights are specified such that $\sum w_l = 1$. An equal-weight setting implies uniform influence across criteria, whereas unequal weights are frequently employed in applied problems to reflect practical priorities or domain knowledge [60].

3.3. Absolute GRA Model

The absolute degree of grey relational analysis (ADGRA) is commonly presented as a complementary perspective to Deng's degree. While Deng's approach emphasizes relational behaviour through the grey relational coefficients derived from deviations, the absolute formulation is intended to reveal relationships among factors from a more global viewpoint [61]. Both approaches share the same underlying rationale assessing similarity through the closeness of sequence trajectories, yet they differ in how the relationship is operationalized.

To estimate the absolute grey relation between X_0 and X_1 over equivalent time spans, the method proceeds as follows. First, construct the zero-initial value sequences X_0^0 and X_1^0 using an interval-based transformation. Next, compute the transformed series $|s_0|$, $|s_1|$ and $|s_1 - s_0|$ and determine the absolute degree of grey incidence (ε_{01}) across the discrete time pattern X_0 and X_1 . The following expression is used:

$$\varepsilon_{01} = \frac{1 + |s_0| + |s_1|}{1 + |s_0| + |s_1| + |s_1 - s_0|} \quad (5)$$

Deng's GRA model (DGRA) defines the Deng degree of grey incidence (often aligned with GRG) as:

$$\gamma_{0i} = \frac{1^n}{n_{l=1}} (\gamma_{0i}(L) \times w_l); i = 1, 2, 3, \dots, m, \quad (8)$$

or

$$\gamma_{0i} = \frac{1^n}{n_{l=1}} (\gamma_{0i}(L)); i = 1, 2, 3, \dots, m \quad (6)$$

In this representation, $\gamma_{0i}(L)$ denotes the grey relational (incidence) coefficient at a given point (L) . Equation (8) corresponds to a weighted arrangement, whereas Equation (9) reflects the non-weighted case.

The absolute degree of grey relation in ADGRA is defined as:

$$\varepsilon_{01} = (1 + |s_0| + |s_1|) / (1 + |s_0| + |s_1| + |s_0 - s_1|) \quad (7)$$

Let the system behaviour data sequence be written as $X_i = (x_i(1), x_i(2), \dots, x_i(n))$, where the sequence operator and zero-based point operator $n = 3, 2, 1 = L; (1)x_i - c(L)x_i = c(L)X_i$ are applied to obtain the C zero-scale point representation X_iC , which is X_i 's. For exposition, X_iC may be abbreviated as:

$$\begin{aligned} X_i^0 &= (x_i^0(1), x_i^0(2), x_i^0(3) \dots, x_i^0(n)), \\ X_j^0 &= (x_j^0(1), x_j^0(2), x_j^0(3) \dots, x_j^0(n)) \end{aligned} \quad (8)$$

Then,

$$|s_i| = \left| \sum_{l=2}^{n-1} x_i^0(L) + \frac{1}{2} x_i^0(n) \right|,$$

and

$$|s_j| = \left| \sum_{l=2}^{n-1} x_j^0(L) + \frac{1}{2} x_j^0(n) \right|$$

The absolute deviation among $s_i - s_j$ sequences is computed as:

$$|s_i - s_j| = \left| \sum_{l=2}^{n-1} (x_i^0(L) - x_j^0(L)) + \frac{1}{2} (x_i^0(n) - x_j^0(n)) \right| \quad (10)$$

According to Javed et al. (2019) [62], building on these foundations, the second synthetic grey relational analysis (SSDGRA) model is defined as:

$$\rho_{ij} = \theta \varepsilon_{ij} + (1 - \theta) \gamma_{ij}; \theta \in [0,1] \quad (11)$$

Within SSGRG, (ε_{ij}) denotes the absolute degree of grey relation, GRG represents Deng's relational grade, and (γ_{ij}) is the pointwise relational coefficient. The term ρ_{ij} captures the SSGRG, integrating absolute and Deng-type relational information to represent the overall association between two sequence levels.

The SSDGRA model is formulated to inherit the operational advantages of both absolute and Deng-based measures. To position the two components without systematic bias, a balanced setting such as $\theta = 0.5$ is often adopted, although θ may be adjusted when the research context requires emphasizing one aspect of relational structure over the other. The methodological framework applied in this study is presented in Figure 1.

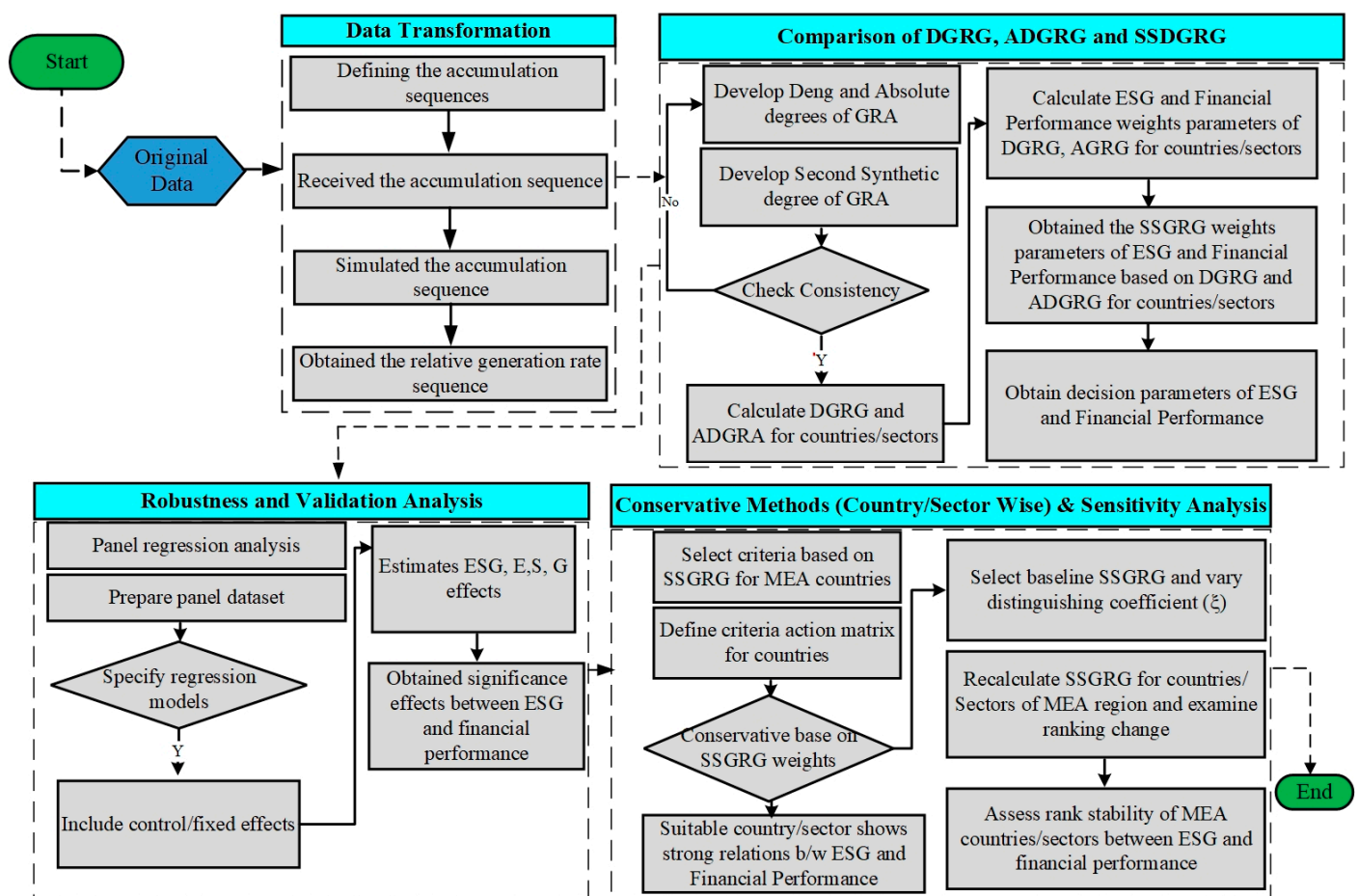


Figure 1. Integrated grey methodological framework operationalized in this study.

Furthermore, the analysis aligns with an underlying relationship of ESG performance characterized by the following form.

$$FP_{j,t} = f(ESG_{j,t}, E_{j,t}, S_{j,t}, G_{j,t}), \quad (12)$$

Let $FP_{j,t}$ represent a financial performance or pricing metric such as ROE, ROA, NETINC, TA, MCAP for firm j in year t . This study employs GRA to determine the ESG components that demonstrate the most significant relational grades with various financial outcomes throughout the sample period, encompassing MEA firms and different time frames. This integrated method utilizes the advantages of GRA in managing multi-criteria, unbalanced, and noisy data, while maintaining a well-established ESG financial performance framework and variable definitions that align with recent empirical research on ESG in emerging regions.

Employing the GRA methodology outlined, we evaluate which ESG component's overall ESG, E, S, and G demonstrate the highest grey relational grades in relation to each financial performance indicator ROE, ROA, NETINC, TA, and MCAP throughout the sample period. A higher SSGRG between governance and ROE indicates a stronger correlation between enhancements in governance scores and improvements in ROE for the firms and contexts analyzed. It is essential to clarify that GRA assesses association rather than causation; a high relational grade indicates that the two series exhibit close movement, but it does not establish that one causes the other. Nonetheless, when integrated with theoretical reasoning and robustness checks, these associations may provide insights that align with causal relationships.

All financial and ESG variables were normalized using min–max scaling to ensure comparability across different units and magnitudes. This normalization prevents any single indicator (e.g., total assets) from unduly dominating the analysis due to scale differences. We then constructed a composite financial performance metric by treating each financial indicator, profitability measures such as ROE/ROA and size measures like TA/MCAP, as a separate criterion within the GRA framework. Equal weighting was applied to each indicator in the absence of a priori theoretical weights, consistent with multi-criteria decision analysis approaches in sustainability research. We acknowledge that profitability and size are distinct dimensions of performance; however, integrating them provides a holistic assessment of a firm's financial standing (internal efficiency and market valuation). We interpret small differences in SSGRG values (0.80 vs. 0.77) as relative rankings rather than large economic effects. In practical terms, a 0.03 difference in relational grade suggests that one context has a slightly stronger ESG–performance association; such a gap is informative for ordering but likely within the margin of economic insignificance. This cautious interpretation aligns with prior findings that ESG benefits may not immediately translate into large financial gains. By clarifying these procedures, we ensure that our method of aggregation is transparent and conceptually sound—the composite metric serves as a decision-support tool to rank associations, while we remain careful not to overstate the economic magnitude of small score differences.

In addition, the sample period spans years characterized by substantial macroeconomic and institutional change. To reduce the risk that the reported associations are driven by common annual shocks, the empirical specification includes year dummies. These fixed effects absorb time-specific influences shared across firms, including broad changes in commodity and energy markets, pandemic-related disruptions, recovery dynamics, and shifts in the global ESG reporting environment. However, the present design does not explicitly estimate period-specific ESG effects. The coefficients should therefore be interpreted as average associations across the full sample period rather than as evidence of temporal regime shifts or event-specific impacts.

This approach leverages GRA's strength in handling multiple criteria and erratic, unbalanced data, while maintaining a familiar framework of analysis. The discourse surrounding results continues to focus on ESG financial performance relationships, identical to traditional studies; however, this discussion is fundamentally based on grey relational grades instead of regression coefficients. Our definitions of variables and overarching expectations are consistent with recent empirical studies on ESG in emerging regions, enabling us to benchmark our findings against theirs despite methodological differences.

We integrate our GRA findings into a decision framework, specifically the conservative maximin analysis outlined in Section 4.4, to identify critical areas. This process involves determining the weakest ESG pillars for each country and sector and assessing which of these present the most significant challenges overall. This addition shifts the analysis from a diagnostic focus on the strength of relationships to a prescriptive approach that identifies areas for improvement to maximize financial benefits.

4. Results

This section outlines the empirical findings regarding ESG and financial performance in the MEA region from 2015 to 2024. The analysis is organized into four sections. Section 4.1 presents the results by country, illustrating the variability in the associations between ESG and financial performance across eleven MEA markets. Section 4.2 presents results categorized by sector, analyzing heterogeneity across eleven industries. Section 4.3 employs the panel regression methods to compare the GRA results with regression results. Section 4.4 consolidates these findings into comparative rankings of countries and sectors regarding the integration of ESG and financial performance, thereby informing policy and investment prioritization. Section 4.5 employs a conservative maximin decision model to pinpoint the most significant ESG bottlenecks at both the country and sector levels, specifically identifying the weakest links where ESG performance is least effectively converting into financial outcomes. Section 4.6 reports the sensitivity analysis and the robustness of SSGRG results. The SSGRG functions as the principal metric in our findings, as it effectively encapsulates both the shape and magnitude of the proximity between ESG and financial performance.

4.1. ESG and Financial Performance in MEA: Country-Wise

Table 2 presents the computed grey relational grades such as Deng's GRG, absolute GRG, and the SSGRG for each ESG component in relation to the composite financial performance across the 11 countries in our sample. In analyzing these results, we concentrate on the SSGRG, which offers a comprehensive assessment of association strength and influence. The primary patterns observed by country are as follows: The GCC countries demonstrate significant environmental and financial linkages, with SSGRG values exceeding 0.70 for the environmental performance. Meanwhile Saudi Arabia, Qatar, and Kuwait exhibit significant correlations between environmental scores and financial performance, with SSGRG values exceeding 0.71. Subsequent to the GCC, South Africa and Morocco exhibit notable environmental linkages, reflecting moderate positive associations. Conversely, nations such as the UAE, Kenya, and Nigeria demonstrate intermediate environmental and financial associations, while Jordan, Egypt, and Oman display weak linkages, as indicated by low SSGRG values for the environmental pillar. This indicates that in the latter group of countries, enhancements in environmental performance have not been consistently acknowledged or manifested in financial results, potentially due to weaker regulatory enforcement or diminished market focus on environmental concerns in those regions.

Moreover, social sustainability shows a similar pattern, as Saudi Arabia, Qatar, and Kuwait consistently lead, exhibiting social sustainability and a financial performance

nexus by obtaining an SSGRG value above 0.77. This suggests a strong correlation between enhanced social performance, such as human capital management and community relations, and improved financial metrics in these nations. The UAE and Jordan exhibit notable social–financial associations, though these are marginally lower than those in the highest tier. South Africa, Kenya, Morocco, and Oman exhibit moderate linkages between social scores and financial performance, indicating some degree of alignment, but even less pronounced. In contrast, Nigeria and Egypt exhibit low rankings in the social pillar, indicating that enhancements in social dimensions, such as labour practices or corporate social responsibility initiatives, have yielded minimal financial benefits. This indicates challenges such as inadequate enforcement of labour standards or diminished consumer and investor pressure regarding social issues in those economies.

The governance and financial relationships are particularly robust in several prominent nations. Qatar excels in the governance pillar, with Kuwait and Saudi Arabia closely following. Higher SSGRG values in these countries indicate that firms exhibiting robust corporate governance are likely to achieve superior financial performance, highlighting the significance attributed to effective governance in these markets. The United Arab Emirates, Morocco, and South Africa demonstrate strong governance linkages, suggesting that enhancements in governance are significantly correlated with financial results. Jordan, Nigeria, Egypt, and Oman hold intermediate standings on the governance pillar, as indicated by their SSGRG values, which are moderate and suggest a fragile yet existing correlation between governance and performance. Kenya exhibits the weakest governance–financial association, as indicated by its governance pillar SSGRG, which ranks lowest among all countries. This situation highlights significant institutional shortcomings: inadequate governance structures within Kenyan firms, coupled with insufficient enforcement of governance codes at the national level, may restrict the financial advantages derived from ESG, thereby constraining the overall impact of ESG initiatives.

The overall ESG score, which combines environmental, social, and governance factors, illustrates the ranking of countries regarding their ESG performance and the financial performance associations. Kuwait exhibits the highest composite ESG and financial performance, establishing it as the leading performer, while Qatar and Saudi Arabia closely follow, indicating a GCC dominance of ESG metrics correlating with financial outcomes. Jordan and the UAE constitute a secondary tier of nations exhibiting moderately robust connections between ESG factors and financial performance. Morocco and South Africa exhibit moderate correlations; the ESG initiatives in these nations produce certain financial advantages, but these are not as pronounced as those observed in the GCC score. Oman, Kenya, Egypt, and Nigeria exhibit weak overall associations between ESG and financial performance, as indicated by low composite SSGRG values. This suggests that ESG practices have not yet been fully integrated into financial outcomes in these markets. Firms in these countries have not yet observed a consistent return from higher ESG scores, likely attributable to underdeveloped ESG ecosystems, limited investor awareness, or dominant macroeconomic influences.

The country-specific findings represent a significant observation: the financial materiality of ESG in the MEA region exhibits considerable geographical variability. Gulf economies characterized by advanced capital markets and established ESG frameworks exhibit the most pronounced positive correlations. In contrast, various African markets demonstrate weaker relationships, suggesting that the mere implementation of ESG initiatives in these regions may not necessarily result in improved financial outcomes under prevailing conditions.

Table 2. ESG individual and combined effect on financial performance (country-wise).

ESG	Countries	Deng GRG	Absolute GRG	SSGRG'
Environmental (E)	Saudi Arabia	0.6882	0.8568	0.7725
	Qatar	0.5978	0.8997	0.7487
	Kuwait	0.6053	0.8221	0.7137
	South Africa	0.6724	0.7332	0.7028
	Morocco	0.6037	0.7963	0.7000
	United Arab Emirates	0.6356	0.8451	0.7406
	Kenya	0.6781	0.6977	0.6879
	Nigeria	0.5646	0.7547	0.6597
	Jordan	0.6763	0.5509	0.6136
	Egypt	0.5475	0.5324	0.5399
	Oman	0.695	0.3035	0.4992
Social (S)	Saudi Arabia	0.7121	0.9334	0.8228
	Qatar	0.6318	0.9449	0.7884
	Kuwait	0.6364	0.9119	0.7742
	South Africa	0.6512	0.7348	0.6930
	Morocco	0.5226	0.6841	0.6034
	United Arab Emirates	0.6456	0.8869	0.7662
	Kenya	0.6721	0.6099	0.6410
	Nigeria	0.5210	0.5354	0.5282
	Jordan	0.6450	0.8382	0.7416
	Egypt	0.5835	0.5296	0.5566
	Oman	0.6681	0.5841	0.6261
Governance (G)	Saudi Arabia	0.5813	0.8342	0.7077
	Qatar	0.6457	0.952	0.7989
	Kuwait	0.6459	0.8321	0.739
	South Africa	0.6301	0.7319	0.681
	Morocco	0.6336	0.7637	0.6987
	United Arab Emirates	0.5854	0.823	0.7042
	Kenya	0.5319	0.4585	0.4952
	Nigeria	0.6609	0.5228	0.5918
	Jordan	0.6168	0.6815	0.6492
	Egypt	0.603	0.531	0.567
	Oman	0.71	0.4197	0.5648
Composite Environmental, Social and Governance (ESG)	Saudi Arabia	0.7045	0.8967	0.8006
	Qatar	0.6798	0.9471	0.8135
	Kuwait	0.7109	0.9275	0.8192
	South Africa	0.6577	0.7394	0.6985
	Morocco	0.6102	0.796	0.7031
	United Arab Emirates	0.6506	0.8968	0.7737
	Kenya	0.5335	0.5923	0.5629
	Nigeria	0.5134	0.538	0.5257
	Jordan	0.7181	0.8625	0.7903
	Egypt	0.5646	0.5303	0.5475
	Oman	0.6624	0.5931	0.6278

4.2. ESG and Financial Performance in MEA: Sector-Wise

Table 3 indicates comparable grey relational outcomes derived from Deng GRG, absolute GRG, and SSGRG for each ESG pillar across the eleven sectors examined. We

analyzed the correlation between the ESG scores of firms within each sector and their financial performance. The primary results categorized by sector are as follows.

The financial sector, including banking, insurance, and other financial services, demonstrates the most robust integration of ESG factors into financial performance. The financial sector exhibits the highest SSGRG values across all three pillars and the composite score, typically ranging from 0.75 to 0.80. This suggests that in the MEA financial sector, firms with superior ESG scores are likely to achieve improved financial outcomes, aligning with the extensive ESG emphasis and regulatory scrutiny in banking highlighted in the existing literature. Subsequently, within the financial sector, the Communication Services sector, which includes telecommunications and media, and the Materials sector, encompassing mining, metals, chemicals, and construction materials, represent the next strongest sectors. Both sectors demonstrate elevated SSGRGs, typically ranging from 0.74 to 0.78 in the composite ESG–performance linkage. This indicates that ESG factors, such as customer privacy and data security in telecommunications or environmental management in materials, significantly influence financial performance within these industries.

Utilities, Industrials, and Consumer Staples constitute a middle tier regarding ESG and financial associations. The sectors exhibit moderate SSGRG values, ranging from 0.62 to 0.67 for composite ESG. This indicates a significant yet not predominant influence of ESG performance in the utilities sector (electricity and water). Environmental and social factors are relevant to financial outcomes to a degree, influenced by regulatory compliance and public scrutiny, but their impact is less pronounced compared to leading sectors. Industrial sectors, including manufacturing, transportation, and consumer staples such as food, beverages, and household goods, exhibit moderate alignment. Firms with higher ESG ratings tend to perform somewhat better financially; however, the correlation is not strong. This may be attributed to the nascent stage of ESG adoption in these sectors or the overshadowing influence of other factors, such as commodity prices for industrials and consumer prices for staples, on ESG considerations.

The energy, healthcare, consumer discretionary, real estate, and information technology sectors exhibit a diminished influence of ESG factors on financial performance. Information technology consistently ranks lowest, exhibiting the lowest SSGRG values across all pillars. The composite ESG and financial performance association based on SSGRG for the IT sector obtained 0.54, which is significantly lower than that of any other sector. This indicates that, at present, ESG performance in the tech sector of MEA is only weakly correlated with financial performance. Numerous IT firms in the region have been startups or privately held until recently, exhibiting limited ESG reporting and minimal investor pressure, which may account for this weak association. The real estate and consumer discretionary sectors, encompassing e-retail, leisure, and automotive, exhibit low composite SSGRGs values ranging from 0.57 to 0.59. This suggests that these industries have not yet integrated ESG principles into their business models in a manner that significantly influences financial performance. The energy sector (oil and gas) exhibits a composite SSGRG below 0.60, while the healthcare sector falls within a comparable range of 0.59–0.60, categorizing both as part of the weaker group. In the energy sector, it is important to recognize that environmental issues may be financially material. However, the moderate SSGRG indicates that, thus far, the financial performance of energy firms in the MEA region continues to be predominantly influenced by traditional factors, including oil prices, production volumes, and state ownership, rather than ESG performance.

The results offer enhanced evidence for H1, suggesting that companies with superior overall ESG performance are likely to demonstrate more positive financial results. The evidence provides inconsistent support for the individual pillars. The environmental dimension offers substantial evidence for H2, indicating a positive correlation with financial performance. The social dimension provides moderate support for H3, especially in

contexts where stakeholder-related practices are more closely aligned with financial outcomes. The governance dimension offers moderate-to-strong support for H4, as governance-related indicators demonstrate a relatively closer association with firm financial performance across various country and sector contexts. The findings indicate that the relationship between ESG and financial performance is not consistent across different dimensions but rather varies depending on the specific pillar being examined.

The sector analysis reveals that ESG factors are most financially significant in knowledge- and capital-intensive sectors, including finance and telecommunications, while their materiality is comparatively lower in sectors such as technology, real estate, and specific consumer industries. The disparity is significant: the composite SSGRG value for the financial sector was recorded at 0.78, markedly surpassing the IT sector's value of 0.54. This disparity underscores the inconsistent integration of ESG principles within business practices across various industries. The analysis indicates that sectors exhibiting low alignment between ESG and financial performance, such as IT and real estate, may possess untapped potential should ESG factors gain prominence in the future. Conversely, sectors with high alignment are likely already benefiting from sustainability investments.

Table 3. ESG individual and combined effect on financial performance (sector-wise).

ESG	Sectors	Deng GRG	Absolute GRG	SSGRG
Environmental (E)	Financials	0.6560	0.9067	0.7814
	Communication Services	0.7432	0.7780	0.7606
	Materials	0.6592	0.8266	0.7429
	Utilities	0.5669	0.7677	0.6673
	Industrials	0.6017	0.7230	0.6623
	Consumer Staples	0.7147	0.5314	0.6230
	Energy	0.6333	0.5643	0.5988
	Health Care	0.5320	0.6532	0.5926
	Consumer Discretionary	0.5720	0.6074	0.5897
	Real Estate	0.6110	0.5423	0.5767
	Information Technology	0.5530	0.5300	0.5415
Social (S)	Financials	0.6321	0.9362	0.7842
	Communication Services	0.7772	0.7869	0.7821
	Materials	0.5563	0.7758	0.6661
	Utilities	0.5508	0.7867	0.6687
	Industrials	0.5584	0.6984	0.6284
	Consumer Staples	0.6683	0.5315	0.5999
	Energy	0.5404	0.5935	0.5670
	Health Care	0.6847	0.7595	0.7221
	Consumer Discretionary	0.5763	0.5322	0.5542
	Real Estate	0.6306	0.5324	0.5815
	Information Technology	0.5213	0.5835	0.5524
Governance (G)	Financials	0.6327	0.9171	0.7749
	Communication Services	0.7480	0.7701	0.7590
	Materials	0.7018	0.7186	0.7102
	Utilities	0.6367	0.7315	0.6841
	Industrials	0.5675	0.7414	0.6544
	Consumer Staples	0.6732	0.5354	0.6043
	Energy	0.7100	0.5648	0.6374
	Health Care	0.5365	0.6269	0.5817
	Consumer Discretionary	0.6308	0.5987	0.6148
	Real Estate	0.6488	0.5381	0.5935

Composite Environmental, Social and Governance (ESG)	Information Technology	0.5671	0.4641	0.5156
	Financials	0.6706	0.9331	0.8019
	Communication Services	0.7482	0.7763	0.7623
	Materials	0.6757	0.8155	0.7456
	Utilities	0.5471	0.7662	0.6567
	Industrials	0.596	0.729	0.6625
	Consumer Staples	0.7273	0.5354	0.6314
	Energy	0.6022	0.5678	0.585
	Health Care	0.5467	0.6596	0.6032
	Consumer Discretionary	0.6624	0.6108	0.6366
	Real Estate	0.6887	0.537	0.6128
	Information Technology	0.6135	0.4956	0.5546

4.3. Panel Regression Results

This study also employed the panel regression methods to compare the GRA results with regression results. Tables 4 and 5 reports coefficients with robust standard errors in parentheses for four models, each including one ESG dimension (ESG, Environmental, Social, or Governance score) and controls (firm size, country, industry, and year fixed effects). Country, industry, and year dummies are included in all models.

Table 4. Panel regression analysis (dependent variable: ROA).

Variable	Model 1 (ESG)	Model 2 (Env.)	Model 3 (Soc.)	Model 4 (Gov.)
ESG Score	1.725 + (0.897)			
Environmental Score		1.196 ** (0.416)		
Social Score			0.406 (0.325)	
Governance Score				−0.002 (1.012)
Firm size (log)	−0.827 ** (0.273)	−0.827 ** (0.273)	−0.827 ** (0.273)	−0.827 ** (0.273)
Country dummies	included	included	included	included
Industry dummies	included	included	included	included
Year dummies	included	included	included	included
Constant	10.192 ** (2.176)	9.613 * (3.399)	10.093 ** (2.728)	10.192 ** (2.176)
Observations	1073	1073	1073	1073
Groups	110	110	110	110
R-sq overall	0.14	0.15	0.13	0.12

$p < 0.1$ (+); $p < 0.05$ (*); $p < 0.01$ (**).

Table 4 shows that the higher ESG-related scores tend to be associated with better profitability. In particular, the environmental score is positive and highly significant: a one-point increase in the environmental score raises ROA by about 1.20 percentage points ($p < 0.01$). The aggregate ESG score also has a positive coefficient (about 1.73) that is marginally significant ($p \approx 0.05$). Social and governance scores have no significant effect on ROA in our models. By contrast, larger firm size (log-assets) has a negative association with ROA (coefficient -0.827 , $p < 0.01$), suggesting diminishing returns in larger firms. These findings broadly align with prior studies: Pulino et al. [63] reported that both overall ESG and environmental performance positively influence firm profitability. Our results similarly indicate that firms with better environmental and ESG metrics correlated with higher returns on assets, holding size and fixed effects constant (year, country, and sector dummies are included as controls).

The economic magnitudes in Table 4 are notable. Model 2 shows that a one-point rise in the environmental score corresponds to a ~ 1.20 percentage-point gain in ROA (standard error 0.416). This result is consistent across related metrics: we also find that

environmental and ESG scores significantly boost ROE and net income. In our regressions, only the governance score is systematically insignificant, which may reflect that governance reforms affect performance with longer lags. Table 4 suggests that environmental and combined ESG strengths contribute positively to short-term profitability, echoing the literature that links sustainability efforts to financial performance

Table 5. Panel regression analysis (dependent variable: total assets in millions).

Variable	Model 1 (ESG)	Model 2 (Env.)	Model 3 (Soc.)	Model 4 (Gov.)
ESG Score	6888.96 *** (1411.75)			
Environmental Score		3163.69 ** (1110.08)		
Social Score			2865.21 *** (646.17)	
Governance Score				22.47 (5933.68)
Firm size (log)	29,615.65 *** (1492.47)	29,615.65 *** (1492.47)	29,615.65 *** (1492.47)	29,615.65 *** (1492.47)
Country dummies	included	included	included	included
Industry dummies	included	included	included	included
Year dummies	included	included	included	included
Constant	−263,208.41 *** (15,870.56)	−264,624.10 *** (25,077.62)	−263,375.48 *** (19,035.09)	−263,208.41 *** (15,870.56)
Obs	1074	1074	1074	1074
Groups	110	110	110	110
R-sq overall	0.65	0.64	0.66	0.62

$p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5 represents the total-assets regressions in which ESG engagement appears to drive firm growth. The coefficients for ESG, environmental, and social scores are all positive and highly significant in the total-assets regressions, such as the one-point increase in ESG that raises assets by about 6889 million USD ($p < 0.01$). This indicates that better-rated firms tend to accumulate more assets over time, even after controlling for firm size and fixed effects. In contrast, none of the ESG dimensions significantly affect market capitalization in our data, implying that market value does not immediately reflect ESG scores in the same way. The strong positive asset coefficients are consistent with theories of ESG-led growth: Zheng et al. [64] analyzed that higher ESG performance significantly enhances firm value, which is mirrored here by a larger asset base. Moreover, the inclusion of comprehensive controls (year, country, industry) assures that these coefficients reflect ESG effects rather than omitted trends.

Moreover, Table 5 shows that firm size (log assets) is positively associated with total assets by construction (coefficient ~29,615, $p < 0.001$). Conversely, large firms (by size proxy) simply have more assets. The fact that ESG and social scores remain significant even with size controlled suggests an independent ESG effect. These patterns reinforce the view that environmental and social initiatives fuel corporate expansion (higher total assets), even if they may not translate immediately into higher market capitalization. Tables 4 and 5 support the conclusion that stronger ESG performance is linked with better firm outcomes, in line with prior findings on the ESG–value relationship based on the SSGRG.

Interestingly, the panel regression results largely confirm the GRA findings. The countries identified as top performers in the GRA ranking such as Kuwait, Qatar, and Saudi Arabia also exhibit the strongest positive association between ESG scores and financial performance. Conversely, countries low in the GRA ranking such as Egypt, Nigeria, and Kenya again show the weakest or insignificant regression coefficients. Moreover, both methods yield a consistent ordering of countries. The social pillar, which had the lowest rank in the GRA, similarly shows an insignificant coefficient, whereas the environmental and governance pillars remain positive and significant in the regressions.

This convergence is reassuring; it suggests that our conclusions do not depend on the analytical technique used. In fact, meta-analyses find that CSR/ESG relationships tend to be robustly positive across different methods. The regression analysis supports the GRA-based country and sector rankings rather than contradicting them.

4.4. Grey Relational Rankings: Comparative Assessment

We establish rankings of countries and sectors according to their SSGRG values, reflecting the extent of their scores in the ESG and financial performance association metrics. The rankings establish a distinct hierarchy that aids in identifying areas of strong ESG integration and those that are underperforming.

The GCC nations are positioned at the highest levels. Kuwait ranks first overall, with Qatar in second place and Saudi Arabia in third, regarding the strength of ESG and financial performance association based on SSGRG. This affirms the pre-eminence of the GCC region in utilizing ESG to enhance financial performance. The United Arab Emirates and Jordan constitute a secondary tier, positioned 4th to 5th in the row, indicating moderately strong affiliations. Morocco and South Africa rank 6th to 7th, suggesting that they need to improve to reach GCC standards, although they surpass the lowest performers. Nigeria, Egypt, and Kenya occupy the lowest positions in the ranking, placed 9th, 10th, and 11th respectively, and exhibit considerable lag in financial performance. In these markets, ESG factors have not consistently resulted in financial benefits, indicating deficiencies in market incentives or infrastructural support for ESG initiatives. The grey assessment ranking based on SSGRG for 11 countries is presented in Table 6.

Table 6. Grey assessment rankings based on SSGRG (country-wise).

Variables	Grey Rational Model	Ranking
Environmental and Financial Performance	Second Synthetic Grey Relational Analysis Model (SSGRG)	Saudi Arabia > Qatar > Kuwait > South Africa > Morocco > United Arab Emirates > Kenya > Nigeria > Jordan > Egypt > Oman
Social and Financial Performance		Saudi Arabia > Qatar > Kuwait > United Arab Emirates > Jordan > South Africa > Kenya > Oman > Morocco > Egypt > Nigeria
Governance and Financial Performance		Qatar > Kuwait > Saudi Arabia > United Arab Emirates > Morocco > South Africa > Jordan > Nigeria > Egypt > Oman > Kenya
ESG and Financial Performance		Kuwait > Qatar > Saudi Arabia > Jordan > United Arab Emirates > Morocco > South Africa > Oman > Kenya > Egypt > Nigeria

Similarly, the financial sector is clearly the foremost sector, confirming its position as the most integrated regarding ESG considerations. Communication services holds the second rank, whereas materials occupies the third rank, as indicated by their high SSGRGs. In contrast, information technology is ranked last 11th in a row, while the energy sector is positioned near the bottom at 9th and 10th, depending on exact composite scores, but clearly within the lower tier. Real estate and consumer discretionary rank among the lowest four categories. The rankings demonstrate that the banking, telecommunications, and basic materials sectors lead in ESG value realization, whereas the technology, real estate, and certain consumer industries are trailing.

The rankings indicate a clear pattern: countries with developed markets and robust ESG frameworks such as GCC and North African nations, as well as sectors that are heavily regulated or closely scrutinized by stakeholders including finance, telecommunications, and materials, typically attain higher rankings. Conversely, frontier markets and emerging sectors generally obtain lower rankings.

The comparative rankings indicate the effectiveness of ESG integration and identify areas requiring improvement. Investors and multinational institutions analyzing the MEA may employ this information to enhance their strategies. For example, investors may

choose to increase ESG-themed investments in GCC financial and telecom sectors, where ESG metrics are reliable performance indicators, while adopting a more cautious or engagement-focused strategy in lower-ranked sectors or countries. The grey assessment ranking based on SSGRG for 11 sectors is presented in Table 7.

Table 7. Grey assessment rankings based on SSGRG (sector-wise).

Variables	Grey Rational Model	Ranking
Environmental and Financial Performance	Second Synthetic Grey Relational Analysis Model (SSGRA)	Saudi Arabia > Qatar > Kuwait > South Africa > Morocco > United Arab Emirates > Kenya > Nigeria > Jordan > Egypt > Oman
Social and Financial Performance		Saudi Arabia > Qatar > Kuwait > United Arab Emirates > Jordan > South Africa > Kenya > Oman > Morocco > Egypt > Nigeria
Governance and Financial Performance		Qatar > Kuwait > Saudi Arabia > United Arab Emirates > Morocco > South Africa > Jordan > Nigeria > Egypt > Oman > Kenya
ESG and Financial Performance		Kuwait > Qatar > Saudi Arabia > Jordan > United Arab Emirates > Morocco > South Africa > Oman > Kenya > Egypt > Nigeria

4.5. Conservative Maximin Analysis: Identifying ESG

Moreover, the decision-analysis approach enabled us to quantify cross-country and cross-sector differences in the ESG and financial performance relationship across 11 MEA economies. Accordingly, the first step is to define and evaluate the decision criteria and the set of alternatives reported in Tables 8 and 9.

In this regard, $p = 4$, $n = 17$, and $\text{result} = v(a_i, C_j)$, while $i = 1, 2, \dots, m$ and $j = 1, 2, 3, 4$. Let $a_1, a_2, a_3, \dots, a_{11}$ denote the alternatives representing the strongest grey relational patterns linking ESG to financial performance for the 11 MEA countries. Table 6 reports the SSDGRA scores derived from the grey relational decision matrix, capturing the secondary (synthetic) grey relationships between decision criteria and decision alternatives. To estimate the contribution of ESG to financial performance outcomes in the MEA context, we developed this decision-making framework to support a consistent comparative assessment across countries and sectors.

Table 8. Decision parameters—country-wise.

Goal	Measuring Grey Relation (Association) Between ESG and Financial Performance of Listed Companies in MENA
State of Nature/Criteria (C_j); $N = 1, 2, \dots, k$	Environmental (C01)
	Social (C02)
	Governance (C03)
	ESG (C04)
Alternatives (a_i); $i = 1, 2, \dots, m$	Grey Relation was superior between ESG and Financial performance in Saudi Arabia (a_1)
	Grey Relation was superior between ESG and Financial performance in Qatar (a_2)
	Grey Relation was superior between ESG and Financial performance in Kuwait (a_3)
	Grey Relation was superior between ESG and Financial performance in South Africa (a_4)
	Grey Relation was superior between ESG and Financial performance in Morocco (a_5)
	Grey Relation was superior between ESG and Financial performance in United Arab Emirates (a_6)
	Grey Relation was superior between ESG and Financial performance in Kenya (a_7)
	Grey Relation was superior between ESG and Financial performance in Nigeria (a_8)
	Grey Relation was superior between ESG and Financial performance in Jordan (a_9)
	Grey Relation was superior between ESG and Financial performance in Egypt (a_{10})
	Grey Relation was superior between ESG and Financial performance in Oman (a_{11})

Similarly, where $p = 4$, $n = 11$, and result = $v(b_i, C_j)$, while $i = 1, 2, \dots, m$ and $j = 1, 2, 3, 4$. Let $b_1, b_2, b_3, \dots, b_{11}$ represent the alternatives that illustrate the most significant grey relational patterns connecting ESG to financial performance for the 11 sectors in MEA. Table 9 presents the SSDGRA scores obtained from the grey relational decision matrix, illustrating the secondary (synthetic) grey relationships between decision criteria and alternatives. We developed a decision-making framework to estimate the contribution of ESG to financial performance outcomes, facilitating a consistent comparative assessment across sectors.

Table 9. Decision parameters—sector wise.

Goal	Measuring Grey Relation (Association) Between ESG and Financial Performance in Different Sectors of MEA
State of Nature/Criteria (S_j); $N = 1, 2, \dots, k$	Environmental (S1)
	Social (S2)
	Governance (S3)
	ESG (S4)
Alternatives (b_i); $i = 1, 2, \dots, m$	Grey Relation was superior between ESG and Financial performance in financial sector (b_1)
	Grey Relation was superior between ESG and Financial performance in communication services sector (b_2)
	Grey Relation was superior between ESG and Financial performance in materials sector (b_3)
	Grey Relation was superior between ESG and Financial performance in utilities sector (b_4)
	Grey Relation was superior between ESG and Financial performance in industrials sector (b_5)
	Grey Relation was superior between ESG and Financial performance in consumer staples sector (b_6)
	Grey Relation was superior between ESG and Financial performance in energy sector (b_7)
	Grey Relation was superior between ESG and Financial performance in health care sector (b_8)
	Grey Relation was superior between ESG and Financial performance in consumer discretionary sector (b_9)
	Grey Relation was superior between ESG and Financial performance in real estate sector (b_{10})
	Grey Relation was superior between ESG and Financial performance in information technology (b_{11})

Further, we employ a conservative maximin decision method with SSGRG values to identify the most significant ESG factor affecting financial performance bottlenecks and to guide strategic decision-making. In this context, the maximin criterion involves assessing each country or sector to determine its weakest ESG pillar, characterized as the minimum SSGRG across the environmental, social, and governance dimensions. It is essential to analyze which of these minima are significantly low within the overall sample. The aim is to focus on areas exhibiting the lowest ESG performance concerning financial benefits, as improving these weakest links could yield the most substantial marginal enhancements in outcomes. Each country is assessed according to the lowest pillar of SSGRG, which functions as its limiting factor. Our analysis reveals that, in multiple countries, a particular ESG dimension is negatively correlated with the overall financial relationship with ESG factors. Figure 2 depicts the SSGRG intensifying effects of ESG on the financial performance of 11 MEA countries.

The governance pillar in Kenya is identified as the weakest link, exhibiting an SSGRG value of 0.495, as presented in Table 10. This indicates the minimal correlation of country pillars across the entire sample. The presence of inadequate governance practices or the lack of governance reform in Kenyan companies considerably limits the financial advantages obtained from ESG initiatives. Despite the progress made by Kenyan firms in environmental and social aspects, inadequate governance will persistently constrain their financial performance. This finding suggests that prioritizing governance reform is essential for enhancing sustainable value creation in South Africa [65,66].

In Oman, the environmental pillar is recognized as the limiting factor, with an SSGRG weight value of 0.499. Companies in Oman demonstrate a significantly low correlation between environmental performance and financial performance. This may stem from the dominance of extractive and high-pollution industries in the economy, along

with insufficient regulatory frameworks or market incentives for the adoption of cleaner practices. Improving environmental management and related disclosures in Oman presents significant opportunities for enhancing financial value.

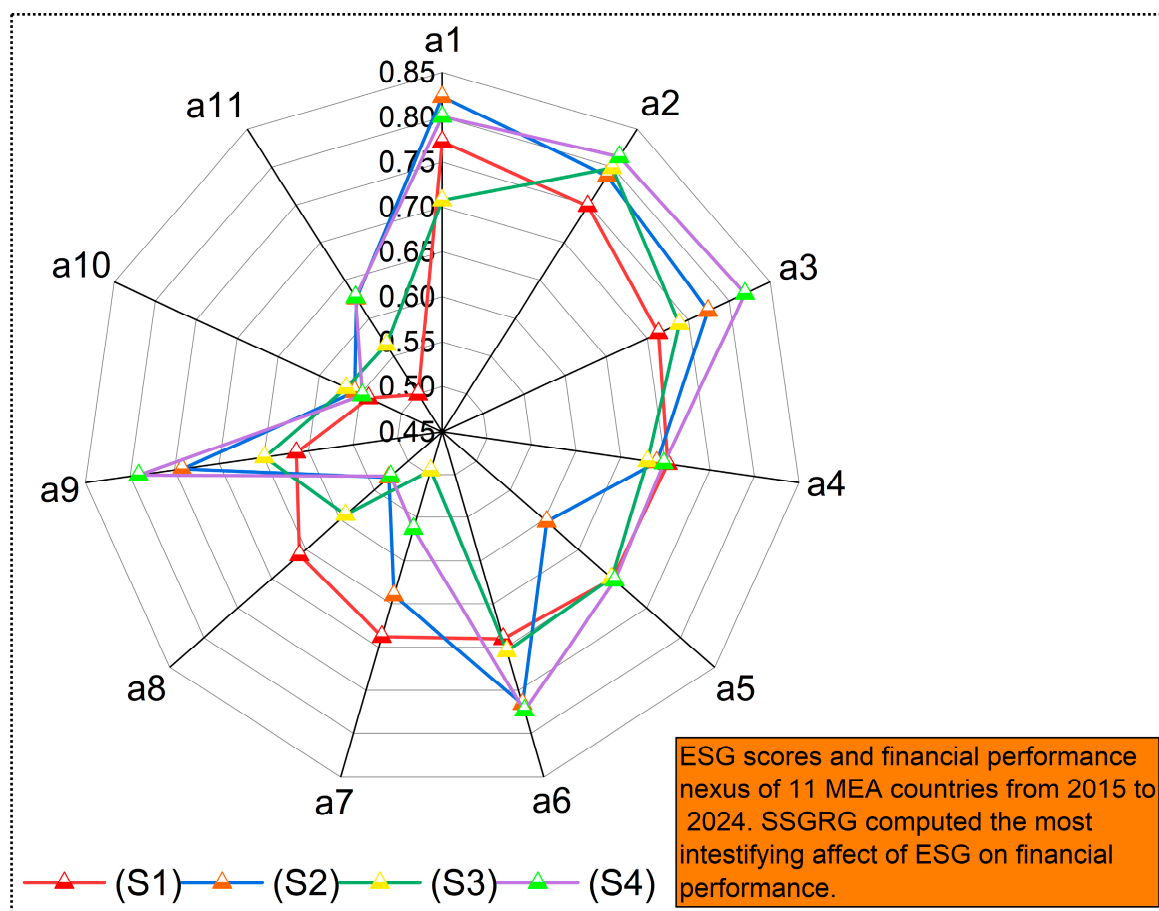


Figure 2. SSGRG result of ESG and financial performance of 11 MEA countries.

Country-specific weaknesses are evident in Egypt and Nigeria, both demonstrating low pillar values, particularly with Egypt recording its lowest in the environmental and governance domain. Although less pronounced than in Kenya or Oman, these weak pillars indicate that targeted improvements, such as bolstering environmental regulations in Egypt or enhancing governance in Nigeria's corporate sector, could yield considerable benefits relative to initiatives in already strong areas. Similarly, we identify the pillar with the lowest SSGRG for each industry, highlighting the most significant ESG weakness encountered by firms within that sector.

The findings indicate that Saudi Arabia is the most influential country in the MEA region regarding ESG. It is important to note that all findings represent associations, not causation; the GRA method identifies strength of co-movement between ESG and financial variables but does not prove that ESG improvements directly cause financial gains of ESG on financial performance. The results indicate that the environmental (E) pillar of ESG has the most significant relationship with financial performance in Saudi Arabia.

Table 10. Criteria action matrix (country-wise).

SSGRA	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11
S1	0.7725	0.7487	0.7137	0.7028	0.7000	0.6903	0.6879	0.6597	0.6136	0.5399	0.4992
S2	0.8228	0.7884	0.7742	0.6930	0.6034	0.7662	0.6410	0.5282	0.7416	0.5566	0.6261
S3	0.7077	0.7989	0.7390	0.6810	0.6987	0.7042	0.4952	0.5918	0.6492	0.5670	0.5648

S4	0.8006	0.8135	0.8192	0.6985	0.7031	0.7737	0.5629	0.5257	0.7903	0.5475	0.6278
----	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

$$\max a_i \left\{ \min S_k V(a_i, S_j) \right\} = \max a_i \begin{bmatrix} 0.7725 \\ 0.8228 \\ 0.7989 \\ 0.8192 \end{bmatrix} = 0.8228 (\text{Saudi Arabia; Environmental})$$

In the information technology sector, governance is identified as the most vulnerable component, with an SSGRG score of 0.52. IT companies in the MEA region demonstrate a significant lack of governance structures, including independent boards, strong shareholder rights, and transparency, which likely hinders investor trust and subsequently influences capital access and performance. This highlights the need for improved governance frameworks as technology companies develop, including the professionalization of management and increased transparency, to ensure that their growth leads to sustained financial performance. Figure 3 depicts the SSGRG-intensifying effects of ESG on the financial performance of 11 sectors in the MEA region.

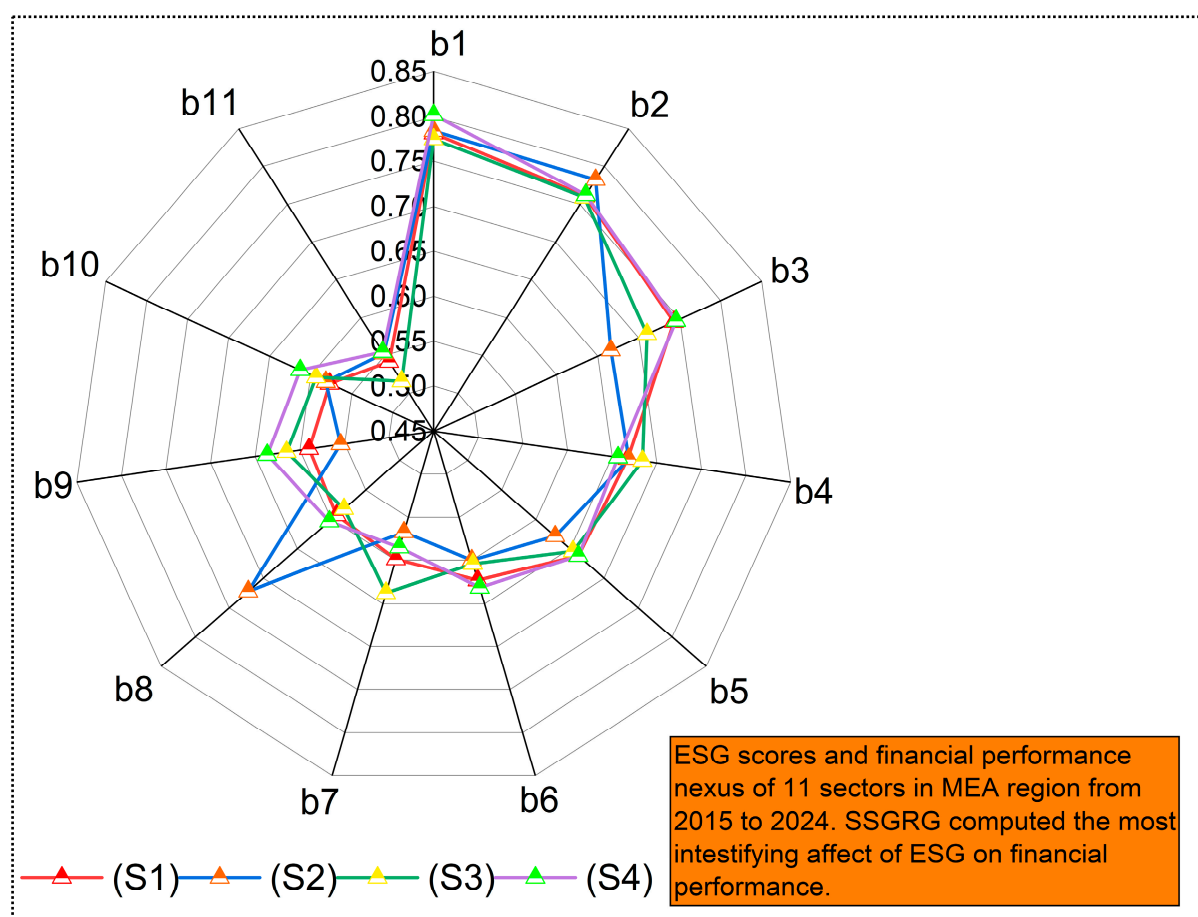


Figure 3. SSGRG result of ESG and financial performance of 11 sectors in MEA region.

In the energy sector, governance is recognized as a critical weak link in relation to financial performance, assigned a weight value of SSGRG 0.64 for governance (G), which is presented in Table 11. This value, although exceeding the minima noted in certain other sectors, suggests that the governance pillar is less effective compared to the environmental pillar in our data. This suggests potential issues in the governance of various energy

companies, often characterized by state influence or monopolistic structures. Implementing governance reforms, including enhanced accountability and improved risk management, may facilitate the integration of ESG initiatives, such as emissions reduction, into financial stability.

Table 11. Criteria action matrix (sector-wise).

SSGRA	b ₁	b ₂	b ₃	b ₄	b ₅	b ₆	b ₇	b ₈	b ₉	b ₁₀	b ₁₁
S1	0.7814	0.7606	0.7429	0.6673	0.6623	0.623	0.5988	0.5926	0.5897	0.5767	0.5415
S2	0.7842	0.7821	0.6661	0.6687	0.6284	0.5999	0.567	0.7221	0.5542	0.5815	0.5524
S3	0.7749	0.759	0.7102	0.6841	0.6544	0.6043	0.6374	0.5817	0.6148	0.5935	0.5156
S4	0.8019	0.7623	0.7456	0.6567	0.6625	0.6314	0.585	0.6032	0.6366	0.6128	0.5546

In the real estate sector, the environmental (E) pillar demonstrated the weakest correlation with financial performance, exhibiting a weight value of 0.58 as reported by SSGRG. Real estate and construction firms may not presently incorporate energy efficiency, green building standards, or climate resilience in a way that improves their financial performance. Improving environmental practices, such as sustainable construction and compliance with green certifications, can result in cost savings from energy efficiency and an increase in property values, ultimately enhancing financial performance.

Furthermore, in the consumer discretionary sector, the social (S) pillar has a diminished effect on financial performance, assigned a weight value of SSGRG (0.55). This sector includes industries such as retail, tourism, and automotive, where customer relations, brand reputation, and social responsibility are critical factors. The low SSGRG suggests that many firms have failed to effectively incorporate social initiatives, such as community engagement, fair labour practices, and improvements in customer satisfaction, into their financial performance. This can be attributed to insufficient communication or a lack of consumer recognition of these efforts. Organizations in this sector could enhance their outcomes by better aligning their social responsibility initiatives with their brand identity and value proposition.

The maximin approach focuses on the most vulnerable elements, pinpointing areas where interventions can produce the greatest marginal effect. Improving corporate governance in a technology firm or an energy utility with low governance scores may lead to a more substantial enhancement in financial performance than similar initiatives aimed at sectors that already exhibit stronger governance frameworks. Policymakers and regulators ought to allocate resources and implement reforms in a strategic manner. Governance codes could be improved in sectors or countries facing substantial governance challenges, or environmental regulations and incentives could be reinforced in sectors with inadequate environmental performance. The results reveal that the most influential sector's ESG associated with financial performance among all sectors in the MEA region is financial sector. The function outcome also shows that the composite ESG is the most influential and has strongest association with the financial performance in the financial sector.

$$\max b_i \left\{ \min S_k V(b_i, S_j) \right\} = \max b_i \begin{bmatrix} 0.7814 \\ 0.7842 \\ 0.7749 \\ 0.8019 \end{bmatrix} = 0.8019 (\text{Financial Sector; ESG})$$

The maximin analysis functions as a diagnostic tool for prioritizing objectives. The findings indicate that governance deficiencies, especially in countries like Kenya and sectors such as IT and energy, as well as environmental shortcomings in regions like Oman and sectors including real estate, present considerable barriers to realizing the financial

benefits of ESG. Focusing on specific areas through policy mandates, capacity building, or targeted investments is anticipated to yield substantial advantages in sustainability and financial performance concurrently.

4.6. Sensitivity Analysis of SSGRG Rankings

Within this study, we employed a sensitivity analysis to examine the robustness of the SSGRG results for the 11 MEA countries and 11 sectors by varying the value of ξ from 0.1 to 0.9. In GRA, the distinguishing coefficient controls the extent to which the method differentiates between alternatives: lower values of ξ increase discriminatory sensitivity, making the method more responsive to small deviations between sequences, whereas higher values reduce this sensitivity and generate relatively smoother relational grades. Following the distinguishing-coefficient-driven perspective in GRA, the assessment focused on testing whether alternative values of the distinguishing coefficient alter the relative ordering and comparative strength of the ESG and financial performance association. This procedure was undertaken to ensure that the reported country- and sector-level rankings were not dependent on a single parameter specification but instead remained stable under reasonable variations in the grey relational setting. The sensitivity analysis therefore provides an additional layer of methodological rigour and strengthens confidence in the reliability of the SSGRG-based findings.

Table 12 indicates that the country-level results of the overall SSGRG ranking remains highly stable across the alternative ξ specifications. The leading countries, Kuwait, Qatar, and Saudi Arabia, consistently preserve their top positions, while the lower-ranked countries, Kenya, Egypt, and Nigeria, also remain unchanged throughout the sensitivity range. Only a very limited shift is observed in the middle of the ranking, where Jordan and the United Arab Emirates interchange between the fourth and fifth positions under higher ξ values. This pattern demonstrates that the country-wise comparative structure is robust and not materially driven by a single arbitrary parameter choice.

Table 12. Sensitivity analysis of composite ESG–financial performance relationship for 11 MEA countries.

Country	$\xi = 0.1$	$\xi = 0.3$	$\xi = 0.5$	$\xi = 0.7$	$\xi = 0.9$	Baseline Rank ($\xi = 0.5$)	Rank Range
Kuwait	0.8084	0.8141	0.8192	0.8230	0.8261	1	1–1
Qatar	0.8021	0.8080	0.8135	0.8176	0.8209	2	2–2
Saudi Arabia	0.7897	0.7952	0.8006	0.8048	0.8080	3	3–3
Jordan	0.7752	0.7834	0.7903	0.7876	0.7859	4	4–5
United Arab Emirates	0.7689	0.7718	0.7737	0.7901	0.7934	5	4–5
Morocco	0.6918	0.6976	0.7031	0.7070	0.7101	6	6–6
South Africa	0.6863	0.6925	0.6985	0.7029	0.7063	7	7–7
Oman	0.6142	0.6213	0.6278	0.6322	0.6358	8	8–8
Kenya	0.5491	0.5560	0.5629	0.5677	0.5710	9	9–9
Egypt	0.5342	0.5411	0.5475	0.5518	0.5550	10	10–10
Nigeria	0.5121	0.5190	0.5257	0.5301	0.5334	11	11–11

From a decision-making perspective, this stability is important because it strengthens confidence in the reliability of the country-level results. Since the ranking remains largely unchanged across different values of ξ , policymakers, investors, and managers can interpret the country ordering as substantively robust rather than method-dependent. In practical terms, this means that the identification of relatively stronger ESG–financial performance environments, such as Kuwait, Qatar, and Saudi Arabia, can be used with greater confidence for comparative benchmarking, investment screening, and policy prioritization. At the same time, the minor sensitivity observed in the middle-ranked countries

suggests that close-ranking cases should be interpreted with caution, particularly when the differences in SSGRG values are small. Therefore, varying ξ does not alter the main decision-making implications, but it does help distinguish between highly stable rankings and those that are more marginal and sensitive to methodological specification. A similar sensitivity analysis was conducted for the 11 sectors by recalculating the composite ESG and financial performance SSGRG values under alternative distinguishing coefficients ($\xi = 0.1, 0.3, 0.5, 0.7, 0.9$)—this is presented in Table 13. As in the country-level analysis, changing ξ affects the discrimination intensity of the grey relational measure: lower ξ values place greater emphasis on small relational differences, while higher ξ values reduce the effect of minor deviations and produce more moderated grades. The sector-level findings also reveal a high degree of ranking stability. The top-performing sectors, financials, communication services, and materials, remain consistently in the upper tier across all ξ values, whereas energy and information technology continue to occupy the lower end of the ranking. Only one limited shift is observed in the middle positions, where utilities and industrials alternate between the fourth and fifth ranks. This confirms that the core sectoral pattern remains substantively unchanged even when the distinguishing coefficient is varied.

Table 13. Sensitivity analysis of composite ESG–financial performance relationship for 11 sectors.

Sector	$\xi = 0.1$	$\xi = 0.3$	$\xi = 0.5$	$\xi = 0.7$	$\xi = 0.9$	Baseline Rank ($\xi = 0.5$)	Rank Range
Financials	0.7894	0.7961	0.8019	0.8062	0.8094	1	1–1
Communication Services	0.7516	0.7575	0.7623	0.7658	0.7686	2	2–2
Materials	0.7341	0.7402	0.7456	0.7493	0.7521	3	3–3
Utilities	0.6518	0.6549	0.6567	0.6536	0.6504	4	4–6
Industrials	0.6427	0.6528	0.6625	0.6661	0.6688	5	4–5
Consumer Discretionary	0.6289	0.6331	0.6366	0.6390	0.6408	6	5–7
Consumer Staples	0.6364	0.6342	0.6314	0.6287	0.6261	7	5–7
Real Estate	0.5987	0.6063	0.6128	0.6171	0.6204	8	8–8
Health Care	0.5892	0.5968	0.6032	0.6075	0.6108	9	9–9
Energy	0.5711	0.5789	0.5850	0.5891	0.5923	10	10–10
Information Technology	0.5416	0.5485	0.5546	0.5588	0.5619	11	11–11

5. Discussion

This study aims to analyze the significance of ESG in relation to financial performance across MEA 11 countries and sectors. Utilizing an integrated GRA approach, we examined the association and influence between ESG and financial performance. This methodology is particularly designed to manage small, incomplete, and heterogeneous data environments [67]. This section connects our empirical findings to the existing literature, emphasizing areas of convergence and divergence, and discusses the implications for investors, companies, and policymakers in the MEA region.

Our findings align with patterns identified in recent studies, thereby enhancing the credibility of the results. The robust associations between ESG factors and financial performance noted in GCC countries align with emerging evidence regarding Gulf corporations, especially in the banking sector. Previous studies indicate that higher ESG scores in GCC firms are correlated with enhancements in profitability, market-to-book valuation, and risk profiles. The governance and environmental dimensions frequently emerge as significant contributors to financial performance in these studies [68,69]. Several studies suggest a bidirectional relationship in the GCC, indicating that strong ESG performance can enhance financial outcomes, while firms with robust financials are better positioned to invest in ESG initiatives [70]. This bidirectional dynamic indicates mutually reinforcing

effects, establishing a virtuous cycle for leading firms. The findings support this narrative, indicating that ESG leadership in the GCC, particularly through governance quality, is associated with financial leadership. Our findings indicate that effective governance serves as a crucial transmission channel: GCC firms with elevated governance scores, typically those that align executive incentives with ESG objectives, demonstrate enhanced financial metrics. This supports the existing literature suggesting that linking management compensation to ESG targets can improve firm value [71].

Our findings for North African and sub-Saharan African markets align with the existing literature, though with certain complexities. In Morocco, positive associations between ESG factors and financial performance were observed, with governance emerging as a particularly significant element. This aligns with evidence indicating that Moroccan firms characterized by robust governance experience enhanced profitability [72]. In Egypt, our analysis indicates that social and governance factors are more influential than environmental factors in their association with financial performance. Our findings endorsed by [73], which have observed that enhancements in labour relations, disclosure practices, and board structure currently provide more significant financial benefits than environmental initiatives within the Egyptian context. Moreover, South African companies exhibiting strong ESG practices generally attained superior returns and market valuations, aligning with findings observed in broader emerging markets [46,74]. South Africa frequently exhibits moderate yet favourable SSGRG values in our findings, aligning with research that identifies South African companies as leaders in ESG, supported by initiatives such as the Johannesburg Stock Exchange's ESG disclosure requirements.

In answer to our guiding question, we find that improvements in a firm's ESG profile tend to coincide with enhanced financial performance in certain contexts. Notably, in the GCC countries, higher ESG scores are strongly associated with better profitability and market valuations, suggesting that firms improving their ESG practices often realize financial gains. However, this effect is not uniform across the MEA region; in several countries such as Egypt, Nigeria, and Kenya, elevated ESG efforts have not yet translated into significantly improved financial outcomes. This indicates that contextual factors such as market maturity and regulatory support mediate whether ESG enhancements yield financial benefits [75]. Thus, while improved ESG performance can enhance financial metrics in supportive environments, it may not guarantee immediate financial gains in all MEA markets.

From a sectoral perspective, our findings align with established industry-specific dynamics. The robust correlation identified within the financial sector supports existing research that characterizes banks as early and proactive implementers of ESG frameworks in their operations. Evidence indicates that banks have integrated ESG considerations into credit risk assessments, lending decisions, and capital allocation, thereby positioning ESG as a fundamental component of core business strategy rather than merely a public relations initiative [76]. Several studies observed that inadequate sustainability frameworks imposing ESG investments on banks prematurely may be negatively associated with profitability, as costs could surpass benefits. Conversely, in favourable contexts, ESG can enhance risk-adjusted returns [77]. The observation that national sustainability infrastructure influences outcomes is consistent with the existing literature: ESG produces favourable financial results in high-sustainability environments such as the GCC, whereas it may exhibit neutral or adverse effects in low-sustainability settings unless there is an enhancement of those frameworks, highlighting the significance of context.

We observed in the communication services and materials sectors that these sectors are sensitive to ESG factors. Telecommunications companies are subject to significant examination regarding social issues such as data privacy, digital inclusion, and labour practices, as well as governance matters including anti-corruption and fair competition. These

factors can substantially influence their customer base and regulatory interactions. Materials such as mining, cement, and chemicals face significant environmental and social risks. Implementing effective ESG management in these sectors can mitigate operational disruptions, minimize regulatory fines, and enhance community relations, thereby positively impacting financial performance [78]. Our findings indicate that in the MEA region, sectors with high ESG materiality demonstrate stronger connections between ESG factors and financial performance. Moreover, ESG is financially material in the MEA region, even in a manner that is specific to individual pillars and sectors, which aligns with recent empirical research findings. ESG generates value in MEA mainly by reducing risk, enhancing governance quality, and building reputational capital in regions and sectors with mature institutions and markets that can acknowledge and reward these characteristics [79]. In contrast, the absence of these enabling conditions results in a weak ESG financial link. Although numerous findings correspond with the existing literature, the grey relational approach has revealed complexities that challenge the simplistic assertion that ESG consistently enhances performance. Our findings either diverge from or provide additional depth to the generalized patterns identified in broader studies.

The support for H1 indicates that enhanced overall ESG performance correlates with improved financial outcomes, aligning with the perspective that firms that effectively address stakeholder expectations may bolster legitimacy, trust, and market credibility. The results indicate that the financial relevance of ESG is unevenly distributed among the various pillars. The stronger support for H4 suggests that governance is crucial in converting ESG commitments into financially significant results, particularly in institutionally diverse markets where the quality of disclosure, oversight, and accountability are essential. In contrast, the mixed evidence for H2 and H3 indicates that environmental and social practices require enhanced institutional support, extended timeframes, or increased stakeholder acknowledgment before their financial significance becomes consistently apparent [80]. The findings enhance theoretical expectations by demonstrating that the associations between ESG and financial performance are sensitive to stakeholder perspectives and contingent upon institutional contexts.

A significant difference lies in the pronounced disparity between GCC and non-GCC markets, particularly those in Africa. Cross-regional analyses frequently indicate a positive average correlation between ESG scores and firm performance, including in emerging markets. However, these studies rarely provide a detailed breakdown of results by individual country or industry, as we have accomplished [79,81]. The findings indicate that Egypt, Nigeria, and Kenya demonstrate weak composite ESG and financial associations, with notable deficiencies in specific pillars for each country such as governance in Kenya and environmental in Nigeria. This indicates that ESG initiatives in these markets have not yet established themselves as stable determinants of financial trajectories. Several plausible explanations account for this weak linkage: (i) limited ESG disclosure infrastructure—if companies do not report ESG metrics comprehensively, investors cannot incorporate ESG performance into their valuations; (ii) weak enforcement of governance and sustainability regulations—firms may adopt ESG policies formally but not substantively, resulting in minimal real impact; (iii) low investor demand for ESG investments—domestic investors may prioritize short-term returns or remain unconvinced of ESG's value, reducing companies' incentives to enhance ESG for financial reasons; (iv) macroeconomic volatility and risks overshadow firm-level ESG signals in economies facing currency instability, high inflation, or political unrest—even well-governed, eco-friendly firms may encounter financial difficulties, obscuring the advantages of sustainability [82]. Furthermore, climate and sustainability challenges, although significant in numerous African nations, may not yet be incorporated into financial decision-making processes. Consequently, the potential value of ESG factors, such as climate resilience, remains

unaccounted for in current performance metrics, resulting in underdeveloped ESG and the financial nexus within these frontier markets.

The information technology sector serves as a significant example of divergence. This sector demonstrated the weakest connection between ESG factors and financial performance, particularly marked by significantly low governance relational grades. This suggests that many IT companies in the MEA region are at the early stages of incorporating ESG principles. This situation is comprehensible, given that the technology sector in MEA often comprises younger enterprises, startups, and subsidiaries of multinational corporations, many of which have not yet encountered the same level of public market scrutiny or regulatory requirements as industries like banking or oil. Privately or family-owned entities may face reduced external pressure to adopt formal ESG practices. Prior regional ESG research has primarily focused on banks, resource companies, and large manufacturers, while technology firms have received comparatively little attention [83]. The presence of IT, characterized by significantly low governance scores, highlights the disparities in the ESG revolution within the MEA region across different sectors. Modern industries characterized by high growth do not inherently excel in ESG practices; instead, they may be surpassed by traditional industries that face more stringent regulatory scrutiny. This complexity highlights the need for policy intervention to incorporate emerging sectors into the ESG framework, including corporate governance reforms and the promotion of ESG disclosures within the technology sector [84].

Despite numerous studies asserting that ESG typically improves performance in emerging markets, our comprehensive analysis reveals that this is applicable only in certain regions and sectors, and not currently in others. This divergence highlights the importance of our methodology: by disaggregating the space into country–sector–pillar combinations, we avoid the potential pitfalls associated with a misleading average. Our analysis suggests that general claims about the uniform advantages of ESG are not applicable across the MEA region. Context is essential; in specific environments, ESG initiatives demonstrate financial success, whereas in others, they face challenges. This requires a more accurate identification of the relevant contexts, which will be discussed in the subsequent section through specific configurations. This study clearly identifies the strongest and weakest correlation between ESG and financial performance. It is important to note that all findings represent associations; the GRA method identifies strength of correlation between ESG and financial indicators but does not prove that ESG improvements directly cause financial gains.

The findings should also be considered in light of the temporal context covered by the dataset. Between 2015 and 2024, firms in the sample operated under changing external conditions, including fluctuations in oil and commodity markets, the COVID-19 crisis, the subsequent recovery period, and an intensification of ESG-related expectations among regulators, investors, and other stakeholders. Although the models control for common year effects, the analysis does not separately estimate whether the ESG–financial performance relationship differed across these distinct phases. Consequently, the reported results should be understood as reflecting the average pattern over a decade shaped by multiple overlapping shocks and transitions, rather than as direct evidence that ESG effects strengthened or weakened in any single sub-period.

The marked cross-country differences in ESG and financial performance relationships in MEA likely reflect underlying institutional heterogeneity. Countries where we found weak ESG–financial linkages such as Kenya, Nigeria, and Egypt tend to have less developed ESG ecosystems characterized by limited enforcement of sustainability reporting, lower investor awareness, and nascent regulatory frameworks. Moreover, ESG disclosure in MENA emerging markets remains uneven and often below international benchmarks, which can lead to lower investor confidence in ESG information. In contrast, GCC

countries benefit from relatively stronger institutional support such as stock exchange ESG guidelines and government sustainability initiatives, contributing to the stronger ESG–financial associations observed [35]. We acknowledge that our use of Bloomberg’s ESG scores assumes comparability across countries; however, measurement biases may exist. Emerging market firms might receive inflated scores despite weaker actual performance due to inconsistent disclosure standards or rating methodology biases. This means an ESG score of 7 in one country may not be strictly equivalent to a 7 in another country with different transparency norms. We have treated the scores as given, but with caution that such differences could partly explain why, say, a high ESG score in one institutional context yields less financial benefit than an equivalent score elsewhere. To probe this, we discuss how those countries with weaker ESG–performance links also rank lower on governance and transparency indices such as how Kenya’s average governance score trails GCC averages, suggesting that institutional quality moderates the effectiveness of ESG efforts. By incorporating these points, we underline that institutional heterogeneity, and potential ESG rating inconsistencies, are important factors in interpreting our results. Thus, stronger institutions and more reliable ESG reporting frameworks seem to enhance the tangible value of ESG performance, whereas weaker institutions may dampen it.

The few observed rank shifts under different ξ values can be analyzed from an economic perspective. In this regard, Jordan and the UAE exchanged positions only when the distinguishing coefficient was increased to 0.7–0.9. This implies that their ESG-to-financial profiles are closely comparable; Jordan’s mixed economy and the UAE’s hydrocarbon-led economy produce comparable performance results under prevailing ESG practices. Minor methodological tweaks thus flip their relative rank. In contrast, the highest-ranked countries, such as Kuwait, Qatar, and Saudi, and lowest-ranked, like Egypt, Nigeria and Kenya, exhibit greater score separations, resulting in an invariant order. A similar logic applies to sectors: utilities, industrials, and consumer discretionary sit in the mid-tier and so are sensitive to ξ changes, reflecting that their ESG impact on performance is less sharply differentiated. In practical terms, these mid-ranked economies and industries may have more heterogeneous ESG strategies or face mixed stakeholder pressures, making their comparative performance more context-dependent. The stability of the overall ranking despite these small movements confirms that the key leaders and laggards are robustly identified.

Furthermore, our conservative maximin analysis introduces a decision-oriented dimension. Identifying the most intensifying ESG pillar in each context reveals the most significant remaining vulnerabilities. Oman exhibits a notably low performance in environmental sustainability, which may pose a risk if investors prioritize carbon footprints. The relatively weak governance in Jordan presents a significant obstacle; enhancing board oversight and transparency could markedly improve ESG performance. The most significant connections between ESG and financial performance in the MEA region are notably localized, resulting in hotspots such as GCC banks and South African industrials where ESG contributes to value creation, alongside cold spots where it does not. Stakeholders ought to customize their strategies accordingly. Investors may focus on scenarios where ESG has demonstrated profitability or seek undervalued companies in enhancing markets. Organizations may evaluate their performance relative to comparable entities within analogous countries and sectors to establish achievable ESG objectives. Policymakers ought to refrain from implementing uniform mandates. Targeted reforms, including the enhancement of ESG reporting in Nigeria, the strengthening of corporate governance in Kenya, and the establishment of environmental standards in Omani industries, are necessary to address specific weaknesses.

Research Implications

This study contributes to current theories regarding ESG and corporate performance in emerging markets. Consistent with stakeholder theory, our findings indicate that firms in the MEA region that address an extensive range of stakeholder concerns, especially social and governance issues, tend to exhibit superior financial performance. Firms that enhance governance structures and community relations tend to achieve greater legitimacy and trust, which correlates with increased profitability. The findings further substantiate institutional theory, indicating that ESG outcomes are shaped not only by firm-level initiatives but also by the strength of the surrounding regulatory, normative, and governance environment. This indicates that a company's ESG practices should not be viewed merely as internal commitments, but as actions whose financial relevance is conditioned by the institutional setting in which the firm operates. The emergence of governance as a central factor in our analysis demonstrates this synergy: effective governance aligns stakeholder interests while also enabling firms to respond more effectively to institutional expectations, reinforcing the notion that governance serves as a nexus between stakeholder and institutional logics.

Our study highlights that institutional context significantly influences these theoretical effects. Institutional theory posits that the robustness of formal and informal regulations influences ESG outcomes, and our findings support this assertion. In markets characterized by advanced ESG frameworks and disclosure practices, such as the Gulf states and South Africa, enhancements in ESG performance are more directly correlated with financial benefits. In contrast, in nations with weaker institutions, such as Egypt, Nigeria, or Kenya, the correlation between ESG initiatives and profit is less consistent. This indicates that a robust sustainability infrastructure, encompassing regulatory quality, capital market development, and investor demand, enhances the value of ESG investments [85]. This study enhances ESG–finance theory by demonstrating that stakeholder alignment and ESG-related advantages are more likely to be realized in contexts with institutional support; in the absence of such support, ESG may produce limited or negative financial outcomes.

This study offers valuable guidelines to investors, managers and policymakers and regulators and ESG should be integrated into investment decisions in a nuanced way. In relatively advanced markets (such as GCC countries and South Africa), especially in financial, telecom, and materials sectors, high ESG scores and strong governance and social metrics in particular are reliable indicators of firm quality. Investors can therefore use ESG ratings in screening, portfolio allocation, and risk management with greater confidence. For example, funds may overweight high-ESG banks or telecom firms in these markets, as they often show lower risk and better access to capital. By contrast, in frontier markets and sectors where ESG-payoffs are weak such as Nigerian or Kenyan firms, or the IT and energy sectors, and investors should treat raw ESG scores more cautiously. In these contexts, ESG metrics should be supplemented by qualitative due diligence on governance practices, disclosure quality and local policy trends. Overall, our findings imply that a differentiated, country- and sector-specific ESG strategy can enhance portfolio resilience, since firms with robust ESG track records often exhibit greater operational efficiency and stability. Governance as a strategic factor, not just a compliance or PR cost. In country-sector clusters where ESG scores and financial performance links are strong, companies can leverage strong ESG performance to reduce business risks, access favourable financing such as green bonds or sustainability-linked loans, and distinguish themselves from competitors. Practically, this means embedding sustainability into the core strategy: improving board governance through greater diversity and oversight and strengthening ESG disclosure can tangibly boost financial outcomes. Our sectoral analysis also provides a diagnostic roadmap for lagging firms: companies in markets with weak ESG links in

North African or sub-Saharan firms should focus on the weakest ESG pillar identified. Prioritizing improvements in the lowest-performing dimension—such as corporate governance in Kenya or environmental management in Oman—is likely to yield the highest marginal financial return on ESG investment. In short, sequentially addressing the most critical ESG deficits will build the capabilities needed for sustainable profitability.

The evidence supports and refines ongoing regulatory reforms. Policymakers should continue to expand ESG disclosure requirements, establish clear taxonomies, and promote green financial instruments across MEA. At the same time, our findings indicate where such interventions will have the greatest impact. In markets where one ESG dimension has been identified as a bottleneck, targeted policy action can unlock value. Moreover, strengthening corporate governance standards in countries with weak governance–performance links, or improving environmental data and accountability in countries with poor environmental and financial ties, will help ensure that private sustainability efforts are rewarded by investors. More broadly, enhancing the national sustainability infrastructure through enforcement, education and market incentives will make ESG integration more financially meaningful, preventing a scenario where ESG initiatives simply become a cost without benefit. By aligning policy measures with the critical country- and sector-specific constraints uncovered in our analysis, authorities can move ESG from symbolic commitment toward substantive contributions to both sustainable development and economic growth. These implications together demonstrate how this study’s granular insights into the MEA ESG performance nexus can inform theory and guide decision-makers. By linking empirical patterns to strategic theory, and by translating them into concrete stakeholder actions, our work bridges academic understanding and real-world practice in pursuit of cleaner, more sustainable production and finance.

Our findings extend theoretical understanding by demonstrating how ESG acts as a competitive signal whose value depends on institutional context. In countries with weaker governance, strong ESG performance appears to substitute as a signal of firm quality, reinforcing institutional theory predictions. This difference deepens stakeholder theory by highlighting when and why stakeholders value ESG efforts differently. Practically, the country and sector rankings have clear implications: firms in leading countries such as Kuwait, Qatar, and Saudi Arabia gain the most from ESG engagement, suggesting that managers should prioritize governance and environmental initiatives there. Investors can use these rankings to gauge where ESG integration is most financially rewarded. Policymakers are informed that strengthening disclosure and governance standards as seen in higher-performing countries could amplify the economic benefits of sustainability. By spelling out these theoretical and practical impacts, we emphasize the broader significance of our work.

6. Conclusions

This study analyzed the relationship between environmental, social, and governance (ESG) performance and the financial performance of listed firms in the Middle East and Africa (MEA) region, acknowledging that the strength of this relationship may differ significantly across various countries and sectors. An integrated grey relational analysis (GRA) with firm-level panel regression methods was employed to examine which ESG factors significantly associate with financial performance across eleven MEA countries and eleven major industry sectors from 2015 to 2024.

The analysis developed a set of association measures, including Deng’s GRA, the absolute GRA, and a Second Synthetic Grey Relational Grade (SSGRG), for each combination of ESG dimensions across environmental, social, governance and composite ESG scores with various financial indicators such as ROA, ROE, net income, total assets, and market capitalization. Subsequently, we synthesized these measures into rankings by country and

sector, employing a conservative maximin decision method to identify critical ESG and financial bottlenecks, specifically the strongest pillar in each country and sector. This approach enabled a detailed mapping of the nexus between ESG and financial performance in the MEA region.

ESG performance exhibits financial significance in the MEA region as a whole, yet it varies considerably among different countries. The Gulf Cooperation Council (GCC) countries, such as Kuwait, Qatar, and Saudi Arabia, demonstrate significant associations between ESG factors and financial performance, with composite SSGRG values exceeding 0.80, primarily influenced by the social and governance dimensions. In these markets, firms exhibiting elevated ESG scores frequently demonstrate enhanced financial metrics, indicating a reciprocal relationship between sustainability and profitability. Conversely, nations like Egypt, Nigeria, and Kenya exhibit weak ESG–financial linkages, characterized by low SSGRG values, frequently below 0.60. This suggests that ESG initiatives in these markets have not yet resulted in significant financial advantages. Countries such as Morocco and South Africa exhibit moderate linkages. The variation observed across countries indicates that the financial benefits of ESG initiatives in the MEA region are significantly influenced by contextual factors, being substantial in certain environments while minimal in others.

At the sector level, distinct leaders and underperformers in ESG integration are evident. The financials, communication services, and materials sectors exhibit strong connections between ESG factors and financial performance. Firms within these industries demonstrate high association grades across all three ESG pillars, indicating a significant interrelation between sustainability considerations and business outcomes. Consequently, banks and telecom companies exhibiting robust ESG profiles generally surpass their peers, presumably attributable to enhanced risk management and increased stakeholder trust. The information technology, energy, and real estate sectors demonstrate the weakest linkages, as evidenced by their composite SSGRG values, which are the lowest in the sample analyzed. Information technology firms exhibited subpar governance scores, suggesting the presence of nascent corporate structures that may not prioritize ESG considerations. In general, social and governance factors proved to be more significant than environmental performance in influencing the ESG–financial relationship across most MEA markets and sectors, particularly within service-oriented and financial industries. Effective governance, characterized by competent boards, transparency, and the protection of shareholder rights, is often identified as an essential condition for the successful conversion of ESG initiatives into financial benefits. The absence observed in Kenya's case, particularly within the IT sector, significantly undermines the impact of ESG.

The analysis indicates that the main mechanisms by which ESG associated with financial outcomes in MEA are risk mitigation and enhanced governance. Environmental initiatives are essential for sustainability; however, their financial association tends to be inconsistent unless they are accompanied by robust governance and a clear connection to business materiality, particularly in high-pollution sectors or in contexts where regulation mandates such alignment. Social performance enhances human capital, customer loyalty, and community relations; however, its effectiveness is maximized when governance guarantees that these initiatives are strategic and clearly communicated. In contexts such as the banking and telecom sectors within the GCC, the quality of governance is characterized by accountable management and well-defined ESG targets, and integrity enhances both environmental and social initiatives, fostering a synergy that promotes financial performance. In contrast, in markets such as Kenya, where governance deficiencies exist, or in sectors like energy, where immediate economic priorities take precedence over environmental, social, and governance (ESG) considerations, significant environmental or social initiatives have not demonstrated a robust financial correlation.

The conservative maximin analysis pinpointed particular strong and weak links that function as bottlenecks in the relationship between ESG and financial performance. Governance in Kenya, with an SSGRG value of 0.495, and environmental performance in Oman, with a value of 0.499, represent two of the weakest country-level ESG associations identified, highlighting national contexts where these specific pillars are not effectively contributing value. At the sector level, significant bottlenecks are identified in governance within the information technology sector (0.52) and the energy sector (0.64), environmental performance in real estate (0.58), and social performance in consumer discretionary (0.55). These indicate instances where the alignment between ESG practices and financial success is notably lacking across various pillar and industry combinations. IT companies that do not implement robust governance frameworks are hindering their growth potential and likely discouraging investors. Similarly, real estate firms that fail to enhance environmental efficiency are overlooking opportunities for cost savings and the associated green premium. Identifying these gaps is crucial as they signify areas where enhancements or interventions could produce the most significant marginal benefits in both sustainability and financial performance. Our analysis indicates that Saudi Arabia is the most influential country in the MEA region concerning the association of ESG on financial performance. The findings demonstrate that the environmental (E) component of ESG exerts the most substantial influence on financial performance in Saudi Arabia. However, the financial sector is the most significantly affected by ESG factors in terms of financial performance among all sectors in the MEA region. The results indicate that the composite ESG has the most significant association and influence on financial performance within the financial sector.

The results support H1, demonstrating that enhanced overall ESG performance correlates with improved financial outcomes. The evidence for the individual dimensions of ESG is more distinct. H2 and H3 demonstrate partial-to-moderate support, with environmental and social performance exhibiting positive yet inconsistent associations across various countries and sectors. H4 demonstrates the most substantial support, indicating that governance is the ESG dimension most reliably correlated with firm financial performance within the MEA context. The findings suggest that although ESG is generally pertinent to financial results, its impact and reliability differ among the environmental, social, and governance components.

This research offers several contributions to both the academic literature and practical applications. This study enhances the existing research on ESG and financial performance by incorporating an analysis within a multi-country, multi-sector, and multi-pillar framework. Previous research has frequently focused on individual countries or sectors; in contrast, our study offers a comprehensive perspective while maintaining detailed distinctions. The application of grey relational grades demonstrates that the relationship between ESG and performance is multifaceted and context-dependent. This approach supports stakeholder and resource-based theories by illustrating the intersections between stakeholder value creation, sustainable resource management, and financial value generation, as well as the areas of divergence. This challenges universalist perspectives on ESG impact, highlighting the necessity for contextualized theory. Our findings indicate that institutional and market contexts serve as contingencies for stakeholder theory outcomes in emerging markets.

This study illustrates the benefits of GRA in analyzing the connections between sustainability and performance, particularly in data environments characteristic of emerging markets, which often involve short time frames, incomplete data, and multiple metrics. This study demonstrates that GRA is capable of addressing these issues and yielding significant insights. The integrated GRA framework represents a significant advancement in the ESG literature. Furthermore, the incorporation of a conservative maximin decision

analysis into sustainability assessment represents a novel approach, offering a decision-support tool to pinpoint priority areas for enhancement. This mixed-method approach is applicable and can be modified for various regions or subjects characterized by complex relationships and limited data.

Our findings provide practical implications for multiple stakeholders. This study identifies the markets and sectors in the MEA region that exhibit the highest responsiveness to ESG information, thereby assisting investors in making informed portfolio allocation decisions and conducting risk assessments. Corporate executives can utilize the detailed results and bottleneck analysis as a framework for developing their ESG strategy. This approach enables companies to concentrate on enhancing specific pillars that impede progress and to compare their performance with peers in analogous situations. The study identifies areas where policy and regulatory support is essential, such as enhancing governance frameworks and environmental standards, to facilitate the translation of ESG improvements into economic development and stability. In conclusion, the study establishes a solid foundation for differentiated strategies; advancing the discourse beyond simplistic assertions of ESG is beneficial to a more complexed comprehension of the conditions under which ESG investments yield returns.

The grey relational results reveal that certain ESG pillars display stronger alignment with firm-level financial performance across selected countries and sectors in the MEA region. Accordingly, the study concludes that higher ESG performance is generally associated with more favourable financial outcomes in several contexts; however, the intensity and consistency of this association vary across environmental, social, and governance dimensions, as well as across industry and national settings. These results therefore offer comparative and context-sensitive insights into the ESG–financial performance nexus, while remaining within the interpretive boundaries of an association-based analytical framework.

While the study encompasses a broad range of topics, it presents several limitations that suggest directions for future research; the analysis was based on ESG scores for publicly listed companies from 2015 to 2025. This limited time frame may not adequately reflect long-term dynamics or structural breaks, including shifts in policy regimes or significant economic cycles. Furthermore, concentrating on publicly listed companies results in the omission of potentially important ESG initiatives within private firms or state-owned enterprises. Future research may expand the time frame as additional years of ESG data become accessible, allowing for an examination of whether the identified relationships persist over extended durations or under varying economic conditions. Incorporating non-listed firms or SMEs would be beneficial if reliable ESG data can be acquired, to evaluate whether the patterns observed in listed firms are generalizable or specific to larger, more prominent companies.

A further limitation concerns temporal heterogeneity. Although the study covers a period marked by oil-price shocks, the COVID-19 pandemic, post-pandemic recovery, and the global expansion of ESG regulation and disclosure pressure, it does not explicitly test whether the ESG financial performance relationship changed across these phases. Future research could strengthen the temporal dimension of the analysis by comparing pre- and post-COVID sub-periods, introducing interaction terms for major shock periods, or estimating rolling-window models to assess whether ESG became more financially salient over time.

The set of financial indicators was comprehensive yet not exhaustive. Our analysis concentrated on profitability, scale, and market valuation. Risk measures such as stock volatility, credit ratings, and cost of capital were not explicitly included, despite their significance in assessing financial performance. ESG performance may have a stronger correlation with risk mitigation factors, such as reduced volatility or default risk, rather than

with mean returns, which may not be entirely reflected in our analysis. Future research may incorporate risk-adjusted performance metrics.

This research establishes a solid basis for comprehending the relationship between ESG factors and financial performance in the MEA region. We present a framework that enables stakeholders to identify strengths, weaknesses, and opportunities in sustainable finance by mapping the dual dimensions of country and sector through an integrated grey relational approach. With advancements in data quality and the evolution of ESG practices in the MEA region, this framework is subject to refinement and updates. Future research should expand upon these insights by investigating causality, examining new data sources, and assessing the generalizability of these patterns in other emerging markets. This endeavour aims to enhance both the academic literature and the practical integration of sustainability with financial success.

Author Contributions: Conceptualization, M.I. and K.D.; Methodology, M.I.; Software, M.I.; Validation, M.I. and K.D.; Formal analysis, M.I.; Investigation, M.I. and K.D.; Resources, M.I.; Data curation, M.I. and K.D.; Writing—original draft, M.I. and K.D.; Writing—review and editing, M.I.; Visualization, M.I.; Supervision, M.I.; Project administration, M.I.; Funding acquisition, M.I. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

References

- Ikram, M.; Boudraa, C. The Role of Quality Governance in Achieving Sustainable Development Goals in North Africa: An Integrated Decision-Support System. *Sustain. Oper. Comput.* **2025**, *6*, 198–216. <https://doi.org/10.1016/j.susoc.2025.07.005>.
- Chen, S.; Song, Y.; Gao, P. Environmental, Social, and Governance (ESG) Performance and Financial Outcomes: Analyzing the Impact of ESG on Financial Performance. *J. Environ. Manag.* **2023**, *345*, 118829. <https://doi.org/10.1016/j.jenvman.2023.118829>.
- Ongan, S.; Gocer, I.; Işık, C. Introducing the New ESG-Based Sustainability Uncertainty Index (ESGUI). *Sustain. Dev.* **2025**, *33*, 4457–4467. <https://doi.org/10.1002/sd.3351>.
- Zairis, G.; Liargovas, P.; Apostolopoulos, N. Sustainable Finance and ESG Importance: A Systematic Literature Review and Research Agenda. *Sustainability* **2024**, *16*, 2878. <https://doi.org/10.3390/su16072878>.
- Abdullah, S.N.; Nazir, M.W.; Rauf, F.; Marwat, A.; Naveed, K. Does ESG Performance Affect Corporate Commitment, Competitiveness, and Profitability? Evidence from a Developing Country. *Discov. Sustain.* **2025**, *6*, 1124. <https://doi.org/10.1007/s43621-025-01353-z>.
- Francis, D.; Fonseca, R. Recent and Projected Changes in Climate Patterns in the Middle East and North Africa (MENA) Region. *Sci. Rep.* **2024**, *14*, 10279. <https://doi.org/10.1038/s41598-024-60976-w>.
- Adenle, A.A.; Ford, J.D.; Morton, J.; Twomlow, S.; Alverson, K.; Cattaneo, A.; Cervigni, R.; Kurukulasuriya, P.; Huq, S.; Helfgott, A.; et al. Managing Climate Change Risks in Africa—A Global Perspective. *Ecol. Econ.* **2017**, *141*, 190–201. <https://doi.org/10.1016/j.ecolecon.2017.06.004>.
- Alexopoulos, C.; Ali, M.; Maratsi, M.I.; Rizun, N.; Charalabidis, Y.; Loukis, E.; Saxena, S. Assessing the Availability and Interoperability of Open Government Data (OGD) Supporting Sustainable Development Goals (SDGs) and Value Creation in the Gulf Cooperation Council (GCC). *Qual. Quant.* **2025**, *59*, 1573–1593. <https://doi.org/10.1007/s11135-024-02025-2>.
- Darnall, N.; Ji, H.; Iwata, K.; Arimura, T.H. Do ESG Reporting Guidelines and Verifications Enhance Firms' Information Disclosure? *Corp. Soc. Responsib. Environ. Manag.* **2022**, *29*, 1214–1230. <https://doi.org/10.1002/csr.2265>.
- Baldi, F.; Pandimiglio, A. The Role of ESG Scoring and Greenwashing Risk in Explaining the Yields of Green Bonds: A Conceptual Framework and an Econometric Analysis. *Glob. Financ. J.* **2022**, *52*, 100711. <https://doi.org/10.1016/j.gfj.2022.100711>.

11. Smaoui, H.; Aassouli, D.; Elakhdar, Y. Does ESG Influence Bank Profitability? A Comparison Between Islamic and Conventional Banks. *Corp. Soc. Responsib. Environ. Manag.* **2025**, *32*, 6048–6065. <https://doi.org/10.1002/csr.70010>.
12. Buallay, A. Sustainability Reporting in Food Industry: An Innovative Tool for Enhancing Financial Performance. *Br. Food J.* **2022**, *124*, 1939–1958. <https://doi.org/10.1108/BFJ-01-2021-0053>.
13. Alghafes, R.; Karim, S.; Aliani, K.; Qureishi, N.; Alkayed, L. Influence of Key ESG Factors on Islamic Banks' Financial Performance: Evidence from GCC Countries. *Int. Rev. Econ. Financ.* **2024**, *96*, 103629. <https://doi.org/10.1016/j.iref.2024.103629>.
14. Gabr, D.H.; ElBannan, M.A. Is It Worth It to Go Green? ESG Disclosure, Carbon Emissions and Firm Financial Performance in Emerging Markets. *Rev. Account. Financ.* **2025**, *24*, 193–217. <https://doi.org/10.1108/RAF-01-2024-0027>.
15. Chen, Z.; Xie, G. ESG Disclosure and Financial Performance: Moderating Role of ESG Investors. *Int. Rev. Financ. Anal.* **2022**, *83*, 102291. <https://doi.org/10.1016/j.irfa.2022.102291>.
16. dos Santos, G.C.; Bazani, C.L.; Zambra, P. Beyond Profit: Do Mergers and Acquisitions and the Board of Directors Increase the Environmental, Social, and Governance? *Bus. Strateg. Environ.* **2026**. <https://doi.org/10.1002/bse.70534>.
17. Qachach, A.R.; El Mahrad, B.; Kharbouch, O.; Moumen, A.; El Aoufi, S.; El Gueddari, M.; Abdallah-Ou-Moussa, S. Bridging the ESG Data Gap: Transparent Metrics and Rankings for Emerging Financial Markets. *Int. J. Financ. Stud.* **2025**, *13*, 198. <https://doi.org/10.3390/ijfs13040198>.
18. Talan, G.; Sharma, G.D.; Pareira, V.; Muschert, G.W. From ESG to Holistic Value Addition: Rethinking Sustainable Investment from the Lens of Stakeholder Theory. *Int. Rev. Econ. Financ.* **2024**, *96*, 103530. <https://doi.org/10.1016/j.iref.2024.103530>.
19. Hsu, H.Y.; Chang, T.S. Institutionalizing ESG in SMEs: Insights From Transformational Leadership and Institutional Theory. *Bus. Strateg. Dev.* **2026**, *9*, e70264. <https://doi.org/10.1002/bsd2.70264>.
20. Zehir, E.; Aybars, A. Is There Any Effect of ESG Scores on Portfolio Performance? Evidence from Europe and Turkey. *J. Cap. Mark. Stud.* **2020**, *4*, 129–143. <https://doi.org/10.1108/JCMS-09-2020-0034>.
21. El Khoury, R.; Nasrallah, N.; Alareeni, B. ESG and Financial Performance of Banks in the MENAT Region: Concavity–Convexity Patterns. *J. Sustain. Financ. Investig.* **2023**, *13*, 406–430. <https://doi.org/10.1080/20430795.2021.1929807>.
22. Caldeira dos Santos, M.; Pereira, F.H. ESG Performance Scoring Method to Support Responsible Investments in Port Operations. *Case Stud. Transp. Policy* **2022**, *10*, 664–673.
23. Obeng, H.A.; Arhinful, R.; Mensah, L.; Mensah, C.C. The Mediating Role of Service Quality in the Relationship Between Corporate Social Responsibility and Sustainable Competitive Advantages in an Emerging Economy. *Bus. Strateg. Dev.* **2025**, *8*, e70099. <https://doi.org/10.1002/bsd2.70099>.
24. Bhandari, K.R.; Ranta, M.; Salo, J. The Resource-Based View, Stakeholder Capitalism, ESG, and Sustainable Competitive Advantage: The Firm's Embeddedness into Ecology, Society, and Governance. *Bus. Strateg. Environ.* **2022**, *31*, 1525–1537. <https://doi.org/10.1002/bse.2967>.
25. Rau, P.R.; Yu, T. A Survey on ESG: Investors, Institutions and Firms. *China Financ. Rev. Int.* **2024**, *14*, 3–33. <https://doi.org/10.1108/CFRI-12-2022-0260>.
26. Senadheera, S.S.; Withana, P.A.; Dissanayake, P.D.; Sarkar, B.; Chopra, S.S.; Rhee, J.H.; Ok, Y.S. Scoring Environment Pillar in Environmental, Social, and Governance (ESG) Assessment. *Sustain. Environ.* **2021**, *7*, 1960097. <https://doi.org/10.1080/27658511.2021.1960097>.
27. Mooneepen, O.; Abhayawansa, S.; Mamode Khan, N. The Influence of the Country Governance Environment on Corporate Environmental, Social and Governance (ESG) Performance. *Sustain. Account. Manag. Policy J.* **2022**, *13*, 953–985. <https://doi.org/10.1108/SAMPJ-07-2021-0298>.
28. Manning, B.; Braam, G.; Reimsbach, D. Corporate Governance and Sustainable Business Conduct—Effects of Board Monitoring Effectiveness and Stakeholder Engagement on Corporate Sustainability Performance and Disclosure Choices. *Corp. Soc. Responsib. Environ. Manag.* **2019**, *26*, 351–366. <https://doi.org/10.1002/csr.1687>.
29. Freeman, R.E. *Strategic Planning: A Stakeholder Approach*; Cambridge University Press: Cambridge, UK, 2010.
30. Liu, M.; Lu, J.; Liu, Q.; Wang, H.; Yang, Y.; Fang, S. The Impact of Executive Cognitive Characteristics on a Firm's ESG Performance: An Institutional Theory Perspective. *J. Manag. Gov.* **2025**, *29*, 145–173. <https://doi.org/10.1007/s10997-024-09695-y>.
31. Shakil, M.H.; Mahmood, N.; Tasnia, M.; Munim, Z.H. Do Environmental, Social and Governance Performance Affect the Financial Performance of Banks? A Cross-Country Study of Emerging Market Banks. *Manag. Environ. Qual. An. Int. J.* **2019**, *30*, 1331–1344. <https://doi.org/10.1108/MEQ-08-2018-0155>.
32. Shan, X.; Song, Y.; Song, P. How ESG Performance Impacts Corporate Financial Performance: A DuPont Analysis Approach. *Int. J. Clim. Chang. Strateg. Manag.* **2025**, *17*, 1–24. <https://doi.org/10.1108/IJCCSM-07-2024-0125>.

33. Yang, J.; Zuo, Z.; Li, Y.; Guo, H. Manufacturing Enterprises Move towards Sustainable Development: ESG Performance, Market-Based Environmental Regulation, and Green Technological Innovation. *J. Environ. Manag.* **2024**, *372*, 123244. <https://doi.org/10.1016/j.jenvman.2024.123244>.
34. Arayssi, M.; Jizi, M.; Tabaja, H.H. The Impact of Board Composition on the Level of ESG Disclosures in GCC Countries. *Sustain. Account. Manag. Policy J.* **2020**, *11*, 137–161. <https://doi.org/10.1108/SAMPJ-05-2018-0136>.
35. Elalfy, A.; Elgharbawy, A.; Driver, T.R.; Ibrahim, A.J. Sustainability Disclosure in the Gulf Cooperation Council (GCC) Countries: Opportunities and Challenges. *Green Financ.* **2025**, *7*, 40–83. <https://doi.org/10.3934/GF.2025003>.
36. Sassi, H.; Lassoued, N. ESG and Bank Stability in MENA Region: Examining the Mediating Role of Income Diversification. *J. Financ. Report. Account.* **2026**, 1–22. <https://doi.org/10.1108/jfra-03-2025-0233>.
37. El Khoury, R.; Nasrallah, N.; Alareeni, B. The Determinants of ESG in the Banking Sector of MENA Region: A Trend or Necessity? *Compet. Rev.* **2023**, *33*, 7–29. <https://doi.org/10.1108/CR-09-2021-0118>.
38. Raouf, H.; Ahmed, H. Risk Governance and Financial Stability: A Comparative Study of Conventional and Islamic Banks in the GCC. *Glob. Financ. J.* **2022**, *52*, 100599. <https://doi.org/10.1016/j.gfj.2020.100599>.
39. Dell’Erba, M.; Ferrarini, G. ESG & Executive Remuneration in Europe. *Eur. Bus. Organ. Law. Rev.* **2024**, *25*, 439–479. <https://doi.org/10.1007/s40804-024-00318-5>.
40. Srairi, S. ESG Performance in GCC Banks: The Influence of Ownership Structure, Risk Attitude and Board Characteristics in Islamic vs Conventional Contexts. *Sustain. Account. Manag. Policy J.* **2025**. <https://doi.org/10.1108/sampj-11-2024-1190>.
41. Carnevale, C.; Drago, D. Do Banks Price ESG Risks? A Critical Review of Empirical Research. *Res. Int. Bus. Financ.* **2024**, *69*, 102227. <https://doi.org/10.1016/j.ribaf.2024.102227>.
42. Belcaid, K. Morocco’s Green Shield: ESG Stock Performance under Global Climate, Economic, Geopolitical and Oil Uncertainties. *Sustain. Futur.* **2024**, *8*, 100250. <https://doi.org/10.1016/j.sft.2024.100250>.
43. Mahboub, R.; Ghanem, M. The Influence of ESG Dimensions on Financial Performance: Evidence from Egyptian Listed Firms. *Front. Sustain.* **2025**, *6*, 1566204. <https://doi.org/10.3389/frsus.2025.1566204>.
44. Al Amosh, H.; Khatib, S.F.A.; Alkurdi, A.; Bazhair, A.H. Capital Structure Decisions and Environmental, Social and Governance Performance: Insights from Jordan. *J. Financ. Report. Account.* **2024**, *22*, 972–989. <https://doi.org/10.1108/JFRA-12-2021-0453>.
45. Sandberg, H.; Alnoor, A.; Tiberius, V. Environmental, Social, and Governance Ratings and Financial Performance: Evidence from the European Food Industry. *Bus. Strateg. Environ.* **2023**, *32*, 2471–2489. <https://doi.org/10.1002/bse.3259>.
46. Chininga, E.; Alhassan, A.L.; Zeka, B. ESG Ratings and Corporate Financial Performance in South Africa. *J. Account. Emerg. Econ.* **2024**, *14*, 692–713. <https://doi.org/10.1108/JAEE-03-2023-0072>.
47. Ikram, M. Redesigning the Value Chain: A Net-Zero Circular Economy Approach to Resource Retention. *Bus. Strateg. Environ.* **2026**. <https://doi.org/10.1002/bse.70591>.
48. Mani, V.; Jabbour, C.J.C.; Mani, K.T.N. Supply Chain Social Sustainability in Small and Medium Manufacturing Enterprises and Firms’ Performance: Empirical Evidence from an Emerging Asian Economy. *Int. J. Prod. Econ.* **2020**, *227*, 107656. <https://doi.org/10.1016/j.ijpe.2020.107656>.
49. Huang, D.Z.X. Environmental, Social and Governance (ESG) Activity and Firm Performance: A Review and Consolidation. *Account. Financ.* **2021**, *61*, 335–360. <https://doi.org/10.1111/acfi.12569>.
50. Zhang, Y.; Shang, K. Evaluation of Mine Ecological Environment Based on Fuzzy Hierarchical Analysis and Grey Relational Degree. *Environ. Res.* **2024**, *257*, 119370. <https://doi.org/10.1016/j.envres.2024.119370>.
51. Sun, X.; Hu, Z.; Li, M.; Liu, L.; Xie, Z.; Li, S.; Wang, G.; Liu, F. Optimization of Pollutant Reduction System for Controlling Agricultural Non-Point-Source Pollution Based on Grey Relational Analysis Combined with Analytic Hierarchy Process. *J. Environ. Manag.* **2019**, *243*, 370–380. <https://doi.org/10.1016/j.jenvman.2019.04.089>.
52. Chakraborty, S.; Datta, H.N.; Chakraborty, S. Grey Relational Analysis-Based Optimization of Machining Processes: A Comprehensive Review. *Process Integr. Optim. Sustain.* **2023**, *7*, 609–639. <https://doi.org/10.1007/s41660-023-00311-4>.
53. Bloomberg Scorecard Bloomberg ESG Scores. Available online: <https://www.bloomberg.com/esg> (accessed on 4 January 2026).
54. Aydoğmuş, M.; Gülay, G.; Ergun, K. Impact of ESG Performance on Firm Value and Profitability. *Borsa Istanbul. Rev.* **2022**, *22*, S119–S127. <https://doi.org/10.1016/j.bir.2022.11.006>.
55. Chau, L.; Anh, L.; Duc, V. Valuing ESG: How Financial Markets Respond to Corporate Sustainability. *Int. Bus. Rev.* **2025**, *34*, 102418. <https://doi.org/10.1016/j.ibusrev.2025.102418>.
56. Ju-Long, D. Control Problems of Grey Systems. *Syst. Control Lett.* **1982**, *1*, 288–294. [https://doi.org/10.1016/S0167-6911\(82\)80025-X](https://doi.org/10.1016/S0167-6911(82)80025-X).

57. Abid, N.; Ikram, M.; Wu, J.; Ferasso, M. Towards Environmental Sustainability: Exploring the Nexus among ISO 14001, Governance Indicators and Green Economy in Pakistan. *Sustain. Prod. Consum.* **2021**, *27*, 653–666. <https://doi.org/10.1016/j.spc.2021.01.024>.
58. Javed, S.A.; Liu, S. Evaluation of Outpatient Satisfaction and Service Quality of Pakistani Healthcare Projects. *Grey Syst. Theory Appl.* **2018**, *8*, 462–480. <https://doi.org/10.1108/gs-04-2018-0018>.
59. Liu, S.; Yang, Y.; Cao, Y.; Xie, N. A Summary on the Research of GRA Models. *Grey Syst.* **2013**, *3*, 7–15. <https://doi.org/10.1108/20439371311293651>.
60. Ikram, M.; Nahdi, R. Toward Sustainable Development: Unfolding the Nexus among Exports, Foreign Direct Investment, Capital Formation, Natural Resource Rent, Unemployment, and Low-Carbon Transition in Morocco. *Resour. Policy* **2025**, *102*, 105490. <https://doi.org/10.1016/j.resourpol.2025.105490>.
61. Javed, S.A.; Liu, S. Bidirectional Absolute GRA/GIA Model for Uncertain Systems: Application in Project Management. *IEEE Access* **2019**, *7*, 60885–60896. <https://doi.org/10.1109/ACCESS.2019.2904632>.
62. Javed, S.A.; Khan, A.M.; Dong, W.; Raza, A.; Liu, S. Systems Evaluation through New Grey Relational Analysis Approach: An Application on Thermal Conductivity-Petrophysical Parameters' Relationships. *Processes* **2019**, *7*, 348. <https://doi.org/10.3390/pr7060348>.
63. Pulino, S.C.; Ciaburri, M.; Magnanelli, B.S.; Nasta, L. Does ESG Disclosure Influence Firm Performance? *Sustainability* **2022**, *14*, 7595. <https://doi.org/10.3390/su14137595>.
64. Zheng, Z.; Li, J.; Ren, X.; Guo, J.M. Does Corporate ESG Create Value? New Evidence from M&As in China. *Pac. Basin Financ. J.* **2023**, *77*, 101916. <https://doi.org/10.1016/j.pacfin.2022.101916>.
65. Martínez-Ferrero, J.; Lozano, M.B. The Nonlinear Relation between Institutional Ownership and Environmental, Social and Governance Performance in Emerging Countries. *Sustainability* **2021**, *13*, 1586. <https://doi.org/10.3390/su13031586>.
66. Zhao, W.; Yang, X.; Sun, N. Do Digital City Policies Promote Corporate ESG Performance? Evidence from Research on Textual Analysis of China. *Emerg. Mark. Financ. Trade* **2024**, *60*, 2960–2979. <https://doi.org/10.1080/1540496X.2024.2331013>.
67. Liu, S.; Tao, Y.; Xie, N.; Tao, L.; Hu, M. Advance in Grey System Theory and Applications in Science and Engineering. *Grey Syst.* **2022**, *12*, 804–823. <https://doi.org/10.1108/GS-09-2021-0141>.
68. Abdullah, A.; Talha, M.; Hadi, N.U. The Effects of ESG Performance on Financial Performance: Evidence From GCC Countries. *Corp. Soc. Responsib. Environ. Manag.* **2025**, *33*, 2570–2587. <https://doi.org/10.1002/csr.70301>.
69. Jizi, M.I.; Arayssi, M. Do Investors Value GCC Firms' Social Performance? *Int. J. Discl. Gov.* **2026**, *23*, 23–35. <https://doi.org/10.1057/s41310-024-00274-z>.
70. Sadriwala, K.F.; Shannaq, B.; Sadriwala, M.F. Gcc Cross-National Comparative Study on Environmental, Social, and Governance (Esg) Metrics Performance and Its Direct Implications for Economic Development Outcomes. In *Studies in Systems, Decision and Control*; Springer: Berlin/Heidelberg, Germany, 2024; Volume 525, pp. 429–441.
71. Tahmid, T.; Hoque, M.N.; Said, J.; Saona, P.; Azad, M.A.K. Does ESG Initiatives Yield Greater Firm Value and Performance? New Evidence from European Firms. *Cogent Bus. Manag.* **2022**, *9*, 2144098. <https://doi.org/10.1080/23311975.2022.2144098>.
72. Namoussi, F.Z.; Cherqaoui, M. Legal Obligation of ESG Reporting and the Quality of Environmental Disclosure Practices: The Case of Moroccan Listed Industrial Companies. *Int. J. Law. Manag.* **2025**, *67*, 445–458. <https://doi.org/10.1108/IJLMA-12-2023-0269>.
73. ElHawary, E.; Elbolok, R. The Implications of COVID-19 on ESG Performance and Financial Reporting Quality in Egypt. *J. Financ. Report. Account.* **2024**, *24*, 1142–1173. <https://doi.org/10.1108/JFRA-08-2023-0469>.
74. Oluwakemi, A.A.; Mishelle, D. Effect of ESG Financial Materiality on Financial Performance of Firms: Does ESG Transparency Matter? *J. Risk Financ. Manag.* **2025**, *18*, 315. <https://doi.org/10.3390/jrfm18060315>.
75. Handoyo, S.; Anas, S. The Effect of Environmental, Social, and Governance (ESG) on Firm Performance: The Moderating Role of Country Regulatory Quality and Government Effectiveness in ASEAN. *Cogent Bus. Manag.* **2024**, *11*, 2371071. <https://doi.org/10.1080/23311975.2024.2371071>.
76. Lee, F.P.; Kiong Ting, I.W.; Lu, W.M. Driving Sustainability: ESG and Business Strategy in Global Autonomous Driving Industry. *Technol. Soc.* **2026**, *85*, 103225. <https://doi.org/10.1016/j.techsoc.2026.103225>.
77. Sherwood, M.W.; Pollard, J.L. The Risk-Adjusted Return Potential of Integrating ESG Strategies into Emerging Market Equities. *J. Sustain. Financ. Investig.* **2018**, *8*, 26–44. <https://doi.org/10.1080/20430795.2017.1331118>.
78. Mohamed Buallay, A.; Al Marri, M.; Nasrallah, N.; Hamdan, A.; Barone, E.; Zureigat, Q. Sustainability Reporting in Banking and Financial Services Sector: A Regional Analysis. *J. Sustain. Financ. Investig.* **2023**, *13*, 776–801. <https://doi.org/10.1080/20430795.2021.1978919>.

79. Ziolo, M.; Bąk, I.; Cheba, K.; Filipiak, B.Z.; Spoz, A. Environmental, Social, Governance Risk versus Cooperation Models between Financial Institutions and Businesses. Sectoral Approach and ESG Risk Analysis. *Front. Environ. Sci.* **2023**, *10*, 1077947. <https://doi.org/10.3389/fenvs.2022.1077947>.
80. Sardana, D.; Gupta, N.; Kumar, V.; Terziovski, M. CSR ‘Sustainability’ Practices and Firm Performance in an Emerging Economy. *J. Clean. Prod.* **2020**, *258*, 120766. <https://doi.org/10.1016/j.jclepro.2020.120766>.
81. Pain, P.; dos Santos, G.C.; Marques, V.A. Shifting the Balance: How ESG Transformed Corporate Debt in Emerging and Developed Markets Post-COP21. *Asian J. Account. Res.* **2025**, *11*, 22–42. <https://doi.org/10.1108/AJAR-12-2024-0498>.
82. Opuni-Frimpong, J. Climate Risk and Financial Performance Amid Crisis: A Sectoral Comparison of Listed Firms in Ghana. *Bus. Strateg. Dev.* **2025**, *8*, e70198. <https://doi.org/10.1002/bsd2.70198>.
83. Al-Hiyari, A. Does Top Executive Gender Diversity Matter for the Value Relevance of ESG Controversies? Empirical Evidence from European Tech Firms. *J. Account. Organ. Change* **2024**. <https://doi.org/10.1108/JAOC-01-2024-0009>.
84. Barros, V.; Verga Matos, P.; Miranda Sarmento, J.; Rino Vieira, P. High-Tech Firms: Dividend Policy in a Context of Sustainability and Technological Change. *Technol. Forecast. Soc. Change* **2023**, *190*, 122434. <https://doi.org/10.1016/j.techfore.2023.122434>.
85. Ning, Y.; Shen, B. Environmental Regulations, Finance, and Firm Environmental Investments: An Empirical Exploration. *Total Qual. Manag. Bus. Excell.* **2024**, *35*, 713–738. <https://doi.org/10.1080/14783363.2024.2329691>.

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.