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IMPACT OF ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) PERFORMANCE ON FIRM PERFORMANCE IN THAILAND STOCK EXCHANGE: INTERACTION EFFECT OF MANAGERIAL EFFICIENCY

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Abstract

This study aims to use stakeholder-agency theory to investigate the relationship between environmental, social, and governance (ESG) performance and firm performance (measured by ROA and Tobin's Q) in the Stock Exchange of Thailand (SET), with a particular focus on whether managerial efficiency has a moderating effect on this relationship. The sample for this study comprised all companies listed in the SET from 2016 to 2021, resulting in a total of 2,104 firm-year observations. The PROCESS analysis technique developed by Hayes (2013) was utilized to analyze the data.

The study found that there was no significant impact of ESG performance on firm performance. However, when considering managerial efficiency, the relationship between ESG performance and firm performance becomes stronger and positive. This moderating effect of managerial efficiency has been neglected in previous research, making this study a valuable contribution to the ESG literature. These findings indicate that both managerial effectiveness and ESG performance should be viewed as interdependent aspects of effective stakeholder management. Moreover, the study emphasizes the importance of implementing ESG regulations in Thailand to encourage sustainable development.

Keyword: ESG, managerial efficiency, firm performance

1. INTRODUCTION

The primary factors contributing to the current global crisis stem from people's excessive consumption, which depletes global resources and leads to scarcity. This trend of increased resource use creates an ecological imbalance and exacerbates social inequality. The COVID-19 pandemic, as well as issues such as climate change, environmental degradation, the digital divide, and global cybersecurity concerns (Bombardier Inc, 2021), have far-reaching consequences on human life and the business sector. According to the 16th edition of the World Economic Forum's Global Risks Report 2021, the world is highly likely to face severe climate change crises, the failure of climate management, and environmental issues caused by human

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behavior in the next decade. These problems affect not only the general public but also the business sector, which may need to adapt for sustainable growth that benefits all parties, as traditional profit-focused business models may no longer be appropriate for the current and future contexts. This is the foundation of the framework that drives sustainable business growth, which is increasingly recognized and accepted today, focusing on three crucial dimensions: environmental dimension (E), social dimension (S) and corporate governance dimension (G) or ESG

ESG plays a crucial role in providing a framework for the procurement, production, and delivery of goods and services, building trust among customers, partners, investors, and supply chain stakeholders, and reducing the risk of disruptions in the production process (SET, 2019). It also enables organizations to manage suppliers sustainably (SET, 2022), resulting in higher revenues, lower costs, and reduced risks of non-compliance. Organizations that consider their supply chain will earn up to 5-20% more revenue, reduce costs by 5-15%, increase product value by 10-25%, and reduce the risk of counterparties not complying with their agreement (World Economic Forum, 2015). ESG can have a positive impact on an organization's reputation and financial performance by supporting the implementation of sustainable production processes, such as using solar energy in factories, or converting waste into fuel and developing value-added products that reduce production costs. Additionally, creating environmentally friendly products and services, such as energy-efficient building materials or electric vehicles, can add value to products, lead to expansion in to new markets, and increase revenue from customers who prioritize environmental concerns. Thus, ESG efforts can help companies build competitive advantages in the long run, especially in the current market where consumers tend to choose socially and environmentally responsible companies, reflecting their effectiveness (Dkhili, 2023).

Efficient management is crucial for a company's success. According to a review of the literature spanning the past decade, managerial efficiency has a significant impact on various aspects related to revenue generation (Demerjian et al., 2012). This includes the disclosure of CSR performance (Sun, 2017; Chen & Chen, 2020). If a company has high managerial efficiency, it reflects a positive business outlook and is attractive to invest in. Companies that implement ESG practices with high managerial efficiency can reduce investment risks, as they have standardized business models and risk management processes. This is seen as an appealing business opportunity by investors (Velte, 2020; Dkhili, 2023). On the other hand, if a company has excellent ESG performance but low managerial efficiency, it may suggest that ESG is being used solely for image purposes and to create a positive perception in the eyes of investors.

Velte's (2020) research explored the impact of CEO power on the relationship between ESG and financial performance, with findings showing that CEO power moderates the relationship between ESG and market performance. In contrast, this study focuses on the role of managerial efficiency in the relationship between ESG and firm performance (as measured by ROA and Tobin's Q) by examining the overall effect of ESG on firm performance, using both accounting-based and market-based financial success indicators. The results of this study will elucidate how ESG influences firm performance, particularly for a listed company in Thailand, and the role of managerial efficiency in establishing this relationship will be determined.

This study aims to address a gap in the current literature by examining how managerial efficiency affects the impact of ESG on firm performance, specifically in Thailand, and to provide new insights on the importance of managerial efficacy in supporting the relationship between ESG and financial success, which will add significant value to the existing body of literature on this topic.

2. Theoretical Framework, Literature Review and Hypothesis Development

2.1 Theoretical Framework

Companies that exhibit positive environmental, social, and governance (ESG) performance see it as a proxy for risk management, ethical responsibility, and long-term profitability. As investors prioritize sustainable investing, corporate openness regarding ESG concerns has evolved as a critical component of modern corporate governance. Incorporating ESG into company plans is both a response to investor expectations and a proactive approach to risk avoidance. Companies with strong ESG policies are better positioned to deal with legislative changes, reputational risks, and operational disruptions, promoting resilience in a changing market context (Alsayegh et al., 2020). Furthermore, companies that actively manage their ESG effect frequently report increased brand loyalty, lower costs, and operational efficiencies, all of which contribute to long-term financial performance (Rezaee, 2016). Companies that want to produce long-term value must integrate ESG goals into their fundamental strategy and operations. This can involve setting carbon emission reduction targets, developing sustainable supply chain procedures, promoting workforce diversity and inclusion, and implementing transparent governance processes. Companies that routinely report on ESG performance and engage with stakeholders can increase their market position and promote trust among investors, consumers, and employees. In this environment, the function of disclosure and reporting systems is critical. Frameworks such as the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) provide mechanisms for standardized ESG reporting, allowing businesses to connect their sustainability activities with investor expectations and regulatory requirements. This alignment can help a firm gain a competitive advantage by positioning it as a sustainability leader and, as a result, increasing its entire corporate value (Del Gesso & Lodhi, 2024).

According to Khan et al. (2016), revealing governance-related information such as board diversity, anti-corruption practices, CEO compensation, and shareholder rights can provide important insights into a company's value generation strategy. This transparency reassures investors and stakeholders, increasing their trust in the company's ethical commitment and strategic congruence with their goals. The social pillar disclosure is similarly important because it demonstrates a company's commitment to fulfilling its social obligation. Information on employee and community interactions, working conditions, gender equity, and human rights compliance helps align corporate activities with social values and ethical standards. Environmental disclosure, on the other hand, refers to a company's role in addressing climate and environmental issues. Efforts to reduce carbon emissions and use responsible resources demonstrate proactive risk management, providing stakeholders with insight into how the organization reduces its environmental effect (Haque, 2017; Del Gesso & Lodhi, 2024). Companies use this complete ESG disclosure to disclose non-financial information that is critical for creating sustainable value.

Chiu (2022) and Gao et al. (2024) contribute to this viewpoint by investigating major ideas that support business sustainability, such as stakeholder and agency theories. Stakeholder theory emphasizes the significance of considering the interests of all parties affected by business actions, whereas agency theory emphasizes corporate managers' responsibilities to align with shareholder aspirations. These theoretical frameworks emphasize the complex character of business sustainability and lay the groundwork for understanding the strategic integration of ESG elements in long-term value generation.

2.1.1 Agency Theory

Agency theory, as articulated by Jensen & Meckling (1976), underscores the tensions

stemming from divergent interests and knowledge asymmetry between principals (shareholders) and agents (managers). Shareholders confer decision-making authority to managers with the anticipation of optimizing corporate value. Nevertheless, when managers possess authority over choices, they may prioritize their own interests over those of shareholders, especially in the absence of transparency (Fama & Jensen, 1983)

This discrepancy frequently results in "agency conflicts", wherein managers' actions diverge from shareholders' value-maximizing objectives, exacerbated by varying risk tolerances, contradictory goals, and transaction costs. Stein (2003) identifies overinvestment and underinvestment as two prevalent expressions of these conflicts. Overinvestment transpires when managers allocate significant capital to projects with marginal profitability, frequently motivated by self-interest or the ambition to enhance their control over resources (Hu et al., 2019). Underinvestment occurs when managers eschew high-potential projects due to risk aversion or self-preservation, resulting in the forfeiture of prospective profits and organizational progress (Gao et al., 2024). Studies based on agency theory indicate that both excessive and insufficient investment can adversely affect firm performance by diminishing profitability, growth, and overall firm value. Naciti et al., (2022) found that investments that are not aligned with the company's goals make it harder for the company to achieve its full financial potential and can prevent it from creating long-term value. This shows how important strong corporate governance is to avoid agency conflicts and make sure that management decisions are in line with what's best for shareholders.

2.1.2 Stakeholder Theory

Stakeholder theory suggests a more comprehensive approach to corporate objectives that considers the interests of all parties affected by a firm's actions, not just its shareholders. The corporation has more extensive objectives. Unlike shareholder-focused models, stakeholder theory considers the needs and interests of all parties impacted by a company's operations, including employees, communities, and the environment (Parmar et al., 2010), highlighting the significance of stakeholder support. The theory underscores the need for businesses to foster positive, reciprocal relationships with these groups, acknowledging the profound interdependence of a company's success with the support of its employees, local communities, and environmental sustainability (Mayer, 2021). This method expands the scope of corporate thinking beyond shareholder primacy, advocating for a sustainable, socially responsible perspective that acknowledges the broader repercussions of corporate decisions on society and the environment (Gao et al., 2024).

According to Freeman (1984), a stakeholder is "any group or individual who can influence or be affected by the achievement of the organization's objectives". The purpose of stakeholder theory is to connect a firm with all other entities involved in it. Stakeholders play an active part in determining social control. As a result, this theory contends that businesses should prioritize performance improvements that suit the demands of all stakeholders, including the economy, society, and the environment (Dkhili, 2023). The disclosure of ESG information to stakeholders, which is crucial to meeting this goal, further demonstrates the company's commitment to sustainability. Companies can better articulate their goals and concerns by adding stakeholders' interests into the reporting process (Muaaz & Ali, 2024).

Stakeholder theory and agency theory are relevant to the concept of corporate social responsibility and are connected to factors, such as corporate governance, stakeholder engagement, and transformational leadership. Additionally, the relationship between transformational leadership and stakeholder engagement is found to have a significant positive impact (Velte, 2020; Napoletano & Curry, 2022; Viererbl & Koch, 2022; Dkhili, 2023; Maji & Lohia, 2023; Wang et al., 2023). In addition, stakeholder theory and agency theory indicate that companies with efficient ESG operations will use assets and expenses that help create

value for the company and result in revenue growth, affecting financial strength within the company, as well as higher business value. The relationship between ESG and performance implies that investing in ESG may develop new internal resources and create external benefits through the reputation of the company (Albitar et al., 2020; Bhandari & Salo, 2022; Yoo & Managi, 2022; Gurol & Lagasio, 2023).

2.2 Impact of Environmental, Social and Governance on Firm Performance

According to stakeholder theory, most empirical studies have found a positive relationship between ESG and firm performance. However, several studies have identified a conflicting relationship. For example, Alareeni & Hamdan (2020) conducted a study on how ESG impacted performance of US S&P 500-listed firms. They discovered that ESG disclosure had a positive impact on ROA, ROE and Tobin's Q. However, the environmental dimension had a negative impact on ROA, ROE and Tobin's Q, as environmental issues increase the cost of financing and lower profitability. However, environmental performance disclosures have a positive impact on Tobin's Q. This evidence suggests that environmental disclosures are important to market value. It is found that companies listed in the S&P 500 tend to disclose their environmental performance as part of their strategy to plan and create added value for the company. As a result, high-scoring environmental performance disclosure can attract investors. There is also an increase in demand for stocks and investments. Disclosure of Corporate Governance (CG) performance also has a positive impact on ROA and Tobin's Q, which demonstrates that a high CG score is a key factor in improving performance for the best interests of shareholders and other stakeholders.

Duque-Grisales & Aguilera-Caracuel (2021) found a negative correlation of ESG and ROA in emerging markets of multinationals in Latin America. The findings indicate that companies that received high ESG scores experienced reduced operating profits, implying that the expenses incurred in ESG operations did not lead to improved efficiency. As a result, investors and shareholders may not receive the expected returns on their investments.

Similarly, Tampakoudis et al. (2021) investigated the negative trend observed when ESG performance affected shareholder wealth for companies that underwent mergers and acquisitions (M&A) before and during the COVID-19 pandemic. The study, which analyzed 19 US companies, revealed that the negative effect was more significant during the pandemic. In line with shareholder theory, it may be necessary to cut sustainability costs during economic crises, as crises require greater flexibility in resource allocation.

Another aspect, which is less evident from the past literature, is that ESG performance has no correlation with firm performance. Utz et al., (2014) analyzed the relationship between ESG score and stock prices from the Thomson Reuters Datastream by using a rolling window approach where each window had a length of 120 months and ended on a date that the fund reported its portfolio composition. They found that investors were unconvinced that ESG reflects CSR performance and that higher ESG scores will deliver high long-term returns. Similarly, Junius et al., (2020) studied the impact of ESG on firm performance and market value, focusing on four ASEAN countries (Indonesia, Malaysia, Singapore, and Thailand). The study found no significant influence of ESG on firm performance and market value since ESG is not yet a part of firm performance measurement.

Furthermore, Amel-Zadeh & Serafeim (2018) suggested that investors still require a clear understanding of the careful use of ESG data in all dimensions as various studies have presented conflicting issues from the past to the present. In other words, ESG is not only a value-added dimension, but ESG performance has a negative impact on firm performance. Moreover, certain studies have suggested that ESG is not correlated with higher or lower firm performance and firm value. However, there were differences in the research methodology,

such as ESG measurement, sample group, and study period. Thus, conducting a study on ESG is also important to provide evidence of different dimensions.

This study is based on stakeholder theory and the empirical results of previous studies pointing out that ESG had a positive correlation with firm performance (ROA and Tobin's Q). The results revealed that potential ESG implementation can enhance firm performance. According to stakeholder theory, it is assumed that the impact on firm performance strategy regarding ESGs must continuously work in order to meet stakeholder expectations (Velte, 2020). Thus, the hypotheses are given as follows:

H1a. ESG performance increases ROA.
H1b. ESG performance increases Tobin's Q.

2.3 Moderator Effect of Managerial Efficiency

2.3.1 Impact of Managerial Efficiency on Firm Performance

Managerial efficiency refers to the expertise, abilities, and effort employed by the CEO or others to make successful business decisions. In this work, we define managerial efficiency as the ability of the senior management team to convert company resources into income. Demerjian et al. (2012) indicate that management efficiency is associated with improved company performance. According to Simamora (2023), managers who are more efficient possess greater knowledge, skills, and information, enabling them to reap benefits and reduce costs from taking risks, thereby enhancing the success of their companies. Inam Bhutta et al. (2021) looked at how more able managers increase firm performance while less able managers reduce firm performance. Phan (2021) showed that managerial efficiency can influence firm decisions and its corresponding business policies. Meanwhile, Ting et al. (2021) provided early evidence that levels of debt are likely observed in firms where CEOs have low efficiency; managerial efficiency positively affects firm performance.

In conclusion, managerial efficiency is a critical factor in the development of firm performance, as it facilitates strategic insight, risk management, operational efficiency, adaptability, and stakeholder trust. Thus, high-ability managers are instrumental in the development of sustainable, long-term growth and resilience in a competitive business environment.

2.3.2 Impact of Managerial Efficiency on Environmental, Social and Governance

ESG can improve performance if managers have higher abilities. Besides stemming from personal cognitive abilities, managerial ability extends beyond mere knowledge in a specific field (Sun, 2017). Managers who possess a greater understanding of industry dynamics and business operations are capable of conducting more precise assessments of the company's conditions to enhance the company's information disclosures (García-Sánchez et al., 2020). Managers are more inclined to implement voluntary disclosure as an element of the organization's sustainable policy during the ESG decision-making process. According to Shehata (2014); Sun (2017); and Kao et al. (2024), mandatory disclosure requirements deem a voluntary sustainability report superior because it contains a greater amount of information. To establish a competitive edge for the organization, managers will not only implement ESG in response to stakeholder demands but also acknowledge the significance of furnishing stakeholders with dependable ESG information.

Lee et al. (2023) discovered that successful companies prioritize ESG implementation by raising awareness of ESG and integrating it into their overall strategy. Additionally, executives place emphasis on ESG reporting in line with annual reporting criteria to improve disclosure efficiency. Sustainability committees have been established to oversee and drive the

ESG agenda, with some companies even assigning ESG duties and responsibilities to them. Listed companies are more likely to establish such committees than non-listed ones. Lastly, improving corporate sustainability can lead to several positive impacts, including efficient operations, cost reduction, improved brand image and credibility, and better risk management (SET, 2023).

Stakeholder theory and agency theory confirm the link between managerial efficiency and CSR performance. This suggests that the effectiveness of senior management impacts strategic decisions, sustainable business operations, and business outcomes. Welch & Yoon (2022) found that managers with greater efficiencies can optimize ESG performance, leading to improved firm performance due to their skills, expertise, experience, and the knowledge necessary to promote business innovation, which is crucial for business survival and growth (Shao et al., 2020). Previous studies have shown that educational and skill-related characteristics enhance innovation and lead to higher performance (Andreou et al., 2015; Shao et al., 2020; Zhang, 2023). Other studies (Demerjian et al., 2012; Cox, 2017; Xu et al., 2022) have found that managerial efficiency improves both accounting- and market-based performance. This suggests that ESG performance by capable managers can lead to innovation benefits that enhance business performance. In other words, if a company has efficient management, the relationship between ESG and company performance may be strengthened.

Thus, the hypotheses are presented as follows:

H2a. ESG performance has a positive effect on ROA for higher managerial efficiency.

H2b. ESG performance has a positive effect on Tobin's Q for higher managerial efficiency.

3. METHODOLOGY

3.1 Study Model

The dependent variable of this study is firm performance, which consists of two components: financial and market performance. We also consider control variables (Velte, 2020; Albitar et al., 2020; Dkhili, 2023). The equation below is used to present the link between ESG performance and firm performance.

$$Perf_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ME_{it} + \beta_3 ESG * ME_{it} + \beta_4 LogFS_{it} + \beta_5 LEV_{it} + \beta_6 GROWTH_{it} + Year/Industry\ Fixed\ Effects + \varepsilon_{it}$$

This equation is further divided into two sub-equations based on the following performance criteria:

$$ROA_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ME_{it} + \beta_3 ESG * ME_{it} + \beta_4 LogFS_{it} + \beta_5 LEV_{it} + \beta_6 GR_{it} + Year/Industry\ Fixed\ Effects + \varepsilon_{it}$$

$$TQ_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ME_{it} + \beta_3 ESG * ME_{it} + \beta_4 LogFS_{it} + \beta_5 LEV_{it} + \beta_6 GR_{it} + Year/Industry\ Fixed\ Effects + \varepsilon_{it}$$

where Perf represents the dependent variable which is firm performance measured against two models (ROA and TQ). β_0 represents the constant while β_{1-6} represent the slopes of the independent and controls variables.

3.2 Data and Sample

The sustainable report and SET Smart database were used to create a list of Thai-listed companies involved in ESG activities during the 2016-2021 period. The study began in 2016 due to the adoption of the United Nations Sustainable Development Goals (SDGs) in 2015 and the subsequent development of Guidance on core indicators (GCI) for corporate reporting by the Economic and Social Council (ECOSOC). The GCI, published in 2019, represents the minimum disclosure that an entity must provide to demonstrate its contribution to the SDGs and assess its ESG impact. This research approach considers that each entity has varying levels of performance and is at different stages of its sustainability reporting journey. Instead of establishing a new normative indicator, data were collected before the GCI's publication in 2019 as indicators are reported in the current reporting framework and the information disclosure guidelines used by companies (e.g. IFRS, IIRC, SASB, GRI, Global Compact). This allows for a basic measure to be established, which can then be expanded to provide more specific information for specific report users or those requiring more specific information.

The non-probability sampling method used in this study is purposive sampling, where the sample is selected based on specific research criteria from the available population. The final sample included 2,104 observations for the years 2016-2021, representing 373 public firms in Thailand. The process of sample selection is outlined in Table 1.

Table 1 Sample Selection and Distribution

Sample selection process	Firms
The listed firms in the Stock Exchange of Thailand (SET)	658
Less: The listed companies which are subject to possible delisting	15
Less: Property funds and real estate investment trusts	68
Less: Financial sector companies	67
Less: Firms with inadequate data to create variables, as well as data outliers	135
Number of unique firms	*373*
Number of observations	*2,104*

3.3 Main Variables

3.3.1 Response Variable

The study's response variable is firm performance, which is measured by two measures: ROA and Tobin's Q. ROA is used to measure accounting-based performance, whereas Tobin's Q is used to measure market-based performance. A combination of these measurements is typically used in empirical studies focusing on ESG and firm performance, as evidenced by previous studies (Alareeni & Hamdan, 2020; Albitar et al., 2020; Velte, 2020; Duque-Grisales & Aguilera-Caracuel, 2021; Tampakoudis et al., 2021; Dkhili, 2023). ROA is calculated by dividing net income by total assets, while Tobin's Q is calculated by dividing the market value of equity and debt capital by total assets.

3.2.2 Covariates Variable

The methodology for designing ESG performance is considered an independent variable. The environmental criteria for this study involve assessing carbon emissions (GHGs), water usage, and waste generation. The social criteria include examining employee injury rates, employee turnover, and personnel costs, as outlined by the United Nations in 2019. The disclosure proportion of large companies trading on a given stock exchange is used to measure the E and S factors (Velte, 2020). To evaluate governance performance, daily calculations were conducted based on the Thai Institute of Directors Association (IOD). Finally, the overall ESG

score was determined by assigning weights of 24%, 35%, and 41% to the E, S, and G factors, respectively (SEC, 2023).

The moderator variable in this study was managerial efficiency (ME), which is measured based on industry and year, as developed by Demerjian et al. (2012). A higher score indicates a higher efficiency of manager. To proxy the construct of managerial efficiency, a two-step method was used. In the first stage, data envelopment analysis (DEA) was used to measure efficiency by using seven inputs (inventory carrying costs, selling and administrative expenditures, property, plant and equipment, operating leases, research and development costs, goodwill, and other intangible assets) divided by revenue to represent outputs (firm efficiency). In the second stage, total firm efficiency was regressed on various company characteristics, including firm size, market share, free cash flow ratio, life cycle, firm age, number of segments, and a dummy variable for foreign currency.

To address endogeneity concerns, based on the literature on ESG performance, firm performance, and managerial efficiency, the research model includes control variables and industry and year fixed effects (Albitar et al., 2020; Velte, 2020; Xu et al., 2022). The control variables include firm size (SIZE), which is measured by the natural logarithm of total assets, as larger firms often have economies of scale that may be difficult to replicate. Previous research has also shown that firm size is related to stakeholders' interest in a firm's ESG activities. Firm leverage is separated into two risk factors: the ratio of total debt to total equity (LEV) as a proxy for unsystematic risk, and firm growth (GR) which measures the percentage change in sales and indicates whether the firm has been growing compared to the previous year (Velte, 2020; Albitar et al., 2020; Dkhili, 2023).

4. DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Descriptive Statistics and Normality Test

Table 2 Descriptive Statistics and Normality Test on the Variables of the Study

Variables	Mean	Median	SD	Min	Max	Skewness	Kurtosis
Panel A: ESG performance							
ESG	0.592	0.478	0.257	0.296	1.000	0.678	-1.219
E	0.321	0.000	0.444	0.000	1.000	0.791	-1.290
S	0.517	0.286	0.326	0.143	1.000	0.604	-1.335
G	0.813	0.800	0.157	0.600	1.000	-0.119	-1.375
Panel B: firm performance							
ROA	0.049	0.043	0.072	-0.193	0.299	0.373	2.071
TQ	1.423	1.165	0.700	0.524	3.055	0.998	-0.185
Panel C: moderator variable							
ME	0.743	0.714	0.355	0.002	1.799	0.867	1.167
Panel D: control variables							
Log_FS	15.934	15.677	1.540	13.016	20.848	0.670	0.063
LEV	0.876	0.736	0.599	0.102	2.356	0.442	-1.037
GR	0.037	0.022	0.217	-0.389	0.594	0.519	0.208

Table 2 presents a summary of the descriptive statistics for the variables in this model. Panel A contains the ESG scores, which range from 0 to 1. The mean and median values for ESG are 0.592 and 0.478, respectively. Considering each aspect individually, the mean and median values of the environmental dimension (E) are 0.321 and 0.00 respectively. For the

social dimension (S) the mean and median values are 0.517 and 0.286 respectively, while for governance (G), the mean and median values of are 0.813 and 0.800 respectively. The S scores are higher than the others. Panel B displays the firm performance variables, with the mean and median values of return on assets (ROA) at 0.049 and 0.043 respectively. The Tobin's Q (TQ) values yield a mean of 1.423 and median of 1.165. Panel C shows the moderator variable (ME) has a mean of 0.743 and median of 0.714. Panel D provides descriptive statistics for the control variables, such as firm size (FS), log of firm size (LogFS), leverage (LEV), and firm growth (GR), with means of 15.934, 0.876, and 0.037, respectively, and medians of 15.677, 0.876, and 0.037, respectively.

As shown in Table 2, the range of skewness was between -0.119 and 0.998, while the range of kurtosis was between -1.375 and 2.071. These values suggest that the data in the sample had a normal distribution as they fall within the suggested threshold values of ± 3 for skewness and ± 10 for kurtosis, as advised by Kline (2016).

4.2 Variable Diagnostics

Table 3 Results of the correlation and Auto-Correlation Analysis

Variables	Correlations	
	Tolerance	VIF
ESG	0.724	1.381
ME	0.857	1.166
LN_FS	0.564	1.774
F_LEV	0.758	1.320
GR	0.901	1.110
Model	Autocorrelation test Durbin–Watson (DW)	
ROA	1.995	
TBQ	1.917	

The effectiveness of the linear regression model is based on the assumption that the independent variables are not correlated with each other. When multicollinearity is present, the standard errors of calculated coefficients tend to rise. Table 3 provides information on the collinearity statistics, tolerance, and variance inflation factor (VIF), and indicate that they are all within acceptable limits (VIF < 10 and tolerance > 0.1). This shows that there is no interdependence among the explanatory variables, and therefore, none of the variables should be removed from the multivariate analysis.

Through the examination of the Durbin-Watson (DW) and the residual autocorrelation test, it was found that the DW values of the models were between 1.5 and 2.5, indicating no autocorrelation problem that could distort the regression outcomes, or that could be anticipated in panel data if the error terms were linked to the data of the previous year, as suggested by Kline (2016). These results are reported in Table 3.

4.3 Panel Regression Tests

A test for poolability [pooled ordinary least square (OLS) versus fixed effect] and the Hausman test were used to determine the model's appropriateness between the fixed effects and pooled OLSESG for firm performance regression and also between random effects (RE) and fixed effects (FE) (Hausman, 1978). A poolability test using the F test under return on assets (ROA) shows F (61, 715) = 122.26 and is significant at 0.01 (p-value is equal to 0.000), hence the pooled OLS is rejected. Using the Hausman test to choose between FE and RE, the

p-value is equal to 0.000, which is significant; hence, FE is appropriate for ROA. A poolability test using the F test under Tobin's Q (TQ) shows F (61, 715) = 88.34 and is significant at 0.01 (p-value is equal to 0.000), hence the pooled OLS is rejected. Using a Hausman test to choose between FE and RE, the p-value is equal to 0.000, which is significant; hence, FE is appropriate for TQ.

4.4 Robustness Checks

To ensure the validity of the moderation analysis, a robustness check was performed by using multiple regression as an alternative measure for moderation. The results of this test were consistent with the original analysis using Andrew F. Hayes' Process for moderation of managerial efficiency between ESG and firm performance.

4.5 PROCESS Regression Analysis

Table 5 presents the results of the moderation analysis of the relationship between ESG and firm performance (ROA and TQ) through the methodology of Hayes, A.F. (2013). The results indicate that there is a significant interaction between managerial efficiency and ROA, as evidenced by the p-value ($p < 0.01$) and the LLCI and ULCI values (0.017 and 0.067, respectively). Similarly, for the interaction between managerial efficiency and TQ, the p-value is significant ($p < 0.01$), and the LLCI and ULCI values are 0.038 and 0.518, respectively. These findings demonstrate that the relationship between ESG and firm performance is moderated by managerial efficiency.

Table 5 Model Summary for the Multiple Regression Analysis

			Model 1 ROA			
Variables	B	SE *β*	*t value*	*p-value*	LLCI	ULCI
constant	-0.061	0.017	-3.601	0.000	-0.094	-0.028
ESG	-0.004	0.012	-0.335	0.738	-0.026	0.019
ME	0.061	0.009	6.937	0.000	0.044	0.078
Int_1	0.042	0.013	3.260	0.001	0.017	0.067
Log_FS	0.006	0.001	5.462	0.000	0.004	0.008
LEV	-0.039	0.002	-16.341	0.000	-0.043	-0.034
GR	0.074	0.006	12.443	0.000	0.063	0.086
*N = 2,104, R Square= 39.61%, F80.436****						
			Model 2TQ			
Variables	B	SE *β*	*t value*	*p-value*	LLCI	ULCI
constant	1.301	0.162	8.045	0.000	0.984	1.618
ESG	0.137	0.110	1.245	0.213	-0.079	0.354
ME	0.645	0.084	7.638	0.000	0.479	0.810
Int_1	0.278	0.123	2.268	0.023	0.038	0.518
Log_FS	-0.017	0.010	-1.677	0.094	-0.037	0.003
LEV	-0.055	0.023	-2.412	0.016	-0.099	-0.010
GR	0.175	0.057	3.050	0.002	0.062	0.287
*N = 2,104, R Square= 40.48%, F 83.447****						

4.6 Multiple Regression Analysis

Table 6 presents the outcomes of the direct effect and the findings of the moderated multiple regression analysis. It provides a summary of the interaction between the two models, ROA and TQ, including beta coefficients, t-statistics, and p-values.

Table 6 Model Summary for the Multiple Regression Analysis

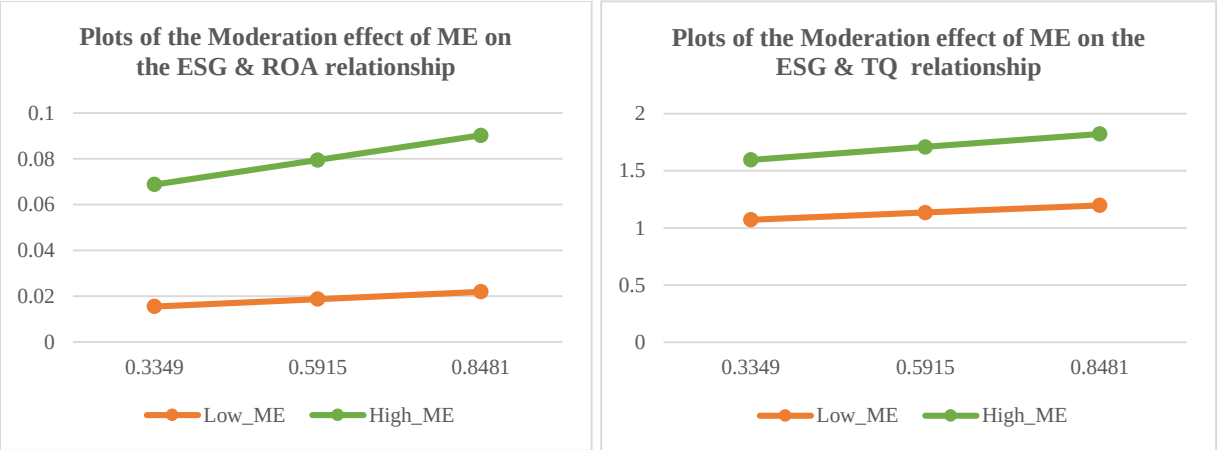
Variables	Expected sign	(1) ROA	(2) TQ
ESG	H1a/b: +	-0.0039 (-0.335)	0.1374 (1.245)
ME	+	0.061 (6.397***)	0.6445 (7.638***)
ESG*ME	H2a/b: +	0.0417 (3.260***)	0.2780 (2.268**)
LN_FS	+	0.0058 (5.462***)	-0.0171 (-1.677)
LEV	-	-0.0386 (-16.341***)	-0.0547 (-2.412**)
GR	+	0.0744 (12.443***)	0.1749 (3.050***)
Industry Effects		Yes	Yes
Year Effects		Yes	Yes
Constant		-0.0607 (-3.601***)	1.3008 (8.045***)
N		2,104	2,104
R Square		39.61%	40.48%
Adjusted R Square		39.12%	39.99%
F		80.436***	83.447***

Note. ***, ** indicate statistical significance at the 1%, and 5% levels, respectively (regression coefficients below the t-values in parentheses)

The results shown in Tables 5 and 6 reveal that there is no correlation between the performance of Environmental, Social, and Governance (ESG) and the firm's overall performance in Thailand, regarding both the return on assets (ROA) and Tobin's Q (TQ). These results suggest that ESG practices do not have a substantial impact on the company's performance (P > 0.05). The study concludes that enhancing ESG performance does not translate to better business performance, which aligns with the findings of previous research conducted by Utz et al. (2014) and Junius et al. (2020).

The results of the moderated regression analysis demonstrate that there is a significant and positive correlation between managerial efficiency (ME) and conscientiousness, which has a direct impact on the relationship between ESG and firm performance. Specifically, the

Figure1 The Interactive Effect of Managerial Efficiency Between ESG and Firm Performance



Statistical values reveal that for ROA, the beta coefficient is 0.0417, while the t-value is 3.260, and the p-value is less than 0.01. Similarly, for TQ, the beta coefficient is 0.2780, the t-value is 2.268, and the p-value is less than 0.05. These findings imply that effective management is a crucial factor in a company's ESG performance and overall success.

As shown in Figure 1 the moderating effect indicates that when managerial efficiency is low, ESG has no impact on firm performance. However, when managerial efficiency is high, ESG has a considerably positive effect on firm performance. This result supports hypothesis H2 (H2a/b).

5. CONCLUSION

This study aimed to investigate how ESG performance relates to firm performance when managerial efficiency is taken into account as a moderator. The study drew from stakeholder theory and agency theory, which suggest that managerial efficiency is a crucial factor in determining the impact of ESG on firm performance. By analyzing data from 2,140 firm-year observations of listed corporations from the SET between 2016 and 2021, this research makes a significant contribution to existing literature on the topic by examining the moderating effect of managerial efficiency on the relationship between ESG performance and firm performance. The findings suggest that managerial efficiency plays a critical role in determining the impact of ESG on firm performance and future firm value.

The results of the PROCESS analysis revealed that there is no significant relationship between ESG performance and firm performance, which is consistent with the findings of previous studies conducted by Utz et al. (2014) and Junius et al. (2020). However, it was observed that managerial efficiency (Demerjian et al., 2012), plays a more prominent role in the successful implementation of ESG practices. When managerial efficiency is high, it can positively influence firm performance, and this in turn can strengthen the relationship between ESG performance and firm performance (measured by ROA and TQ).

These findings stress the significance of prioritizing both managerial efficiency and ESG performance, and offer important implications for researchers, regulators, and companies. The results suggest that simply implementing ESG practices is not enough to improve performance, as companies cannot rely solely on their ESG disclosures to gain the trust of various stakeholders. Rather, high levels of managerial efficiency are essential to realize the potential benefits of ESG, increasing management efficiency and reducing business risks, ultimately enhancing competitive advantage and promoting sustainable development (Cox, 2017; Welch & Yoon, 2022). The study further emphasizes the need for effective ESG regulations in Thailand to encourage sustainable development. The stakeholder-agency theory provides a possible explanation for why listed companies are required to report ESG data, despite voluntary disclosure.

This study offers evidence regarding the significance of managerial efficiencies in determining the effectiveness of ESG implementation mechanisms, which cannot be ascertained solely from the disclosure of ESG operations. Instead, it must be evaluated alongside managerial efficiency, which measures how effectively executives can manage the organization, and consequently, indicates the effectiveness of ESG operations.

The limitations of this study are that it lacks an industry-specific or company-size-specific analysis of ESG performance in the Thai stock market, and in the financial industry. The financial industry stands out in terms of ESG performance due to the difference in managerial efficiency measurement compared to other industries, which this research did not differentiate or investigate based on financial crisis situations, such as the new COVID-19 outbreak. In the future, research should address these gaps and limitations. The study's other limitation includes the lack of a fixed-effects model supported by the Hausman test. However,

like other research that has been done on the same topic, sets of control variables and year-fixed effects were added to the process model to find interaction effects that happen across time series. However, the research findings from the Hausman test and PROCESS did not differ.

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