


**INFLUENCES OF ENVIRONMENTAL, SOCIAL, GOVERNANCE  
PERFORMANCE AND INSTITUTIONAL OWNERSHIP ON FIRM  
PERFORMANCE: THE MODERATING ROLE OF  
MANAGERIAL EFFICIENCY**

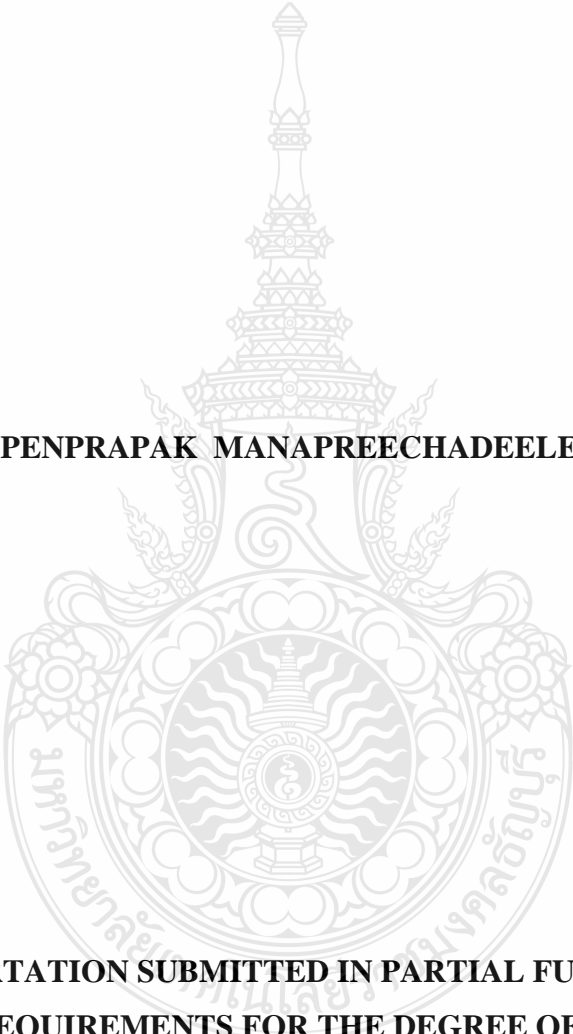
**PENPRAPAK MANAPREECHADEELERT**



**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF  
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FACULTY OF BUSINESS ADMINISTRATION  
RAJAMANGALA UNIVERSITY OF TECHNOLOGY THANYABURI  
ACADEMIC YEAR 2023  
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**Dissertation Title** Influences of Environmental, Social, Governance Performance and Institutional Ownership on Firm Performance: The Moderating Role of Managerial Efficiency  
**Name – Surname** Miss Penprapak Manapreechadeelert  
**Program** Business Administration  
**Dissertation Advisor** Assistant Professor Kusuma Dampitakse, Ph.D.  
**Dissertation Co-Advisor** Associate Professor Sungworn Ngudgratoke, Ph.D.  
**Academic Year** 2023

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15 September 2023

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### ABSTRACT

This research aimed to study: 1) the relationship between environmental, social, and governance (ESG) performance and firm performance, 2) the relationship between institutional ownership and firm performance, 3) the moderating role of managerial efficiency on the relationship between ESG performance and firm performance and 4) the moderating role of managerial efficiency on the relationship between institutional ownership and firm performance. Firm performance was based on the accounting and market performance of the firm by return on assets (ROA) and Tobin's Q respectively. ESG performance was measured according to the Sustainable Development Goals (SDGs), as promoted by the United Nations in 2019. The samples consisted of 373 companies listed on the Stock Exchange of Thailand. The data were collected from sustainability reports and the SETSMART database for the period from 2016 to 2021, which yielded 2,104 firm-year observations. The statistical methods used to analyze the data were multiple linear regression and Hayes's regression-based analysis.

The research results showed that ESG performance had no relationship with firm performance while institutional ownership had positive relationship with firm performance. In addition, the study revealed that managerial efficiency positively moderated the relationship between ESG performance and firm performance as well as the relationship between institutional ownership and firm performance. Specifically, the study indicated that the positive effect of managerial efficiency on firm performance was stronger when the managerial efficiency was average and above, whereas managerial

efficiency showed no statistically significant effect on firm performance when it was below average. The rule of ESG performance can lead to better firm performance if ESG performance can improve the overall efficiency of the firms, which is reflected through managerial efficiency. This research also provides additional information considering the size of the firms included in the analysis. This study provides additional insights into ESG performance data based on the size of businesses. It highlights an intriguing observation that in small-sized companies, engaging in ESG activities can lead to a decrease in company performance. This suggests that for small-sized companies, ESG operations may still pose a relatively high cost when compared to the benefits gained. Conversely, if small firms conduct ESG performance efficiently and achieve high management efficiency, ESG performance will lead to better firm performance as well as large firms.

In addition, in small-sized companies, the proportion of institutional investor ownership has a negative impact on company performance. This suggests that in small-sized companies, institutional investors may not effectively serve as external monitors for corporate governance. However, if small-sized companies can attract institutional investors who can contribute to efficient operations, which in this research context refers to achieving high managerial efficiency, they can also improve their overall company performance like larger companies.

**Keywords:** ESG, institutional ownership, managerial efficiency, firm performance

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## Table of Contents

	Page
Abstract .....	(3)
Acknowledgements .....	(5)
Table of Contents .....	(7)
List of Tables .....	(9)
List of Figures .....	(11)
<b>CHAPTER 1 INTRODUCTION</b> .....	<b>14</b>
1.1 Background and Statement of the Problem .....	14
1.2 Purpose of this Study .....	18
1.3 Research Question and Hypotheses .....	18
1.4 Scope of Study .....	20
1.5 Limitation of Study .....	20
1.6 Definitions of Terms .....	21
1.7 Contribution of the Study .....	23
1.8 Conceptual Framework .....	24
1.9 Organization of the Study.....	25
<b>CHAPTER 2 REVIEW OF THE LITERATURE</b> .....	<b>26</b>
2.1 Overview Concept of ESG .....	26
2.2 Theories that Guided the Research .....	28
2.3 The Costs and Benefits of Implementing ESG Principles .....	33
2.4 The Concepts of Variable .....	34
2.5 Linkage Literature Review and Research Hypotheses Development ..	55
<b>CHAPTER 3 RESEARCH METHODOLOGY</b> .....	<b>85</b>
3.1 Statistical Analysis Model .....	85
3.2 Research and Sampling Design .....	85
3.3 Research Variables .....	87
3.4 Study Model .....	90
3.5 Data Preparation .....	94



## Table of Contents (Continued)

	Page
CHAPTER 4 RESEARCH RESULTS .....	95
4.1 Descriptive Statistics .....	95
4.2 Variables Diagnostics .....	96
4.3 Panel Regression Tests .....	99
4.4 Robustness Checks .....	100
4.5 PROCESS Regression Analysis .....	100
4.6 Proposed Model and Hypotheses Testing: ESG Model .....	100
4.7 Proposed Model and Hypotheses Testing: Institutional Ownership Model .....	115
4.8 Summary of Research Hypotheses .....	128
CHAPTER 5 CONCLUSION AND RECOMMENDATIONS .....	129
5.1 Conclusion .....	129
5.2 Research Results and Discussion .....	131
5.3 Contribution of the Study .....	134
5.4 Limitation and Future Research .....	139
Bibliography .....	142
Appendices .....	158
Appendix A Regression Diagnostics .....	159
Appendix B Results of PROCESS Regression Assumptions Testing .....	166
Biography.....	180

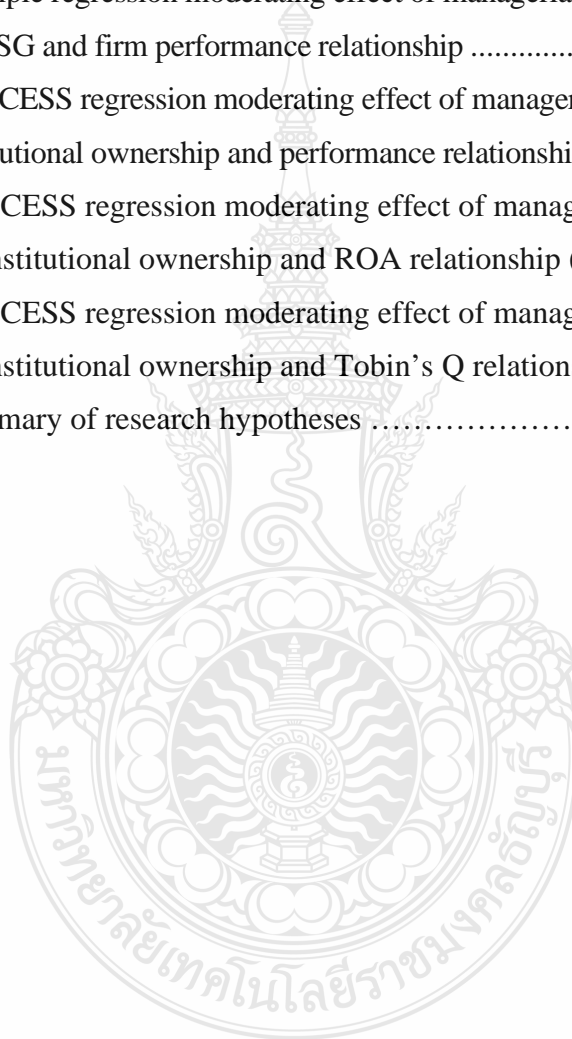
## List of Tables

		Page
Table 2.1	Summary of studies on ESG and firm performance .....	59
Table 2.2	Summary of studies on institutional ownership and firm performance .....	72
Table 2.3	Summary of studies on managerial efficiency and performance .....	77
Table 3.1	Research sample .....	86
Table 3.2	Describes the sample fiscal year .....	86
Table 3.3	Sample distribution by industry .....	87
Table 3.4	Definition of variables .....	90
Table 4.1	Descriptive statistics on the variables of the study .....	95
Table 4.2	Normality test of sample distribution .....	97
Table 4.3	The result of correlation and auto-correlation analysis .....	98
Table 4.4	Goodness of fit for the panel data models .....	99
Table 4.5	PROCESS regression moderating effect of managerial efficiency on ESG and ROA relationship .....	101
Table 4.6	PROCESS regression moderating effect of managerial efficiency on ESG and Tobin's Q relationship .....	103
Table 4.7	Multiple regression moderating effect of managerial efficiency on ESG and firm performance relationship .....	106
Table 4.8	Descriptive statistics on the variables of large and small samples ....	108
Table 4.9	PROCESS regression moderating effect of managerial efficiency on ESG and firm performance relationship on large firms .....	109
Table 4.10	PROCESS regression moderating effect of managerial efficiency on ESG and ROA relationship on small firms .....	111
Table 4.11	PROCESS regression moderating effect of managerial efficiency on ESG and Tobin's Q relationship on small firms .....	113
Table 4.12	PROCESS regression moderating effect of managerial efficiency	

	on institutional ownership and ROA relationship .....	116
Table 4.13	PROCESS regression moderating effect of managerial efficiency on institutional ownership and Tobin's Q relationship .....	119

**List of Tables (Continued)**

		Page
Table 4.14	Multiple regression moderating effect of managerial efficiency on ESG and firm performance relationship .....	121
Table 4.15	PROCESS regression moderating effect of managerial efficiency on institutional ownership and performance relationship (large firms) .....	122
Table 4.16	PROCESS regression moderating effect of managerial efficiency on institutional ownership and ROA relationship (small firms) .....	124
Table 4.17	PROCESS regression moderating effect of managerial efficiency on institutional ownership and Tobin's Q relationship (small firms) .	126
Table 4.18	Summary of research hypotheses .....	128



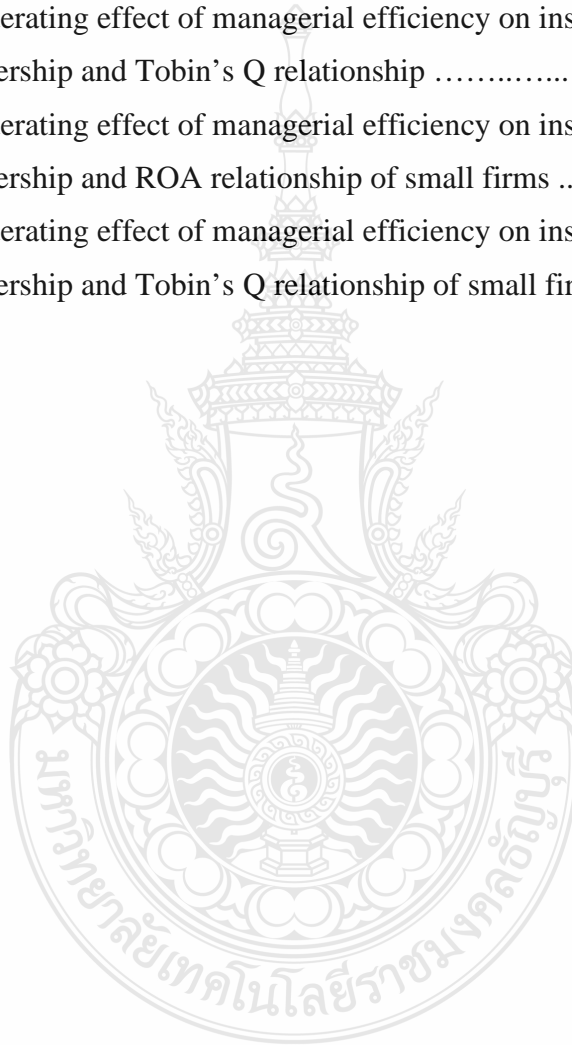
## List of Figures

	Page
Figure 1.1 The research framework model 1.....	24
Figure 1.2 The research framework model 2 .....	24
Figure 2.1 Linking environmental, social and governance (ESG) performance and firm performance .....	59
Figure 2.2 Measuring ESG performance .....	65
Figure 2.3 Linking institutional ownership and firm performance .....	71
Figure 2.4 Linking ESG performance, managerial efficiency and firm performance .....	80
Figure 2.5 Linking institutional ownership, managerial efficiency and firm performance .....	82
Figure 3.1 Two-way interaction effect between ESG and firm performance on managerial efficiency conceptual diagram .....	92
Figure 3.2 Two-way interaction effect between ESG performance on managerial efficiency statistical diagram .....	92
Figure 3.3 Two-way interaction effect between institutional ownership and firm performance on managerial efficiency conceptual diagram .....	93
Figure 3.4 wo-way interaction effect institutional ownership on managerial efficiency statistical diagram .....	93
Figure 4.1 Moderating effect of managerial efficiency on ESG and ROA relationship .....	102
Figure 4.2 Moderating effect of managerial efficiency (M_Score) on ESG and Tobin's Q relationship .....	104
Figure 4.3 Moderating effect of managerial efficiency on ESG and ROA relationship of small firms .....	113
Figure 4.4 Moderating effect of managerial efficiency on ESG and Tobin's Q relationship of small firms .....	115

Figure 4.5	Moderating effect of managerial efficiency on institutional ownership and ROA relationship .....	118
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**List of Figures (Continued)**

	Page
Figure 4.6	Moderating effect of managerial efficiency on institutional ownership and Tobin's Q relationship ..... 120
Figure 4.7	Moderating effect of managerial efficiency on institutional ownership and ROA relationship of small firms ..... 125
Figure 4.8	Moderating effect of managerial efficiency on institutional ownership and Tobin's Q relationship of small firms ..... 127



## List of Abbreviations

Abbreviation	Meaning
M_Score	Managerial efficiency
ESG	Environment, social and governance performance
INS	Institutional ownership
ROA	Return on assets
Q	Tobin' Q
FS	Firm size
LnFS	The natural logarithm of firm size
LEV	Firm Leverage
GR	Sales growth
INDUS	Industry
TIMES	Years



# CHAPTER 1

## INTRODUCTION

### 1.1 Background and Statement of the Problem

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 disrupt, and global cybersecurity concerns (Bombardier Inc, 2021), have far-reaching consequences on human life and the business sector. According to the 16<sup>th</sup> 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 behavior in the next decade. These problems affect not only the general public but also the business sector, which may need to adapt to 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: environment dimension (E), social dimension (S) and corporate governance dimension (G) or ESG (Napoletano & Curry, 2022).

Environmental regulations around the world, including Thailand, are becoming stricter (Kasikorn Research Center, 2023). Thus, ESG has become an important issue among corporate investors (S&P Global, 2022). It first emerged in socially responsible investing in 1992 when the United Nations Environment Program Finance Initiative (UNEP FI) encouraged financial institutions to consider ESG factors in their business decision-making processes. Institutional investors began using ESG in their investment decisions in 2006, and in 2009, there was a push to promote sustainability in private businesses worldwide through the stock market. Through the mechanism of the stock market, transparency and ESG have been promoted for long-term sustainability (SSE initiative, 2019). Obviously, the importance of ESG has grown significantly since 2016 and continues to expand according to Morgan Stanley (2023), with investors increasingly

willing to invest in companies with outstanding ESG performance, and other stakeholders demanding corporate ESG data. ESG is becoming the most important way of measuring the sustainability of economic agents in the international community, with the three dimensions of environmental, social, and governance increasingly important (Wang et al., 2023).

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. Apparently, organizations that consider supply chain will earn more revenue up to 5-20%, reduce costs by 5-15%, increase product value by 10-25%, and reduce the risk of counterparties not complying with the agreement (World Economic Forum, 2015). ESG can have a positive impact on the organization's reputation and financial performance by implementing sustainable production processes, such as using solar energy in factories or converting waste into fuel and 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, expand 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).

An important element of ESG that investors pay a lot of attention to is corporate governance. Nowadays, domestic and foreign investors pay attention to listed companies with corporate governance (CG), together with business model, competitiveness, and growth ability. The reason is that a company with good corporate governance can provide a long-term benefit for stakeholders. Furthermore, good corporate governance also reflects transparency and sincerity with investors. Thus, stakeholders from all sectors consider good corporate governance as an important factor to success since it builds confidence and trust among customers, which makes the company worth investing



(Farooq et al., 2022). Several studies have shown that good corporate governance comes from the role of the board after examining board characteristics, such as board size, frequency of board meetings, board independence, CEO duality and gender diversity of the board (Al Farooque et al., 2020; Butt et al., 2022; Shaat et al., 2023). In addition to the role of the board, an effective relationship between the board and the management is essential for good corporate governance and firm performance. The board must act in supervising the management to achieve the objectives and goals. As a result, the performance of the board of directors is inevitably linked to the management. Furthermore, the CEO is responsible for implementing good corporate governance principles in the management and corporate structure, as well as applying the policies to the operational level for long-term corporate benefits and sustainable growth (SEC, 2023).

Most corporate governance studies focus on internal governance mechanisms and board characteristics, such as board independence, board size, audit committee independence, audit committee size, CEO duality, and board diversity. These are considered as indicators of a good corporate governance mechanism that affects the corporate added value (Butt et al., 2022; Farooq et al., 2022; Alajmi & Worthington, 2023). However, investment analysts or equity analysts are an integral part of the external governance mechanism that affects the investment decisions of individual investors (Navissi & Naiker, 2006). With a role in investment analysis and the role of shareholders, institutional investors reflect good corporate governance mechanisms since their analysis focuses on investment with the goal of generating long-term returns. With an investment committee with expertise and administrative mechanisms, they are able to manage risks to generate higher returns for the efficiency of the investments. Furthermore, with a shareholder who can audit the management, agent costs caused by major and minor shareholders and the management can be decreased (Jensen & Meckling, 1976). It has been widely accepted that institutional investors have an influence on managerial performance. A company with a high proportion of shares held by institutional investors indicates a higher performance since this can lead to a good corporate governance mechanism and the most efficient use of resources (Nurleni et al., 2018). Institutional shareholders are considered as a key investor group in the capital market due to the fact

that their large proportion of investment helps promote the improvement of corporate governance in the capital market (SEC, 2022).

Efficient management is crucial for a company's success. According to a review of 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 has 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, our 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.

The above evidence suggests that the shares held by institutional investors reflect a good corporate governance mechanism since this type of investors is able to monitor the management to efficiently perform their duties which would add value to the company. In this regard, managerial efficiency is the use of skills, knowledge, and abilities reflected through operational strategies to achieve business success. Demerjian et al., (2012) defined managerial efficiency as a change in the corporate resources and high managerial efficiency was correlated with higher firm performance. According to Chen & Lin (2018), companies with high managerial efficiency generate higher returns on purchases and hold their investments over the long term. Furthermore, Khurana et al.

(2018) found that high managerial efficiency had an influence on effective investment in capital markets.

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

## **1.2 Purpose of the Study**

Indeed, most ESG performance and institutional ownership research has focused on examining connections with firm performance. However, there needs to be a more systematic study that focuses solely on how ESG and institutional ownership impact firm performance across a sample of listed companies in the Stock Exchange of Thailand. The purposes of this study are as follows:

- (1) To determine the influence of environmental, social, and governance (ESG) performance on firm performance.
- (2) To determine the influence of institutional ownership on firm performance.
- (3) To explore a potential moderation effect of managerial efficiency on the relationship between environmental, social, and governance (ESG) performance on firm performance.
- (4) To explore a potential moderation effect of managerial efficiency on the relationship between institutional ownership on firm performance.

The study shows the perspective of ESG and institutional ownership on firm performance, and analyzes whether the link between ESG, institutional ownership, and financial performance (ROA and Tobin's Q) is moderated by managerial efficiency and the effect of control variables.

## **1.3 Research Questions and Hypotheses**

The present research about ESG and institutional ownership is built upon the positive theory, which aims to answer questions in a way that leads to a solution based on

stakeholder theory (Freeman, 1984) and agency theory (Jensen & Meckling, 1976). According to the stakeholder theory, the management should not only focus on internal stakeholders but also external stakeholders. Previous studies on the relationship between environmental, social, corporate governance, and institutional ownership on firm performance provide various theories that can explain this relationship.

Furthermore, the management must support social responsibility by broadening the perspective of stakeholders that including employees, customers, suppliers, local communities, and governments since the success of corporate missions based on policies and decision-making might affect this group of people. The research suggests that corporate responsibility and ownership structure to all stakeholders improve long-term performance and reflect corporate ethical values when making investment decisions (Aboud & Diab, 2018; Melinda & Wardhani, 2020; Bodhanwala & Bodhanwala, 2023).

According to stakeholder theory and agency theory and former empirical research results, we assume that ESG performance and ownership structure are positively related to firm performance (ROA and Tobin's Q). Successful ESG activities and institutional ownership will lead to a better firm reputation and firm performance. Consequently, past empirical research finds evidence for a positive impact of ESG performance on firm performance Hence, hypothesize:

The research question was separated into four categories, as follows:

**Research Question 1:** Does ESG performance affect the firm performance of listed companies in Thailand?

**Research Question 2:** Does institutional ownership affect the firm performance of listed companies in Thailand?

**Research Question 3:** Does managerial efficiency moderate the effect of ESG performance on firm performance and when does it moderate?

**Research Question 4:** Does managerial efficiency moderate the effect of institutional ownership on firm performance and when does it moderate?

According to the research questions and objectives, the hypotheses were proposed as follows:

**Hypothesis 1:** The ESG performance will lead to increased firm performance.

**Hypothesis 2:** Institutional ownership will lead to increased firm performance.

**Hypothesis 3:** The managerial efficiency moderates the effect of ESG performance on firm performance, such that the effect is stronger in firms with high managerial efficiency than in firms with low managerial efficiency after controlling for firm characteristics.

**Hypothesis 4:** Managerial efficiency moderates the effect of institutional ownership on firm performance, such that the effect is stronger in firms with high managerial efficiency than in firms with low managerial efficiency after controlling for firm characteristics.

#### **1.4 Scope of Study**

This study aims to investigate the effect of environmental, social, and governance (ESG) performance on firm performance (ROA and Tobin's Q) to explore a potential moderation effect of managerial efficiency on this relationship. The study uses the non-probability sampling method, specifically the purposive sampling method, to choose a sample from the available population. The sample is chosen based on how well it meets the research needs. The sample includes 373 non-financial firms (2,104 firm-year observations) listed on the Stock Exchange of Thailand (SET), for which data are manually collected from 2016 to 2021. The data are collected from SETSMART, which provides the financial statement information as well as financial market data of Thai listed companies. The statistical method used to analyze the data was Andrew Hayes Process regression to test the hypotheses. The alternative measurement for moderation was multiple linear regression, conducting a robustness check for moderation by recalculating moderation through multiple regression analysis. The robustness test results show similar results of the moderation of managerial efficiency between ESG, institutional ownership, and firm performance.

#### **1.5 Limitations of the Study**

This research is subject to certain restrictions, which may present an opportunity for future research to extend this investigation. First, companies whose corporate governance scores were not disclosed by the Thai Institute of Directors Association (IOD), as their scores were assessed to be below 70 points (less than 3 stars) were

excluded in this study. Second, The ESG performance within the financial business group was not examined. The measurement of managerial efficiency in this group differs from other industry groups and warrants separate investigation, especially considering the impact of events, such as the financial crisis and the COVID-19 pandemic. Finally, the ownership structure of institutional investors based on concentration groups, such as the 30 percent threshold highlighted in the studies by Bushee (1998) and Daryaei & Fattahi (2020) was not analyzed since the concentration of institutional investors has varying effects on performance. Additionally, domestic and foreign institutional investors were not specifically differentiated in this study.

## **1.6 Definition of Term**

### **(1) Environmental social and governance (ESG) performance**

ESG is a sustainable business operation, taking into account the three responsibilities: environmental, social, and governance. It is information for investors who want to invest in the concept. Sustainability Investment brings the ESG factor into the investment decision-making component together with the analysis of the financial data of the company to generate continuous returns in the long term. To calculate the overall ESG Score use applied The Stock Exchange of Thailand ESG score. The count of measures per category determines the weight of the respective category. Detailed counts and weights are Environmental 24%, Social 35%, and Governance 41% (SEC, 2023).

### **(2) Environmental performance**

Disclosing information about the operations of the company regarding environmental management activities clearly and using resources efficiently, including the restoration of the natural environment affected by the business operations of the company, consisting of 11 indicators: water recycling and reuse, water use efficiency, water stress, reduction of waste generation, waste reused, re-manufactured and recycled, hazardous waste, greenhouse gas emissions: scope 1, greenhouse gas emissions: scope 2, ozone-depleting substances and chemicals, renewable energy, energy efficiency. measured the proportion of large companies trading on a given stock exchange that disclosed (United Nations, 2019).

### **(3) Social performance**

Disclosure of company operations regarding social activities in the management of human resources fairly and equally, there is continuous promotion and development of staff and quality, consisting of 7 indicators: proportion of women in managerial positions, average hours of training per year per employee, expenditure on employee training per year per employee, employee wages and benefits as a proportion of revenue, by employment type and gender, expenditures on employee health and safety as a proportion of revenue, frequency/incident rates of occupational injuries, percentage of employees covered by collective agreements (United Nations, 2019). Measures the proportion of large companies traded on the stock exchange.

### **(4) Governance performance**

Governance performance was assessed by the IOD, and corporate governance practices were defined as 'Poor', 'Good', and 'Excellent.' The presentation is according to the five CGR categories: rights of shareholders, equitable treatment of shareholders, role of stakeholders, disclosure and transparency, and board responsibilities. Shows the CG score results on IOD's website. IOD stands for Thai Institute of Directors (SEC, 2023).

### **(5) Institutional ownership**

The percentage of shares held by the top five institutional investors with an ownership interest (%TOP5) (Al-Najjar & Kilincarslan, 2016; Altaf & Shah, 2018)

### **(6) Managerial efficiency**

The measure of managerial efficiency (M\_Score) used in this study was developed by Demerjian et al. (2012). This study uses data envelopment analysis (DEA), an operations managerial decision-making technique. DEA essentially fits an output measure (revenue) to inputs. The input variables used to yield maximum revenue are cost of goods sold (COGS), selling, general & administrative expenses (SG&A), property, plant and equipment (PPE), research and development cost (R&D), operating lease expenses, goodwill, and other intangibles. A firm with an efficiency score of 1 is considered to be the most efficient, while a firm with an efficiency score of 0 is considered to be inefficient (suboptimal).

There are firm and top manager-specific factors that contribute to the firm's efficacy. Factors unique to top managers are used to evaluate managerial skills. This research regresses six firm characteristics (firm size, firm market, free cash flow, firm age, business segment, and foreign currency indicator) on firm efficiency using a sector industry-effect and year-effect regression model.

### **(7) Firm performance**

The accounting-based measure return on assets (ROA) and market-based measure Tobin's Q are used as dependent variables to assess firm performance (Kirchmaier & Grant, 2006; Cornett et al., 2007; Abedin et al., 2022).

Accounting-based measures use audited accounting data to get a good idea of how well a company is doing. ROA shows how well a company's management is able to get a return on its resources. Companies that use their assets well have a higher ROA. Accounting-based profit measurements are criticized for being backward-looking and only partially estimating future occurrences in the form of depreciation and amortization. On the other hand, tobin's  $q$  is heavily affected by a wide range of unstable factors, such as the psychology of investors and predictions about the market. If tobin's  $q$  is larger than 1, the firm's market value is overvalued relative to the asset's book value, but if it is less than 1, the market value of the firm is undervalued.

### **1.7 Contribution of the Study**

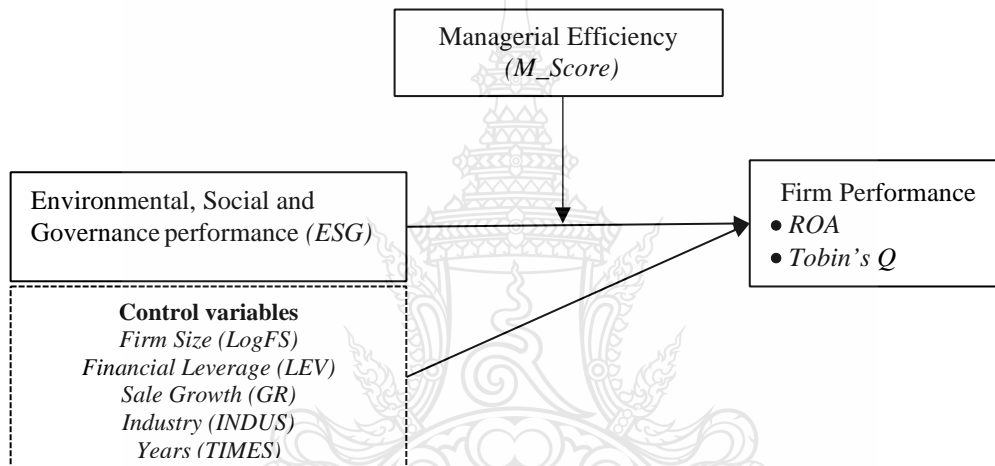
This research contributes to resolve the conflicting arguments and address the gaps in previous findings regarding the relationship between ESG, institutional ownership, and firm performance. By incorporating managerial efficiency as a crucial factor, this study provides insights into achieving favorable performance outcomes. The results demonstrate that both ESG performance and institutional ownership positively impact firm performance, particularly when coupled with higher levels of managerial efficiency. Managerial efficiency plays a pivotal role by contributing knowledge, skills, and information that benefit and enhance firms' performance. Furthermore, the influence of managerial efficiency on improving the performance of ESG practices and institutional ownership is more pronounced in the case of highly efficient managers.



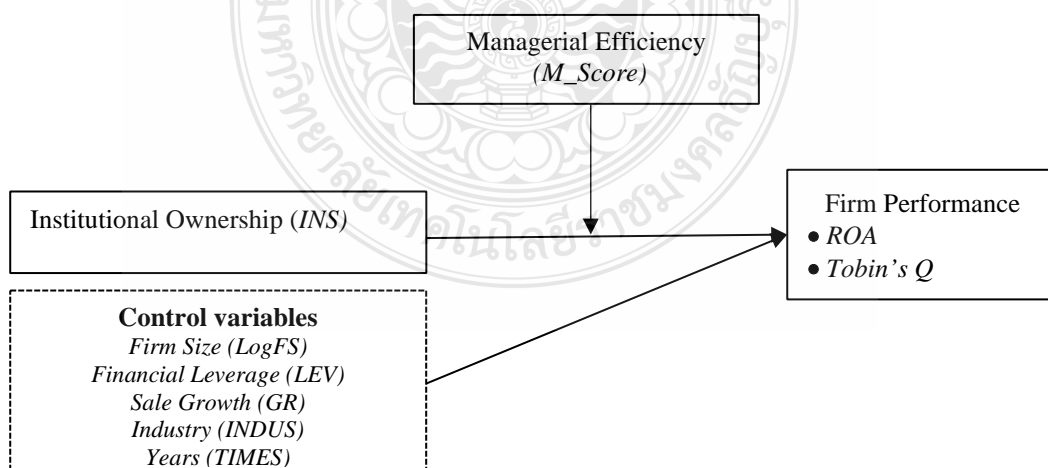
## 1.8 Research Framework

The research framework is a quantitative analysis of the relationships between the variables of the literature review. These variables included environmental, social and governance performance and institutional ownership (independent variables), managerial efficiency (moderator variable), and firm performance (dependent variables). Control variables, including firm size, firm leverage, firm growth, industry and times.

Figure 1.1 and 1.2 illustrates the conceptual framework of this research, which focuses on environmental, social and governance performance, institutional ownership, and managerial efficiency role: Two-way interaction effects on firm performance.



**Figure 1.1** The research framework model 1



**Figure 1.2** The research framework model 2

## **1.9 Organization of the Study**

Chapter 2 reviews the environmental, social, governance performance, and institutional ownership literature giving special attention to examines the managerial efficiency literature with special attention to the impact of environmental, social and governance performance and institutional ownership on firm performance. Chapter 3 develops and introduces hypotheses to be tested, data sources, and statistical methods to be employed to test hypotheses. Chapter 4 reports the results of the study, and Chapter 5 provides the summarizes, discussion, concludes, limitation and suggestion for future research.



## **CHAPTER 2**

### **REVIEW OF THE LITERATURE**

This chapter presents a literature review relevant to the hypotheses developed in the study. In order to understand environment, social, governance performance, and institutional ownership context and related research questions of this study, the literature review.

#### **2.1 Overview Concept of Environment, Social, and Governance Performance (ESG)**

Given the devastating impact of recent system-wide crises, particularly the global financial crisis of 2007-2009 and the 2020 crisis of COVID-19, economic resilience has become a top priority. Both crises will leave permanent scars on our economy and society. The global financial crisis had a disproportionately negative impact on the impoverished and contributed to a significant decline in public confidence in global economic policies. The COVID-19 crisis had unprecedented effects in times of peace, with many nations suspending their entire economies to prevent its spread, necessitating a greater government role. In numerous ways, economic resiliency has been and will be tested. Others, such as the effects of climate change, are well-documented and already have severe consequences. Lessons from COVID-19 and other crises demonstrate that resilient economies and societies are necessary, not just resilient financial sectors.

As nations begin to emerge from this catastrophe as a result of a mix of vaccine distribution, continuous containment, and financial support measures, governments are increasingly looking to create resilience to future crises as an integral part of post-pandemic recovery efforts. There is no such thing as an identical crisis; however, it is essential to learn from this and other crises in order to take the necessary policy actions to strengthen economic resilience. This includes preventing the buildup of potential vulnerabilities, preparing to absorb shocks when they occur, and building the capacity to recover quickly from such shocks. These include increasing efforts to address existing and emerging vulnerabilities, particularly in supply chains; climate change, including the catastrophic potential of tipping points; and a range of security threats, including those arising from digital transformation, which is both an emerging source of risk and offers

new solutions to increase adaptive capacity and innovation for resilience. One particular supply chain that is particularly vulnerable is the food and beverage supply chain. It is also important to note that governments are increasingly employing economic levers for the aim of enhancing their national security. Trust in governance structures, institutions, and the evidence itself is vital to public acceptance and compliance with necessary actions, and yet trust has been one of the casualties of recent crises. As countries attempt to solve these difficulties, trust in governance structures, institutions, and the evidence itself is critical. It is therefore important to address not only risks that are exogenous to the system and acute shocks to the system, but also risks that arise within the economy itself. These risks typically manifest themselves as a gradual buildup of distortions or imbalances that can be addressed through the implementation of sound regulatory frameworks and principles for open and transparent markets. (OECD, 2021).

The capital markets are sturdy and resilient economic engines, which have efficiently adapted to the needs of enterprises in order to support them. Businesses are able to provide employment opportunities, sell goods and services, and engage with investors in a variety of dynamic ways thanks to the existence of markets. However, markets are also susceptible to change, and there is an ongoing demand for novel concepts, improved tools, and more comprehensive data. Exchanges all over the world are members of the World Federation of Exchanges (WFE), which is the largest and most comprehensive trade association for exchanges in the world. It proposes new innovations and reforms, develops and promotes market standards, and facilitates international cooperation and coordination among regulators. It detects a shift in the market's demand for data, specifically regarding the investment community's hunt for environmental, social, and governance (ESG) performance indicators (World Stock Exchanges, 2017).

It has been demonstrated that the operational process of ESG can serve as a tool to reflect the risk management of an organization and also to prevent harm through sustainable management. The maximum amount that can be invested in the short term is no longer enough and has become out of date for the investing market of today. The expansion in assets that are managed by exchange-traded funds (ETFs) is a reflection of the remarkable acceleration in recent times of the trend toward sustainability, which can be seen in the graph. The value of ESG theory has increased from \$2 billion over the

course of the previous five years to \$11 billion this year. According to Triwacharekorn (2018), this is the outcome of greater knowledge throughout society as well as strong governance. It is the goal of ESG to convey information on the environment, society, and ethical business practices to investors so that they will have a better understanding of the firm and will care more about it. It is also about enhancing the positive image that people have of the organization in order to consistently achieve good performance. One interpretation of the data is that it has the potential to improve long-term performance.

As a result, ESG is particularly significant if one wants to forecast the course of long-term earnings that will result from investments made by a company. The term "sustainability" is used interchangeably throughout this text despite the fact that the term "ESG" is used more frequently among investors. This is because the term "sustainability" is used more frequently among firms. It is crucial to emphasize that this distinction exists. Although there are some subtle differences between the two terms, for the purposes of this guide, it is understood that both terms encompass the broad range of environmental, social, and governance considerations that can impact a company's ability to execute its business strategy and create value. This is despite the fact that there are some subtle differences between the two terms.

## **2.2 Theories that Guided the Research**

The literature presents a number of different hypotheses, many of which appear to elaborate on the ESG, ownership and managerial efficiency methodology. As a result of this, the two primary ideas that underpin this work, namely the agency theory and the stakeholder theory, will now be examined in further detail below.

### **2.2.1 Agency Theory**

Based on agency theory, Jensen & Meckling, (1976) stated that agency costs can arise when conflicts of interests between the management and the shareholders occur. Shareholders may require management to add value to shareholders. On the other hand, the management may want to operate in a different direction which may cause conflicts of the interests of shareholders. As a result, shareholders have to encounter agency costs. For agency costs, institutional shareholders act as a good corporate governance mechanism since they can monitor the management more closely and more systematically

since they hold a large number of shares. Institutional investors can also increase firm value for shareholders (Navissi & Naiker, 2006). In addition, institutional investors consist of fund managers and professional analysts with knowledge and expertise of finance, investment and macroeconomics that can drive strategies. This leads to advantages and increases company value (Nurleni et al., 2018).

### **2.2.2 Stakeholder Theory**

According to the stakeholder theory, the management should not only focus on internal stakeholders, but also external stakeholders. Previous studies on the relationship between environmental, social, and corporate governance and firm performance provide various theories that can explain this relationship. Furthermore, the management must support social responsibility by broadening the perspective of stakeholders that includes employees, customers, suppliers, local communities, and governments since the success of corporate missions based on policies and decision-making might affect this group of people. The research suggests that corporate responsibility to all stakeholders improves long-term performance and reflects corporate ethical values when making investment decisions (Aboud & Diab, 2018; Melinda & Wardhani, 2020; Bodhanwala & Bodhanwala, 2023).

According to stakeholder theory, executives, particularly CEOs, with transformational leadership, are considered to possess a leadership style that is closely associated with social responsibility within the company. The success of a company largely depends on the passion and commitment of its executives towards ESG, as it is a key indicator of performance. To establish a positive relationship with stakeholders, it is imperative for executives to have clear goals and effective communication (Viererbl & Koch, 2022). In the end, it will lead to the determination of sales and profits. In other words, if the product is not environmentally friendly, customers will not buy the product. Thus, ESG is not the only social issue, but it has a positive effect on the company (Melinda & Wardhani, 2020; Maji & Lohia, 2023). Corporate governance is an additional approach that can enhance transparency and accountability of the companies listed on Thai Stock Exchange. According to the SEC (2023), shareholders have a legitimate right to receive a return on their investment as they take on investment risks. This is considered as a way to promote social responsibility within the representative theory framework. The

stakeholder theory has expanded the scope of corporate social responsibility to include a diverse range of individuals who should be given attention and accountability. By allowing stakeholders to participate in decision-making and business management, trust, mutual respect, and a shared responsibility model can be established (Fama & Jensen, 1983).

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).

Agency-stakeholder theories provide the foundation for understanding the relationship between environmental, social, and governance ratings and the performance and value of companies. Friedman (1970) is the proponent of the theory that, if a company engages in social activities, it will incur costs that will lower the amount of profits that can be distributed to shareholders. This theory states that it is the social obligation of a company to maximize financial returns, and it predicts that when a company pursues non-financial purposes, it becomes more difficult for the company to maximize the wealth of its owners. This theory aims to broaden existing neo-classical methodologies by including the negative impact (i.e. the costs of investing in non-financial goals such as ESG practices) inside traditional pricing systems (Flores and Sarandon, 2004). It does this by applying a cost-to-benefit lens, which measures the costs of an action relative to its benefits. Nevertheless, we contend that managers need to be aware of the unique input required to generate the intended output, particularly while

working within an emerging economy. This is especially important when the targeted outcome is favorable financial returns. This study intends to address this theoretical gap by analyzing the influence of investing in ESG practices (as the input) on corporate financial performance (as the output). Given the limited knowledge of the non-financial goals that contribute to favorable financial performance, this study aims to solve this theoretical gap.

In a similar line, the behavioral economic theory assumes that human beings employ heuristics while making decisions for themselves and their societies, as stated by Beerbaum and Puaschunder (2019). Even though these mental shortcuts allow people to cope with a complicated world and the surroundings of that environment, these heuristics leave individuals vulnerable to biases and, in the end, cause failures in their ability to make logical decisions. As a result, the theory casts doubt on the idea that individuals are capable of making rational choices. Behavioral economics contend that people are more likely to be guided in their decision-making by their impulsivity, their environment, and their emotions rather than by scientific evidence and that they are more prone to prioritize short-term benefits over long-term rewards (Witynski, 2022). Environmental, social, and governance (ESG) refers to the criteria that investors, companies, and other stakeholders use to evaluate a company's performance and its impact on various factors other than money.

The rational choice theory and the stakeholder-agency theory both explain why environmental, social, and governance (ESG) issues have a favorable effect on financial performance. To begin, the rational choice theory (RCT) is an additional classical economic theory. This theory is based on the assumption that human beings make decisions after considering a variety of aspects, and after doing so, they choose the option that would result in the greatest amount of profit for them. The randomized controlled trial operates under the presumption that individuals rationally make an investment decision by analyzing the associated costs and benefits and searching for the alternative that provides the greatest return. Since the interests of persons are an increase in return, it is in the greatest interest of individuals if the evaluated ESG expenses are lower than the ESG returns (Marinescu, 2016; Bowen, 2018; Robinhood, 2022). ESG investing is similar to the practice of using a logical process in the process of picking investment



choices after balancing the costs and benefits of those choices and include consideration of future risks in order to create return.

This theory, on the other hand, is predicated almost entirely on the actions of individuals and does not take into account nuances such as cultural or social circumstances in which socially responsible behaviors are carried out for reasons that are not directly related to the pursuit of self-interest. Therefore, in order to account for this limitation, we apply the stakeholder theory. This theory is based on the premise that businesses should take into account the interests of their stakeholders when making business decisions. According to Wijnberg (2000), a firm's value is created through the interdependence between the firm and its stakeholder groups. These stakeholder groups include financiers, customers, suppliers, communities, employees, and the government. Stakeholders now have a greater interest in the company's actions related to sustainability because these activities boost the company's chances of long-term survival and profitability. According to Jensen and Meckling (1976), the agency theory is a relationship between a principal and an agent to make some investment decisions that maximize revenue and minimize costs.

ESG ratings are a useful instrument that firms can use to fulfill stakeholder interests, resulting in improved sustainable practice ratings and reputation, which leads to increased financial performance (Velte, 2017). The agency theory provides an explanation for the process of maximizing shareholder wealth by utilizing measurements like as return on equity (ROE) and return on assets (ROA). Because shareholders view higher ESG ratings as an indication of risk management, which points to better performance of a company's shares in the future, it demonstrates that management is fulfilling their fiduciary duty of increasing the wealth of the shareholders (Rahi et al., 2022). This shows that management is fulfilling their fiduciary duty of increasing the wealth of the shareholders by carefully selecting investments that are environmentally friendly. The theories of rational choice and stakeholder-agency, in addition to the empirical evidence from earlier studies.

## **2.3 The Costs and Benefits of Implementing ESG Principles**

The costs and benefits of implementing ESG principles can be measured in several ways:

### **2.3.1 Costs of Using ESG**

(1) Investing in technology, processes, and employee training to improve sustainability, reduce environmental impact, and promote social cohesion. These initial expenses can be seen as costs by some companies, tiny companies with limited capital.

(2) Compliance costs: Companies must comply with new laws or standards for environmental protection, operations, and management, which may result in additional expenses.

(3) Transparency and Reporting Costs: Monitoring, measuring, and reporting ESG metrics requires additional support and effort from company management and employees.

(4) Transition costs: Some companies will face transition costs, especially when they have to change their business model, supply chain, or energy.

(5) Risk mitigation costs: Engaging in ESG practices often involves identifying and addressing environmental, social, and governance issues that may incur additional costs.

### **2.3.2 Benefits of Using ESG**

(1) Improved reputation and business value: Companies that use ESG principles are often recognized by customers, investors, and other stakeholders. This reputation can build trust and commercial competitiveness.

(2) Access to capital: Many investors, including institutional investors, are increasingly incorporating ESG performance into their investment decisions. Companies with good ESG practices will have better access to capital and the ability to lower borrowing costs.

(3) Risk reduction: Integrating ESG factors can help companies identify and mitigate risks associated with environmental damage, supply chain disruptions, regulatory changes, and conflict.

(4) Innovation and performance: Following ESG initiatives can spur innovation, encourage companies to find better business opportunities, reduce costs and generate more savings.

(5) Employee engagement and retention: Companies that adhere to ESG values often attract and retain employees who share these values, which leads to employee engagement and productivity.

(6) Long-term financial performance: Research shows that companies with good ESG performance tend to outperform their peers in the long run, in part for the reasons outlined above.

As a result, while implementing ESG practices may involve initial costs and efforts, the long-term benefits can help improve financial performance, risk management, reputation, and social partners, making it useful for many businesses in today's world. Additionally, the increased focus on sustainability and responsible business practices means that ESG considerations will become more critical to companies in the future.

## **2.4 The Concepts of Variables**

### **2.4.1 Environmental, Social and Governance Performance (ESG)**

In 2015, following the adoption of the 2030 Agenda for Sustainable Development by the member states of the United Nations, which included 17 Sustainable Development Goals (SDGs), it was determined that the objectives and targets would be monitored and reviewed using a set of global indicators centered on measurable outcomes. As a direct consequence, the Inter-Agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) was established with the mandate to develop a global indicator framework for the purpose of monitoring the 2030 Agenda's implementation. The member states are presently developing individual nation-specific metrics in line with the 2030 Agenda, taking into account the particulars of their own countries. The complete construction of the indicator framework is a time-consuming process that has the potential to be refined as the level of knowledge and the availability of data increase. These new developments will undoubtedly affect the accounting and reporting objectives that have been established. In its objective, the Sustainable Development Goal (SDG) for sustainable consumption and production expressly

encourages companies, especially large and multinational corporations, to adopt sustainable practices and integrate sustainability data into their reporting cycles. One of the required pieces of information for this indicator is the number of enterprises that publish sustainability reports.

**(1) Principles underlying fundamental SDG indicator selection and reporting**

The Guidelines are predicated on the following methodological considerations.

**Simplicity:** The data and understanding of entities for various public and private sector consumers.

**The baseline method:** All businesses use the same core indicators, which focus on rational resource use (water, energy, air, and waste reduction), social issues like human capital development and gender equality, and governance and transparency, which are essential to the operational business cycle. Entities' practices and sustainability reporting journeys are considered in the Guidance. It selects common sustainability indicators based on entities' current reporting practices and leading reporting frameworks (IFRS, IIRC, SASB, GRI, and others) and provides a measurement methodology and accounting sources for data collection. Individual businesses in varied operational circumstances must use these baseline indicators and provide extra and other capital sources.

**Focus on quantitative measures:** The Guidance emphasizes quantitative metrics above narrative disclosures, even when qualitative indications are important.

**(2) Reporting principles**

The Guidance states that SDG indicator reporting frameworks must be aligned with institutional models and allow consistent sustainability information integration into firm reporting cycles. The international measurement technique, data comparability, clarity of reporting boundaries, and incremental approach are included.

**Materiality vs. universality:** Parties agreed that some economic, environmental, and social actions were important to them, which is a key part of the materiality vs. universality principle. So, the choice of key SDG indicators is based on the idea that the goals are already part of how companies measure what's important to them. This helps guide sustainability in the majority of industries. Also, there needs to be more transparency in the materiality assessment process that goes along with the reporting of data on financial materiality, which looks at the business's growth, performance, and

position and is mostly for investors, and environmental and social materiality, which looks at the effects of the business's operations and is mostly for consumers, civil society, employees, and an increasing number of investors.

**Clarity of reporting boundaries:** Standards for reporting stress how important it is to explain how the reporting entity's limits were set up and what other assumptions and methods were used to support sustainability reporting. In some places, international rules have a big impact on the process of combining data from the company level to the corporate level. This has an effect on the link between corporate reporting and tracking the Sustainable Development Goals at the country level.

**Incremental approach:** When choosing core indicators, the incremental method takes firms into account. Too much stress on companies could hurt the goal of getting the private sector involved in the 2030 Agenda. A step-by-step plan that a company can control and for which it already gets data, or a situation in which a company has access to the right sources of information.

**Measurement methodology consistency and data comparability:** Indicators must be the same across entities, time, and place. This means that documentation on scope, data quality, methods used, and constraints must be clear and easy to check.

**Reporting period:** The reporting time is always the same length (usually one year) and begins and ends on the same dates. The information that is sent in should be full and accurate for the time period that the reporting entity says it is for.

## **2.4.2 Entities' Primary SDG Indicators**

### **2.4.2.1 Environmental performance**

The following core indicators have been chosen in the environmental area: (1) water recycling and reuse. (2) water use efficiency (3) water stress (4) reduction of waste generation. (5) waste reused, re-manufactured and recycled. (6) hazardous waste. (7) greenhouse gas emissions (scope 1). (8) greenhouse gas emissions (scope 2) (9) ozone-depleting substances and chemicals (10) renewable energy and (11) energy efficiency.

#### **Sustainable use of water**

##### **(1) Water recycling and reuse**

**Definition:** Water recycling and reuse is the amount of water that a reporting entity recycled or reused during the reporting time.

**Measurement methodology:** It is recommended that the entity report the total volume of water recycled and reused (in cubic meters) in addition to the total volume of water recycled and reused as a percentage of the total water removal plus the total water received from a third party (where total water withdrawal is the sum of all water drawn into the boundaries of the company from all sources for any use during the reporting period). Water can be taken from clean surface water, groundwater, seawater or brackish water, or water that has been made or processed. So, the indicator is written both in cubic meters (m<sup>3</sup>) and as a number (%).

### **(2) Water use efficiency**

**Definition:** Water use efficiency is both the amount of water used per net value added during the period of reporting and the change in water use per net value added between two reporting periods. This sign shows how much water was taken from the water supply and how much water was taken from other sources.

**Measurement methodology:** The indicator is reported in cubic meters (m<sup>3</sup>) (unnormalized, absolute terms) and as a percentage of the period's net value added. Each facility/business site should meter water and calculate the indication using water or flow meters, with appropriate documentation and reporting. This indicator allows data aggregation within geographical and operational boundaries. To track and communicate progress in reducing water consumption, this indicator should be reported as a change from the previous reporting period (i.e., water consumption at time t- (minus) water consumption at time t-1).

### **(3) Water stress**

**Definition:** Total water extracted, broken down into sources (surface, ground, precipitation, and waste water), and a reference to water-stressed or water-scarce areas (represented as a percentage of total withdrawals) is the definition of water stress. Water scarcity is another term for water stress.

#### **Measurement methodology:**

The total volume of water extracted is calculated as the sum of all the water that was drawn within the borders of the organization during the reporting period, regardless of the source of the water or the reason for doing so. It is possible to obtain water from a variety of sources, including fresh surface water, groundwater, ocean or

brackish water, and produced or process water. A breakdown of the following sources should be included: surface water, ground water, rainwater collected directly by the organization and kept by the organization, and waste water from another organization.

This indicator is presented in cubic meters (total m<sup>3</sup> of water pulled from various sources) and as a percentage (%) because it is required to transmit the amount of water withdrawn from water-stressed or water-scarce areas as a proportion of the total amount of water withdrawn. This indicator is expressed in cubic meters (total m<sup>3</sup> of water withdrawn from various sources). It is vital to take into consideration the organization's operations and the context of its water resources in order to contextualize how an organization handles water consumption and stress. It is therefore recommended that the reporting entity disclose its water use policy and, in particular, its water use objectives and targets, as well as any additional qualitative information regarding the entity's water use and the public wastewater system, particularly in the context of water scarcity. In addition, it is recommended that the reporting entity disclose any additional quantitative information regarding the entity's water use and the public wastewater system.

#### **Waste management**

##### **(4) Reduction of waste generation.**

**Definition:** The change in the entity's waste generation as a percentage of its net value added is measured by this metric. A non-product output that has a value that is less than zero on the market is known as waste. Emissions of pollutants into the water and the air are not regarded to be waste, despite the fact that they are byproducts.

**Measurement methodology:** The entire amount of all mineral, non-mineral, and/or hazardous waste processed by any waste disposal method is the definition of total waste generated during the reporting period. This is the definition of total waste generated. A measurement or weight should be taken of the waste. Since waste might take the form of a solid, liquid, or paste, it can be quantified not only in kilograms and tons but also in volumes and cubic meters. However, for the purposes of this indicator, trash should be reported in terms of its weight (in kilograms or tons) and not its volume (in liters or cubic meters).

#### **(5) Waste reused, re-manufactured, and recycled.**

**Definition:** (1) The act of reusing a component, element, or product after it has been removed from a clearly defined service cycle (2) Reusing, remanufacturing, and recycling are some of the various alternatives for treating trash. The act of reusing something does not include any kind of manufacturing process; nonetheless, it may be subject to cleaning, repair, or refurbishment in between uses.

**Measurement methodology:** It is important that the amount of trash that is treated and then either reused, remanufactured, or recycled be recorded and measured in kilos or tons during the time period in which it is treated. If it is at all possible to do so, it would be best to discriminate between the three possibilities, paying particular attention to the differences between recycling, reuse, and remanufacturing. It is important that waste that has been recycled, reused, and remanufactured be provided in absolute numbers (in kilos or tons), and that these quantities be standardized. The amount of waste that is reduced, reused, remanufactured, and recycled is calculated, and the resulting number should be divided by the total amount of garbage that is generated.

#### **(6) Hazardous waste.**

**Definition:** This indicator provides a description of the overall quantity of hazardous waste that has been dealt with in absolute terms, as well as the percentage of hazardous trash that has been treated in comparison to the total amount of waste reported by the business.

**Measurement methodology:** The total amount of hazardous waste that has been accumulated over the course of a reporting period is defined as the sum of all of the forms of hazardous waste that were specified in the definition that came before it. This quantity is required to be quantified in kilograms and tons. Both the absolute volumes of hazardous waste (measured in kilos or tons) and the normalized amounts of those volumes must be presented. The generation of hazardous waste should be divided by the same reporting period's net value added. This will help standardize the data on the generation of hazardous waste and ensure that it is consistent with how the indicator "Reducing waste generation" is computed. Calculating the difference between year  $t$  and year  $t-1$  is another step that needs to be taken before it is feasible to monitor the development of the organization over the course of time.



### **(7) Greenhouse gas emissions (scope 1)**

**Definition:** Greenhouse gas emissions (scope 1) are defined as the amount of direct greenhouse gas (GHG) emissions produced in relation to the amount of net value added. Within the organizational boundaries of an entity are considered to fall under Scope 1's purview any direct greenhouse gas emissions that are produced. These are emissions that come from sources that are owned or controlled by the organization.

**Measurement methodology:** Utilizing an Excel file, also known as a tool, which can be acquired from [www.ghbprotocol.org](http://www.ghbprotocol.org) is the most widely used and straightforward way for computing greenhouse gas emissions (scope 1). The method of calculation relies on the use of emission factors that are specific to the various kinds of fuel or materials being considered. In point of fact, it is possible to find some conversion coefficients, also known as the so-called global warming potentials (GWPs), in the Excel sheets in order to convert different gases into carbon dioxide (CO) emissions. GWPs stands for global warming potential. GWPs were developed so that a comparison can be made between the impacts of various gases on the warming of the planet. It is a measurement that compares the amount of energy that is absorbed by the emissions of one ton of a gas over a certain amount of time to the amount of energy that is absorbed by one ton of CO emissions. GWPs values translate GHG emissions data for non-CO<sub>2</sub> gases into units of CO<sub>2</sub> equivalent. As a consequence of this, they serve as a standardized unit of measurement, which makes it possible to incorporate emission estimates for a variety of gases. Entities are able to choose which greenhouse gas projections (GWPs) to use by adopting a certain protocol offered by the Intergovernmental Panel on Climate Change.

The instrument will carry out the calculation on its own automatically. For instance, reporting companies are required to enter the quantity of fuels consumed during the reporting period using the proper unit measures (for example, natural gas must be entered in cubic meters; lubricants must be entered in volumes), and the tool will then convert these quantities into GHG emissions.

### **(8) Greenhouse gas emissions (scope 2)**

**Definition:** This metric determines the amount of indirect greenhouse gas emissions produced per unit of net value added. Indirect greenhouse gas emissions can

result from the consumption of purchased energy, heat, or steam. The development of secondary energy forms for the entity's own use, such as electricity, is an example of an activity that falls within Scope 2 and results in emissions. Because these emissions are the outcome of operations carried out by the entity that is reporting them, but they take place at resources owned or managed by another organization (for example, an electricity generator or utility), they are categorized as "indirect" emissions. It's possible that the indirect greenhouse gas emissions (scope 2) that an organization generates as a result of the generation of power they buy will be much larger than their organization's direct emissions (scope 1). The generation of electricity and heat is responsible for one-third of the world's total greenhouse gas emissions. Scope 2 emissions are also considered to be one of the primary sources of global greenhouse gas emissions.

**Measurement methodology:** In order to evaluate the entire GHG emissions impact of energy use and to calculate scope 2 emissions, the standard of the company proposes multiplying activity data (MWh of electricity consumption) by emission factors. There are two different ways that could be done:

Market-based method: a way to quantify a reporter's scope 2 GHG emissions based on the GHG emissions generated by the generators from whom the reporter contractually obtains electricity in conjunction with contractual instruments or contractual instruments by themselves. This method is also known as the market-based approach. The GHG emission rate that is reflected in the contractual instruments that satisfy the quality standards for scope 2 is used to calculate the emission factors in this instance. The method that is based on the market is based on emission characteristics that are unique to each supplier.

Method dependent on location: A method for determining the quantity of scope 2 greenhouse gas emissions by calculating the average emission factors for energy-generating sources within predetermined geographic locations. These locations can be local, subnational, or national in scope. According to this methodology, emission factors indicate the average emissions that result from the production of energy that takes place within a particular geographical area and time frame. This area and time frame are both predetermined. The data on statistical emissions and the amount of power produced within a certain region are compiled and averaged using this methodology.

### **(9) Ozone-depleting substances and chemicals**

**Definition:** This indicator makes an effort to quantify an entity's reliance on ozone-depleting substances (ODS) and chemicals as a percentage of its net added value. ODS stands for "ozone-depleting substance." All ODS are considered to be bulk chemicals or compounds, which can either exist as individual substances or as mixes. In most cases, these are chemicals that include chlorine and/or bromine in their makeup. Compounds and chemicals that contribute the most to the depletion of the ozone layer.

**Measurement methodology:** The ozone depletion potential value of a material reveals how much of an impact that substance has on the destruction of the ozone layer in comparison to a typical substance. Because trichlorofluoromethane (CFC-11), the standard reference substance, has an ozone depletion potential of 1, values for ozone depletion potential are represented in kilograms of CFC-11 equivalents per kilogram of the respective substance. The standard reference substance is trichlorofluoromethane.

### **Energy consumption**

#### **(10) Renewable energy**

**Definition:** The ratio of an entity's use of renewable energy to its total consumption of energy during the reporting period is the value represented by this indicator. There are many different types of renewable energy sources, such as solar energy, biomass energy, hydropower energy, geothermal energy, and ocean energy.

**Measurement methodology:** Only the amount of renewable energy that was put to use should be factored into the numerator when doing the calculation. Therefore, renewable fuel sources (such as biofuels), solar energy, biomass, hydropower, geothermal energy, and ocean energy, in addition to heat and electricity derived from renewable sources, can be included in the numerator. The following formula can be used to calculate the total energy usage of an organization: consumption of nonrenewable fuel plus the consumption of renewable fuel plus the consumption of purchased electricity, heating, cooling, and steam plus the generation of one's own electricity, heating, cooling, and steam that is not used equals the consumption of electricity, heating, cooling, and the sale of vapor.

### **(11) Energy efficiency.**

**Definition:** A company's energy efficiency can be determined by taking its total energy usage and dividing that number by its total net value contributed.

**Measurement methodology:** To determine the numerator, the entity in question needs to consider its overall use of energy, which can be computed in the following manner: There is a market for the sale of electricity, heating, ventilation, and steam. The amount of fuel used is measured in joules or multiples of that unit. The number of joules, watt-hours, or multiples that are consumed might be considered the consumption of steam, heating, and ventilation systems. As a result, conversion factors are required whenever any quantity is expressed in terms of joules.

#### 2.4.2.2 Social performance

The following core indicators have been chosen in the social area: (1) proportion of women in managerial positions (2) average hours of training per year per employee (3) expenditure on employee training per year per employee (4) employee wages and benefits as a proportion of revenue, by employment type and gender (5) expenditures on employee health and safety as a proportion of revenue (6) frequency/incident rates of occupational injuries and (7) percentage of employees covered by collective agreements.

#### **Gender equality**

##### **(1) Proportion of women in managerial positions**

**Definition:** The formula for determining this statistic is to take the total number of workers within a given reporting period and divide that number by the number of women who hold managerial positions.

**Measurement methodology:** It is recommended that the total number of staff members be used in the computation of this indicator as of the last day of the reporting period. Headcount or full-time equivalent employees (FTE) are both acceptable ways of referring to the number of staff members. In situations where a company has a sizeable contingent of workers who are only employed part-time, the second choice is strongly advised. In any event, the method that is selected must be implemented in a manner that is consistent across different time periods.

## **Human capital**

### **(2) Average hours of training per year per employee**

**Definition:** This indicator represents the volume of an organization's investment in employee training (that is, in human capital), as well as the extent to which this investment is made throughout the whole workforce, measured in terms of the number of training hours.

**Measurement methodology:** The first thing that needs to be done in order to calculate the number of hours is to determine all of the training programs that were carried out by an organization during the reporting period. This is done in order to accrue the hours that are linked with each of these training programs. Internal training courses, external training or education supported by the entity, sabbatical periods with a confirmed return to employment supported by the entity (e.g., paid learning leave provided by the reporting entity to its employees), and training on specific topics such as health and safety are examples of the types of opportunities that may fall under this category. Either the number of people or full-time equivalents should be used to express the denominator, and the same approach should be taken both within and across time periods. The data ought to be segmented according to employment category and, presumably, gender. The total number of hours spent teaching employees is subtracted from the total number of employees to arrive at the average number of hours spent training per employee.

### **(3) Expenditure on employee training per year per employee**

**Definition:** This statistic represents the scope of an organization's investment in employee training (human capital), as well as the degree to which that investment is made across the board in all of the organization's workforce.

**Measurement methodology:**

When assessing the costs connected with training programs, it is recommended that both the direct and indirect costs of training be factored in. Some examples of direct training expenses include course fees, trainers' fees, training facilities, training equipment, and associated travel costs. Indirect training costs include costs that are not directly related to the delivery of training. Either headcount or FTE must be used to indicate the denominator, and the same technique must be used throughout the period as well as between periods. The same method must also be used. A breakdown of the data

according to the various employment classifications should be supplied. The overall quantity of training is equivalent to the average amount of money spent on training for each employee.

**(4) Employee wages and benefits as a proportion of revenue, by employment type and gender**

**Definition:** This indicator should display the total costs incurred by the entity's workforce for the reporting period, broken down by employee type and gender, as a % of the entity's total revenue.

**Measurement methodology:** This indicator is calculated using total payroll, which includes employee wages and amounts paid to government institutions on behalf of employees, as well as total benefits (excluding training, costs of protective equipment, or other cost items that are directly relevant to the employee's job function). Contributions, pensions, employment taxes, levies, and employment funds are all examples of the types of payments that might be made to the government in this context. Following that step, the entire income for that particular reporting period will be divided by the total amount of employee pay and benefits. The total amount of employee compensation and benefits is already recorded when an organization prepares a value-added income statement (together with the other elements that are included in the economic value distribution).

**Employee health and safety**

**(5) Expenditures on employee health and safety as a proportion of revenue**

**Definition:** This indicator determines how much of an organization's overall revenue goes toward paying for the costs of ensuring the health and safety of its workforce and expresses those costs as a percentage. Occupational incidents not only lower productivity and divert management attention, but they also limit the development of human capital and may be an indication of poor management quality and practice. This pertains to a fundamental part of corporate responsibility, as occupational incidents impede human capital development and diminish production simultaneously.

**Measurement methodology:** This indicator is expressed as a proportion and is determined by adding up the expenditures for safety and related to health insurance

policies, for healthcare activities supported directly by the entity, and for all expenses sustained for working environment problems related to occupational safety and health that were incurred during a reporting period; and then dividing this amount by the total revenue that was incurred during this reporting period. The result of this calculation is expressed as a percentage and can be used to measure the effectiveness of an organization's efforts to promote worker safety and health.

#### **(6) Frequency/incident rates of occupational injuries**

**Definition:** This indicator relates to the total number of workdays that were missed during the reporting period as a result of accidents, injuries, and illnesses that occurred on the job. It is an indication of how effective an organization's employee health and safety policy is, as well as the organization's ability to establish a workplace that is healthy, safe, and productive.

**Measurement methodology:** When computing this indicator, days of absence should have regarded as the amount of time an employee was absent from work as a result of an occupational illness, injury, or accident. In other words, these are days that could not be performed and were thus lost as a result of personnel being unable to perform their customary job duties as a result of an accident, illness, or injury that occurred on the job. This may have occurred as a result of a hazardous working environment.

#### **Coverage by collective agreements**

#### **(7) Percentage of employees covered by collective agreements**

**Definition:** The proportion of employees at the reporting entity who are covered by collective bargaining agreements as a percentage of the total number of employees at the company.

**Measurement methodology:** The phrase "collective bargaining" refers to all discussions that take place between one or more employers or employers' organizations and one or more workers' organizations (trade unions) to decide working conditions and terms of employment or to regulate relations between employers and workers. These negotiations can take place to define working conditions and terms of employment or to regulate relations between employers and workers. There is more than one level of negotiation that can take place. Collective agreements can be made on a

sectoral, national, or regional level, as well as on an organizational, workplace, or even a workplace-specific level. For the purposes of calculating this indicator, the total number of staff members as of the end of the reporting period should be used. The number of employees can be expressed either using headcount or using the full-time equivalent (FTE) approach, with the technique that is chosen to be used consistently throughout all time periods.

#### 2.4.2.3 Governance performance

One of the most important components for bolstering economic growth and productivity, as well as the trust of investors, is good corporate governance (CG). It is crucial for the successful operation of a market economy to have a functioning CG mechanism, which can promote investor trust and is necessary for the economy to function well. The quality of CG is becoming an increasingly important factor for consideration at publicly traded companies in Thailand. These companies make an effort to implement CG as a type of internal control so that they can monitor the performance of both their management and their board of directors. In a similar vein, in order to reap the benefits of increased investment, these businesses work hard to raise their corporate governance scores (CGSs).

The CG Score reflects the effectiveness of governance. Since 2001, the Thai Institute of Directors Association (IOD), in conjunction with the Stock Exchange of Thailand (SET), has conducted an evaluation of the corporate governance procedures of companies that are listed on the SET. The overall findings of the survey were compiled and included in the "Corporate Governance Report of Thai Listed Companies (CGR)" reports, which were then distributed to all listed businesses and parties associated with the capital market. The progress of the paradigm of good corporate governance in Thailand has been considerably aided by the contributions made by the CGR studies.

The evaluation criteria were formulated with the help of the Organization for Economic Cooperation and Development (OECD) Principles of Corporate Governance and Thailand's Corporate Governance Code for Listed Companies. The next five categories have a total of 241 criteria between them. obligations of the board of directors, the rights of shareholders, the equal treatment of shareholders, the role of stakeholders, disclosure and transparency, and the system of corporate governance that is



required of registered firms in Thailand has been designed by the Stock Exchange of Thailand in accordance with international standards. The first step was taken in 1995, well before the onset of the financial crisis, when research was conducted into the function of the audit committee for publicly traded firms. After that, in the beginning of 1998, it came out with a listing regulation that stated, effective 1999, every company that was listed was required to have an audit committee. The SET also published a guideline that year titled "Code of Best Practices for Directors of Listed Companies." The rules served to encourage Thai listed businesses to engage in responsible corporate governance, which, in turn, contributed to the growth of the Thai capital market in terms of both recognition and transparency. The year 2002 in Thailand was designated as the "Compass for Good Corporate Governance" by the Thai government, which also initiated the formation of the National Corporate Governance Committee (NCGC).

During the same year, the stock exchange established fifteen principles of good corporate governance to be adopted by listed companies. These standards should be followed by all publicly traded companies. Companies that are publicly traded are required to indicate, in both their annual registration statement (Form 56-1) and their annual reports, how they follow the fifteen principles, beginning with the fiscal year that ends on December 31, 2002. If they choose not to apply a principle, they are required to provide an explanation for their decision. (According to the Thailand Stock Exchange, 2018) The Stock Exchange of Thailand (SET), the office of the Securities and Exchange Commission (SEC), and the Thai Institute of Directors (IOD) are the three organizations that push to have instruments to research or analyze the corporate governance of registered firms in the stock market. The evaluation of corporate governance is conducted as part of the stock market evaluation process. The SEC offers awards to registered companies in an effort to incentivize them to provide data. SET gives prizes to businesses that are proactive and compliant with regulations. The acronym for both of these is IOD and the SET award. In order to control and report, a tool is developed. It is referred to as a corporate governance report (CGR) by rating 1-5, however, it will only be disclosed by companies that have a rank of number three or higher. This is due to the fact that major corporations are more likely to take action than minor ones. Therefore, it is unfair for smaller businesses to have lower scores. On the other hand, the CGR is the most reliable

source of study and evaluation that we have at the moment (The Stock Exchange of Thailand, 2018). In accordance with the international standard, IOD serves as a controlling principle that includes the following five categories: 1) the privilege of stockholders 2) providing for the fair treatment of shareholders 3) the role of stakeholders 4) the practice of openness and candor 5) the duties that are expected of the board. These crucifixions are the rules by which we rate. These executions are able to be amended on an annual basis due to changes in corporate governance. An annual report, an annual registration statement (form 56-1), an annual general letter, a shareholder's report, corporate data obtained through SET and SEC, and any other data that has been released public ally via the firm website are all utilized in the evaluation process.

In addition, SET is concerned about the significance of environmentally friendly growth. Additionally, it is concerned with stakeholders, and as a result, it concentrates on maintaining stability in the capital market so that businesses can expand economically while maintaining a healthy balance of social responsibility. In the same way that it supports the development of registered firms to be concerned about the effects of environmental, social, and governance issues, SET also urges investors to be concerned about long-term investing with responsible investment. It places an emphasis on the strategy, as well as the public disclosure of ESG data. In light of the fact that ESG is intended to serve a purpose for registered businesses, it is used for the development of the procedure known as benchmarking. It leads to investment in a sensible manner. The stock market has for the first time in 2015 announced that Thailand is financially sustainable. (The Stock Exchange of Thailand, 2018)

### **2.4.3 Institutional Ownership**

Most corporate governance studies focus on internal governance mechanisms and board characteristics, such as board independence, board size, audit committee independence, audit committee size, CEO duality, and board diversity. These are considered indicators of a good corporate governance mechanism that affects the corporate added value (Butt et al., 2022; Farooq et al., 2022; Alajmi & Worthington, 2023). However, investment analysts or equity analysts are an integral part of the external governance mechanism that affects the investment decisions of individual investors (Navissi & Naiker, 2006). With a role in investment analysis and the role of shareholders,

institutional investors reflect good corporate governance mechanisms since their analysis focuses on investment with the goal of generating long-term returns. With an investment committee with expertise and administrative mechanisms, they are able to manage risks to generate higher returns for the efficiency of the investments. Furthermore, with a shareholder who can audit the management, agent costs caused by major and minor shareholders and the management can be decreased (Jensen & Meckling, 1976). It has been widely accepted that institutional investors have an influence on managerial performance. A company with a high proportion of shares held by institutional investors indicates a higher performance since this can lead to a good corporate governance mechanism and the most efficient use of resources (Nurleni et al., 2018). Institutional shareholders are considered as a key investor group in the capital market due to the fact that their large proportion of investment helps promote the improvement of corporate governance in the capital market (SEC, 2022).

The above evidence suggests that the shares held by institutional investors reflect a good corporate governance mechanism since this type of investor is able to monitor the management to efficiently perform their duties which would add value to the company. In this regard, managerial efficiency is the use of skills, knowledge, and abilities reflected through operational strategies to achieve business success. Demerjian et al., (2012) defined managerial efficiency as a change in the corporate resources and high managerial efficiency was correlated with higher firm performance. According to Chen & Lin (2018), companies with high managerial efficiency generate higher returns on purchases and hold their investments over the long term. Furthermore, Khurana et al. (2018) found that high managerial efficiency had an influence on effective investment in capital markets.

Thailand, as a developing country with huge stock market growth, was found to have a leap in investor growth in 2021 (SEC, 2022). Despite the growth situation of listed companies in the Thai Stock Exchange, financial institution shareholders still need to study whether corporate governance can lead to performance and confidence among stakeholders. Academic evidence on institutional investor relations and performance reveals that institutional investors with positive engagement and managerial perspectives can enhance allocating effective resources and benefit the company in building a good

image. Retail investors can be confident that their investments will be protected and maximize their investment returns. It is expected that the results of this study can provide empirical evidence that enriches the literature on institutional shareholding structures on firm performance and managerial efficiency, which expands the scope of how institutional shareholder relationships impact firm performance.

Based on agency theory, Jensen & Meckling, (1976) stated that agency costs can arise when conflicts of interests between the management and the shareholders occur. Shareholders may require management to add value to shareholders. On the other hand, the management may want to operate in a different direction which may cause conflicts of the interests of shareholders. As a result, shareholders have to encounter agency costs. For agency costs, institutional shareholders act as a good corporate governance mechanism since they can monitor the management more closely and more systematically since they hold a large number of shares. Institutional investors can also increase firm value for shareholders (Navissi & Naiker, 2006). In addition, institutional investors consist of fund managers and professional analysts with knowledge and expertise in finance, investment and macroeconomics that can drive strategies. This leads to advantages and increases company value (Nurleni et al., 2018).

#### **2.4.4 Managerial Efficiency (M\_Score)**

The assessment of performance holds significant importance as it can function as a pivotal factor in decision-making processes. Various decisions, such as investments, agency relationships, and other choices, are significantly influenced by the performance exhibited by a company. Demerjian et al. (2012) posit that the presence of skilled administrators has the potential to improve business performance. Previous research has indicated that the effectiveness and competencies of managers can yield favorable consequences for enterprises, including precise projections, reduced tax evasion, and decreased audit expenses. According to a study conducted by Demerjian et al. (2012), it was discovered that managers' efficiency has a negative impact on earnings quality and promotes income normalization. Considerable focus has been directed towards the significance of managerial competence as a pivotal attribute in administration. Kor (2003) posits that managerial ability encompasses the inherent knowledge, skills, and experience possessed by a manager.

According to Demerjian et al. (2012), an effective manager is characterized by their ability to optimize advantages while utilizing minimal resources. Proficient managers possess a superior understanding of business and industries, exhibit enhanced foresight in anticipating demand, make more informed decisions in selecting initiatives, and demonstrate a deeper comprehension of risk. The implementation of a unique methodology for managing financial, operational, and accounting choices holds significant significance. Putra et al. (2022) posit that proficient managers possess the ability to enhance cost and revenue efficiency, employ effective business strategies, and allocate resources efficiently. In order to enhance the operational efficiency of their organizations, corporations allocate substantial financial resources toward compensating qualified managers for their services. According to Yung and Chen (2018), senior managers possess the potential to significantly influence the performance of the firm. However, they encounter various constraints when attempting to apply their expertise. Demerjian et al. (2012) posit that the competencies of managers have the potential to exert an impact on analysts' assessments of a firm and subsequently foster investor interest and engagement in the said firm. The preceding study, as indicated by Andreou et al. (2015), primarily emphasized the assessment of managers' capacity to forecast forthcoming performance through the utilization of efficient resource management.

Demerjian et al. (2012) and Salehi et al. (2021) have identified a positive correlation between the competencies of managers and the overall performance of firms. During the period of the financial crisis, managers who possessed the necessary skills and expertise demonstrated a higher level of proficiency in effectively utilizing available resources compared to managers who lacked such knowledge and experience. Furthermore, Yung and Chen (2018) provide empirical evidence that establishes a positive correlation between a company's managerial capabilities and its enhanced performance. According to Salehi et al. (2021), there is an expectation for managers to enhance their effectiveness in managing firms. Managers who possess higher levels of capabilities have the potential to enhance operational management effectiveness, especially in critical situations where their decisions can significantly influence firm performance (Andreou et al., 2015). In a recent study conducted by Xu et al. (2022), it was found that managers who possess high levels of competence demonstrate a greater

propensity for investment compared to their counterparts. Cheung et al. (2017) posit that the presence of experienced managers possessing significant authority has the potential to enhance the overall performance of a company. Demerjian confirmed that the model indicates managers' efficiency affects economic outcomes and is therefore important to economics, finance, accounting, and management research by quantifying the managerial efficiency model, principle of data envelopment analysis (DEA). It reflects the ability of management to effectively of changed resources by proving that the ability of manager can create an effective of work process and value to company more in over the past few years.

DEA is the indicator to evaluate the effectiveness of the unit by economics theory with nonparametric. There is a flexible function for efficiency. It is calculated by linear programming. It used empirical data of production factors and production (Morita & Avkiran, 2009). Development of started from Farrell (1957). Economics efficiency of unit is divided into two types: (1) Price/ allocative efficiency is an ability of unit to select each factor portion under the assumption of price of production factor. (2) Technical efficiency is an ability of unit in increasing production under factor of output – oriented measure. on the other hand, it can be considered from the ability of unit production to reduce production factor, but the production is still the same (input – oriented measure). To study managerial efficiency is a process of DEA which aims to calculate technical efficiency only.

Farrell (1957) defined efficiency and measurement efficiency by activity analysis approach. The purpose is to create a single index, it indicates the efficiency of unit which produces many products. However, the study of Farrell (1957) limited only one product for a unit, so it was not a good tool to measure the efficiency. Research on Charnes, Cooper, & Rhodes (1978), developed a model to solve this problem. It is called efficiency frontier. It is used to measure the maximum efficiency by scoring the production and products. The DEA model is used to measure the performance of the organization. There are many researches which used DEA to measure. Using DEA is famous, especially for accounting (Chang et al., 2018). It can be summarized as follows:

- The DEA model can be calculated specifically no matter what variety of production factors and products.

- DEA is a method to measure with nonparametric method, so there is no limit of appropriate function

Demerjian, et al. (2012) present a method of measuring management competence that eliminates the influence of various external factors. We measure managerial ability using Demerjian, et al. (2012) proposed method. Using a two-stage data envelopment analysis model, managerial ability is determined. Initially, a data envelopment analysis model with Sales revenue as the output and seven input variables (property, plant, and equipment; PPE, R&D, operating leases, goodwill, other intangible assets, cost of inventory, and selling, general and administrative expenses) is optimized to determine firm efficiency. In addition to managerial efficiency, other factors such as firm size, age, and competitive position will influence this efficiency.

$$\Theta = \frac{Sales}{COGS + SG\&A + OpsLese + PPE + GW + OtherInt + R\&D}$$

$\Theta$  is firm efficiency. Sale revenue is the output, as firms' main goal is to generate sales. Firm efficiency refers to the maximization of sales at the lowest possible cost per sale. The cost to produce sales has seven inputs (Demerjian et al., 2012).

There are firm and top manager-specific factors that contribute to the firm's efficacy. Factors unique to top managers are used to evaluate managerial skills. This research regresses six firm characteristics (firm size, firm market, free cash flow, firm age, business segment, and foreign currency indicator) on firm efficiency using a sector industry-effect and year-effect regression model (Demerjian et al., 2012). The following model is proposed:

$$\Theta = \beta_0 + \beta_1 FirmSize + \beta_2 FirmMarket + \beta_3 FreeCashFlow + \beta_4 FirmAge + \beta_5 BusinessSegment + \beta_6 ForignCurrency + YearDummy + \varepsilon$$

#### 2.4.5 Firm Performance

The study's response variable is firm performance, as measured by ROA and Tobin's Q. ROA measures accounting-based performance, whereas Tobin's Q measures market-based performance. A mix of these measurements is widely used in empirical studies focusing on ESG and firm/financial performance (Cornett et al., 2007; Andreou

et al., 2015; Aboud & Diab, 2018; Alareeni & Hamdan, 2020; Albitar et al., 2020; Junius et al., 2020; Abedin et al., 2022; Bodhanwala & Bodhanwala, 2023; Dkhili, 2023).

ROA is calculated by dividing net income by total assets, and Tobin's Q is calculated by dividing the market value of equity and debt capital by total assets. Accounting-based measures use audited accounting data to get a good idea of how well a company is doing. ROA shows how well a company's management is able to get a return on its resources. Companies that use their assets well have a higher ROA. Accounting-based profit measurements are criticized for being backward-looking and only partially estimating future occurrences in the form of depreciation and amortization. On the other hand, Tobin's Q is heavily affected by a wide range of unstable factors, such as the psychology of investors and predictions about the market. If Tobin's Q is larger than 1, the firm's market value is overvalued relative to the asset's book value, but if it is less than 1, the market value of the firm is undervalued.

## **2.5 Linkage Literature Review and Research Hypotheses Development**

### **2.5.1 Theoretical Framework, Literature Review and Hypothesis Development of ESG Performance**

The present research is built upon the positive theory, which aims to answer questions in a way that leads to a solution based on stakeholder theory (Freeman, 1984) and agency theory (Jensen & Meckling, 1976). According to the stakeholder theory, the management should not only focus on internal stakeholders, but also external stakeholders. Previous studies on the relationship between environmental, social, and corporate governance and firm performance provide various theories that can explain this relationship. Furthermore, the management must support social responsibility by broadening the perspective of stakeholders that includes employees, customers, suppliers, local communities, and governments since the success of corporate missions based on policies and decision-making might affect this group of people. The research suggests that corporate responsibility to all stakeholders improves long-term performance and reflects corporate ethical values when making investment decisions (Aboud & Diab, 2018; Melinda & Wardhani, 2020; Bodhanwala & Bodhanwala, 2023).



According to stakeholder theory, executives, particularly CEOs, with transformational leadership, are considered to possess a leadership style that is closely associated with social responsibility within the company. The success of a company largely depends on the passion and commitment of its executives towards ESG, as it is a key indicator of performance. To establish a positive relationship with stakeholders, it is imperative for executives to have clear goals and effective communication (Viererbl & Koch, 2022). In the end, it will lead to the determination of sales and profits. In other words, if the product is not environmentally friendly, customers will not buy the product. Thus, ESG is not the only social issue, but it has a positive effect on the company (Melinda & Wardhani, 2020; Maji & Lohia, 2023). Corporate governance is an additional approach that can enhance the transparency and accountability of the companies listed on the Thai Stock Exchange. According to the SEC (2023), shareholders have a legitimate right to receive a return on their investment as they take on investment risks. This is considered as a way to promote social responsibility within the representative theory framework. The stakeholder theory has expanded the scope of corporate social responsibility to include a diverse range of individuals who should be given attention and accountability. By allowing stakeholders to participate in decision-making and business management, trust, mutual respect, and a shared responsibility model can be established (Fama & Jensen, 1983).

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).

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 the 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, in terms of environmental dimension, it had a negative impact on ROA, ROE, and Tobin's Q since environmental issues increase 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.

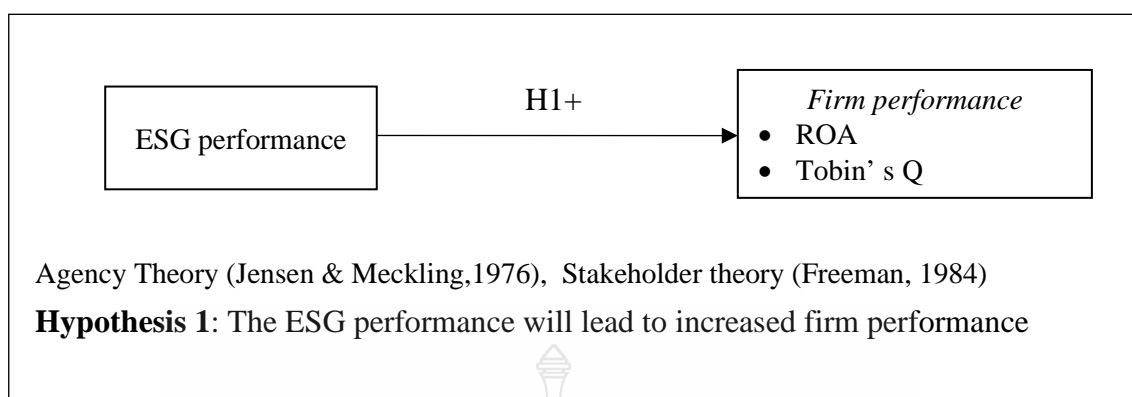
Duque-Grisales & Aguilera-Caracuel (2021) found a negative correlation of ESG and ROA in emerging markets of multinationals in Latin America. The findings indicate that companies that received high ESG scores experienced reduced operating profits, implying that the expenses incurred in ESG operations 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 of how 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 more 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 Thomson Reuters Datastream by using a rolling window approach where each window has a length of 120 months and ends on a date that a fund reports its portfolio composition. They found that investors were unconvinced that ESG reflect CSR performance and ESG scores will deliver high long-term returns. Similarly, Junius et al., (2020) studied the impact of ESG on firm performance and market value and focused 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) suggest that investors still need a clear understanding of the careful use of ESG data in all dimensions since various studies 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 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 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 need to continuously work in order to meet stakeholder expectations (Velte, 2020). Thus, the hypotheses are as follows:

**H1a.** ESG performance increases ROA.

**H1b.** ESG performance increases Tobin's Q.



**Figure 2.1** Linking environmental, social and governance (ESG) performance and firm performance

**Table 2.1** Summary of studies on ESG and firm performance

Authors	Purpose	Variables	Results
Al Amosh et al., (2023)	To investigate the impact environmental, social, and governance (ESG) on financial performance	X: ESG Y: ROA, ROE, Tobin's Q Control: size, age, leverage, year and sector	<ul style="list-style-type: none"> <li>• Environmental, social and ESG disclosure positive significant ROA, ROE and Tobin's Q.</li> <li>• Governance positively positive impact ROA</li> </ul>
Bodhanwala & Bodhanwala, (2023)	To investigate the impact sustainability policies by firms makes performance	X: ESG Y: Price-to-book ratio, market capitalization, Tobin's Q, buy and hold rawprice return	<ul style="list-style-type: none"> <li>• ESG no significant stock market performance</li> </ul>
Dkhili (2023)	To investigate the moderating role of competitive advantage on the relationship between ESG and market performance	X: ESG Mod: Competitive advantage Y: Tobin's Q Control: size, leverage, growth and industry	<ul style="list-style-type: none"> <li>• ESG positive significant Tobin's Q.</li> <li>• ESG has a positive effect on firms' performance for higher competitive advantage.</li> </ul>
Kalia & Aggarwal (2023)	To investigate the impact of component of environmental, social and governance score (ESG) on financial performance	X: ESG Y: ROA, ROE Control: size, leverage, market value to book ratio and market capitalization	<ul style="list-style-type: none"> <li>• ESG positive significant firm performance (developed economies)</li> <li>• ESG negative significant firm performance (developing economies)</li> </ul>

**Table 2.1** Summary of studies on ESG and firm performance (Cont.)

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Maji & Lohia, (2023)	To investigate the impact of environmental, social and governance (ESG) performance on the firm performance	X: ENV, SOC, GOV, ESG Y: ROA, Tobin's Q and market capitalization Control: size, leverage and net sales growth	<ul style="list-style-type: none"> <li>• ENV negative significant ROA, positive significant Tobin's Q and market capitalization</li> <li>• SOC, GOV, ESG positive significant on ROA, Tobin's Q</li> </ul>
Menicucci & Paolucci (2023)	To investigate the impact of environmental, social, and governance (ESG) on bank performance	X: ENV, SOC, GOV Y: ROA, ROE, Tobin's Q and stock market return Control: size, capital adequacy ratio, liquid asset ratio, loans to total deposits, customer deposits to total liabilities	<ul style="list-style-type: none"> <li>• ENV positive significant ROA and ROE</li> <li>• SOC negative significant ROA and ROE</li> <li>• GOV positive significant stock market return</li> </ul>
Alipour et al. (2019)	To investigate the moderating role of board independence on the relationship between environmental disclosure quality (EDQ) and firm performance	X: EDQ Mod: Board independence Y: ROA, ROE, ROS and Tobin's Q Control: size, leverage, age, liquidity	<ul style="list-style-type: none"> <li>• EDQ positive significant ROA and Tobin's Q</li> <li>• EDQ has a positive effect on firms performance for higher board independence</li> </ul>
Buallay (2019)	To investigate the impact of ESG and firm performance	X: Environmental, social, governance and ESG Y: ROA, ROE and Tobin's Q Control: bank specific and macroeconomic	<ul style="list-style-type: none"> <li>• ESG positive significant ROA, ROE and tobins Q</li> <li>• Environmental (E) positive significant ROA and Tobin's Q</li> <li>• Social (S) negative significant ROA, ROE and Tobin's Q</li> <li>• Social (S) negative significant ROA, ROE and positive significant Tobin's Q</li> </ul>
Mar, Luis, & Redondo (2019)	To investigate the impact of ESG and stock prices	X: ESG Y: Tobin's Q Control: size, age, leverage, year and sector	ESG positive significant impact stock prices

**Table 2.1** Summary of studies on ESG and firm performance (Cont.)

Authors	Purpose	Variables	Results
Aboud & Diab (2018)	To investigate the impact of ESG and firm value	X: ESG Y: Tobin's Q Control: size, leverage, ROA, capital expenditure ratio, EGX listing	ESG positive significant impact Tobin's Q
Atan, Mahmudul, Said, & Zamri (2018)	To investigate the impact of ESG on the performance	X: ESG disclosure Y: ROE, Tobin's Q and WACC	ESG positive significant impact Tobin's Q and WACC
Lu & Taylor (2018)	To investigate the environmental performance, environmental disclosure, and financial performance	X: Environmental performance X,Y: Environmental disclosure Y: Market capitalization	<ul style="list-style-type: none"> <li>• Environmental performance positive significant impact environmental disclosure</li> <li>• Environmental performance negative significant impact market capitalization</li> </ul>
Sultana, Zainal, & Zulkifli (2017)	To investigate the ESG performance and investment decision	X: ESG Y: Investment decision	ESG positive significant impact investment decision
Velte (2017)	To investigate the ESG and financial performance	X: ESG Y: ROA and tobin's <i>q</i> Control: R&D expenses, beta factor, firm risk),size, branch of industry	ESG positive significant impact and no significant on tobin's <i>q</i>
Bosco & Misani (2016)	To investigate the ESG and liability of foreignness	X: ESG Y: liability of foreignness Control: size, EBITDA, firm profitability	ESG negative significant impact on liability of foreignness
Hodkam (2016)	To investigate the economies, social and environmental disclosure, and stock price.	X: Economies, social and environmental disclosure Y: Tobin's Q Control: size, ROE, dividend payout, capital structure	<ul style="list-style-type: none"> <li>• Economies disclosure positive significant Tobin's Q</li> <li>• Social and environmental disclosure no significant Tobin's Q</li> </ul>

**Table 2.1** Summary of studies on ESG and firm performance (Cont.)

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Nor et al. (2016)	To investigate the environmental disclosure and financial performance	X: environmental index Y: ROA, ROE, EPS and profit margin	ESG positive significant impact ROA, ROE, EPS
Semenova & Hassel (2016)	To investigate the moderating role of environmental risk on the relationship between environmental performance and financial performance	X: Environmental performance Mod: Environmental risk Y: ROA and Tobin's Q Control: total assets, debt/total assets, sales growth (%) and age	<ul style="list-style-type: none"> <li>• Environmental performance positive significant Tobin's Q.</li> <li>• Environmental performance has a negative effect on tobin's <i>q</i> and ROA for higher environmental risk</li> </ul>
Benjamin & Zain (2015)	To investigate the corporate governance (CG) and dividend payout	X: CG (board meeting, board independence) Y: Divided payout. Control: ROE, size, leverage, cash, growth, Industry	Board meeting and board independence negative significant impact on dividend payout
Elkelish & Hassan (2015)	To investigate the corporate governance disclosure and share price accuracy	X: CG (number of directors on the board, big4 audit firms) Y: Share price accuracy Control: market capitalization, stock market and ROE	Number of directors on the board and big4 audit firms has a significant positive impact on share price accuracy
Thanasarnborisud & Phadoongsitthi (2015)	To investigate the extent level of social and environmental disclosure	X: Extent level of social (firm size, industry type, profitability, leverage, ownership structure and listing age) Y: level of disclosure Control: auditor size	Firm size and industry type has a significant positive impact on level of disclosure
Yarram (2015)	To investigate the corporate governance and the dividend payout decisions	X: Corporate governance score Y: dividend payout Control: ROA, MVBV, growth, cash, debt.	Corporate governance score has significant positive impact on the average dividend payout

**Table 2.1** Summary of studies on ESG and firm performance (Cont.)

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Dragomir (2010)	To investigate the environmental performance and financial performance	X: environmental disclosure Y: Tobin's Q, share return, ROE, leverage, ROA, EPS Control: Size	• Environmental disclosure positive significant Tobin's Q, share return and ROA • Environmental disclosure negative significant leverage
Samontaray (2010)	To investigate the effect corporate governance and share price	X: Corporate governance Y: share price Control: size, leverage, cash, growth, Industry	Corporate governance positive significant on the share price

It appears that the literature on sustainability and its impact on performance presents two distinct perspectives: the cost-of-capital reduction perspective and the value-creation perspective. The former argues that investing in ESG (environmental, social, and governance) initiatives increases costs and negatively affects market values, while the latter contends that ESG can be used as a tool to create a competitive advantage and improve financial performance. However, despite these two contrasting views, research on the effects of ESG has yielded inconsistent and contradictory findings, as indicated by various studies. This inconsistency might be attributed to the complexity of the relationship between ESG and performance indicators. To gain a better understanding of why ESG has variable effects on performance, the researchers in question decided to investigate the impact of ESG on operational, financial, and market performance indicators. By doing so, they likely aimed to shed light on the specific factors or mechanisms that may be influencing the relationship between ESG initiatives and a company's performance. It is important to recognize that the field of sustainability and its impact on business performance is dynamic and multifaceted. Different industries, regions, and organizational contexts can influence the outcomes of ESG initiatives. Additionally, the timeframe over which these effects are observed might play a significant role in the varying results obtained in different studies.

The researchers' investigation into operational, financial, and market performance indicators might provide valuable insights into understanding the nuanced



relationship between ESG and performance, potentially contributing to more informed decision-making for businesses and policymakers regarding sustainability strategies. However, the complexity of the topic and the ongoing evolution of ESG practices necessitate continued research and analysis to draw comprehensive conclusions.

From reviewing researches on ESG (Table 2.1) it was found that the data arrangement was used from data stream (Aboud & Diab, 2018 and Bosco & Misani, 2016) Thomson Reuters (Mar, Luis, & Redondo, 2019; Velte, 2017 and Semenova & Hassel, 2016) Bloomberg database (Buallay, 2019 and Atan, Mahmudul, Said, & Zamri, 2018) or the respective found a mental data such as CODAL database and FTS Euro first 300 Index constituents. The reviewing of ESG data in Thailand, it was found that ESG score was not published publicly. The researcher finds that scoring criteria of ESG data of the involved department which organizes this test in the stock market. Here are criteria of scoring ESG.

The Stock Exchange of Thailand: There are two steps of E.S.G. evaluation.

**The first step:** Questionnaire of sustainability (100 questions), Questionnaire of sustainability: there is the score determination for each question in advance. The company will receive a score. After answering all questions, each will be collected by equal weighted on industrial subject.

**The second step:** Interview

It is to present and answer about the process of sustainability. The committee will consider registered companies sustainably by calculating and comparing scores to filter companies. Criteria:

**1. Management and control category 41%**

- 1.1 Policy and managerial control and governance (7 %)
- 1.2 Risk management and economic crisis (6%)
- 1.3 Taking action under the law and regulation/corruption management and bribery (7%)
- 1.4 Customer relation management (CRM)
- 1.5 Brand image management (4%)
- 1.6 Supply chain management from the source to consumers (3%)
- 1.7 Policy of crime protection (4%)

1.8 Financial stability and risks in work process (4%)

**2. Environment category 24%**

2.1 Report about environment to stakeholders and the public (3%)

2.2 Environment management and policy (4%)

2.3 The effectiveness of environmental work process (4%)

2.4 Risk management and the opportunity affecting business (9%)

2.5 Strategy acting against the climate change issue (4%)

**3. Society category 35%**

3.1 Reporting to society (3%)

3.2 Labor and human rights (5%)

3.3 Human resource development (6%)

3.4 Persuading abilities employees (6%)

3.5 Showing of decent citizen and giving back to society (3%)

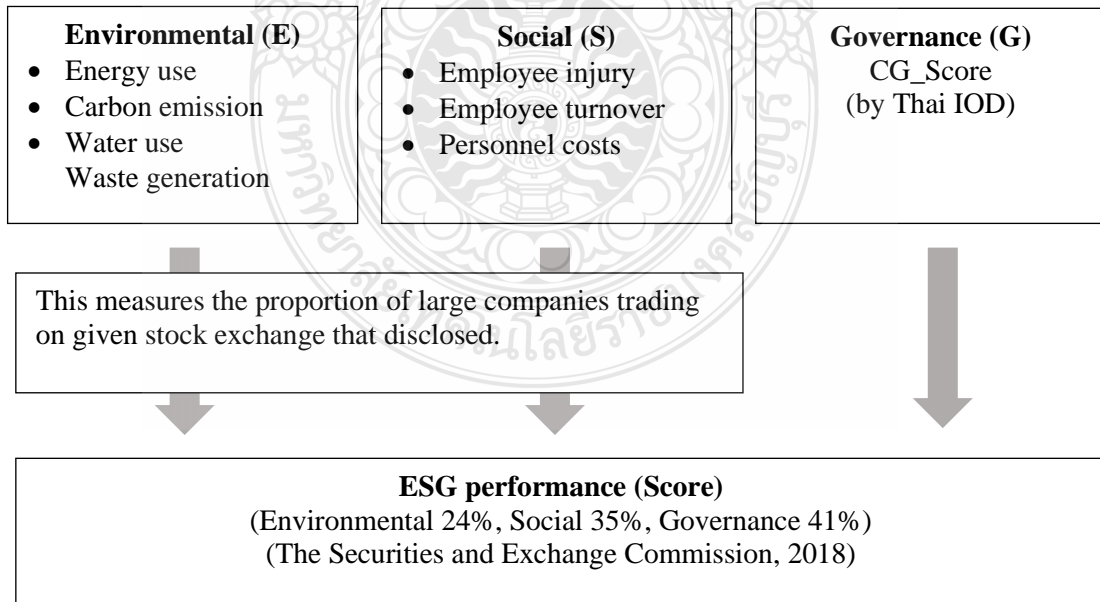
3.6 Hygienic and safety at work (3%)

3.7 No transparency of money investment and business loans (4%)

3.8 Opportunity to access money sources equally (3%)

3.9 Giving opportunity to stakeholders to business process (2%)

The researcher evaluated by measuring ESG performance. There are two models:



**Figure 2.2** Measuring ESG performance

## Step.1 Environmental, social, and governance (ESG) criteria

### (1) Measuring the environmental and social score

The researcher used seven indicators to relate the costs and factors of companies with environmental and social impacts, such as energy consumption, carbon emissions (GHG), water consumption, waste generation, employee injury rate, employee turnover, and personnel costs (payroll). The study, *Measuring Sustainability Disclosure: Ranking the World's Stock Exchanges* (Sustainable Stock Exchanges Initiative, 2019), ranks sustainable disclosure for registered companies on fifty-five stock exchanges. Thailand's stock market is ranked 10th and is the only stock market in Asia. And it is also one of the emerging stock markets ranked in the top ten. This reflects the quality of registered companies, which is in line with the standard of developed markets.

### (2) Measurement of corporate governance score (CGS)

The CG ranking criteria of the Thai IOD data was used for this research, as it is an international standard. It is accepted by Wylie and can reflect the advantage of the negative process in the case of management strategy. In addition, from the stakeholders' point of view, transparency should protect executives and managers from being tempted to take advantage of their position. A high value of CGS strengthens shareholders' confidence in investments and leads to a high enterprise value.

### Step 2: Assessing ESG disclosure (ranking model based on three metrics)

The disclosure score is based on the percentage of significant publicly traded corporations that published the seven indicators between 2016 and 2021.

First, the percentage of significant companies trading on a particular exchange that disclosed a specific indication is calculated. This is done for all of the evaluated stock exchanges.

Second, for each company, the resulting percentages are ordered, with the highest percentage receiving the highest score.

This process is repeated for the remaining six indicators. Finally, the disclosure score of an exchange is a simple average of the seven percentage scores. In terms of their contribution to the disclosure score, the indicators are weighted equally.

### Step 3: Giving each area a weight

For the Securities and Exchange Commission's overall ESG score, an automated, data-driven, and objective logic is used to figure out how much weight each area should have. The number of indicators in each category compared to the total number of indicators used in the ESG score determines how much each category is worth. This means that problems with more information are given more weight, and the relative performance scores of different companies can be calculated with more confidence. So, categories like management (CG score) that have a lot of topics that are fairly clear and companies that report more information on these topics are given more weight than categories that aren't as clear and don't have as much information.

### **2.5.2 Theoretical Framework, Literature Review and Hypothesis Development of Institutional Ownership**

Most corporate governance studies focus on internal governance mechanisms and board characteristics, such as board independence, board size, audit committee independence, audit committee size, CEO duality, and board diversity. These are considered as indicators of a good corporate governance mechanism that affects the corporate added value (Butt et al., 2022; Farooq et al., 2022; Alajmi & Worthington, 2023). However, investment analysts or equity analysts are an integral part of the external governance mechanism that affects investment decisions of individual investors (Navissi & Naiker, 2006). With a role in investment analysis and the role of shareholders, institutional investors reflect good corporate governance mechanisms since their analysis focuses on investment with the goal of generating long-term returns. With an investment committee with expertise and administrative mechanisms, they are able to manage risks to generate higher returns for the efficiency of the investments. Furthermore, with a shareholder who can audit the management, agent costs caused by major and minor shareholders and the management can be decreased (Jensen & Meckling, 1976). It has been widely accepted that institutional investors have an influence on managerial performance. A company with a high proportion of shares held by institutional investors indicates a higher performance since this can lead to a good corporate governance mechanism and the most efficient use of resources (Nurleni et al., 2018). Institutional shareholders are considered as a key investor group in the capital market due to the fact

that their large proportion of investment helps promote the improvement of corporate governance in the capital market (SEC, 2022).

The above evidence suggests that the shares held by institutional investors reflect a good corporate governance mechanism since this type of investor is able to monitor the management to efficiently perform their duties which would add value to the company. In this regard, managerial efficiency is the use of skills, knowledge, and abilities reflected through operational strategies to achieve business success. Demerjian et al., (2012) defined managerial efficiency as a change in the corporate resources, and high managerial efficiency was correlated with higher firm performance. According to Chen & Lin (2018), companies with high managerial efficiency generate higher returns on purchases and hold their investments over the long term. Furthermore, Khurana et al. (2018) found that high managerial efficiency had an influence on effective investment in capital markets.

Thailand, as a developing country with huge stock market growth, was found to have a leap in investor growth in 2021 (SEC, 2022). Despite the growth situation of listed companies on the Thai Stock Exchange, financial institution shareholders still need to study whether corporate governance can lead to performance and confidence among stakeholders. Academic evidence on institutional investor relations and performance reveals that institutional investors with positive engagement and managerial perspectives can enhance allocating effective resources and benefit the company in building a good image. Retail investors can be confident that their investments will be protected and maximize their investment returns. It is expected that the results of this study can provide empirical evidence that enriches the literature on institutional shareholding structures on firm performance and managerial efficiency, which expands the scope of how institutional shareholder relationships impact firm performance.

Based on agency theory, Jensen & Meckling, (1976) stated that agency costs can arise when conflicts of interests between the management and the shareholders occur. Shareholders may require management to add value to shareholders. On the other hand, the management may want to operate in a different direction which may cause conflicts of the interests of shareholders. As a result, shareholders have to encounter agency costs. For agency costs, institutional shareholders act as a good corporate governance

mechanism since they can monitor the management more closely and more systematically since they hold a large number of shares. Institutional investors can also increase firm value for shareholders (Navissi & Naiker, 2006). In addition, institutional investors consist of fund managers and professional analysts with knowledge and expertise in finance, investment and macroeconomics that can drive strategies. This leads to advantages and increases company value (Nurleni et al., 2018).

However, institutional shareholders may promote self-interest behavior. In other words, if institutional shareholders are involved with the company as an investor with voting rights from investing in securities and a business partner at the same time, this may lead to conflicts of interests. In addition, if the institutional shareholders and the company have mutual benefits, the institutional shareholders will not be able to fully monitor the management's performance. As a result, institutional investors' holdings may also have a negative impact on firm performance (Pound, 1998; Sakawa & Watanabel, 2020; Saleh et al., 2022).

Institutional ownership activism has played an increasing role in the stock market growth, together with laws and regulations that have increasingly empowered shareholders since the 2001 due to the scandal of the management in several big companies, such as Enron Tyco and WorldCom, engaged in fraudulent account manipulation and embezzlement, which caused crash in the stock market and negatively affected the image of big business. Thus, investors in the United States have cooperated in monitoring the management more closely and systematically, especially institutional investors who have power due to their large number of shares with the ability to arrange private discussions to create social pressure, and use legal channels to gather other shareholders to increase the agenda at the shareholders' meeting, convince other shareholders to jointly vote on important issues, such as the removal of directors or executives who misbehave, propose business plan improvement, support or oppose the acquisition plan or oppose the plans of suspicious major shareholders (Sakawa & Watanabel, 2020). Previous research has taken different views of the relationship between institutional shareholder structure and corporate performance as follows:

Firstly, institutional shareholders have a positive relationship with firm performance. Ferreira & Matos (2008) found that the role of institutional investors was

monitoring the performance of a company. The higher percentage of institutional investors can increase firm performance since they are investors with knowledge, expertise, and the ability to monitor the management at a lower cost than retail investors. Likewise, Abedin et al., (2022) found a positive linear relationship between institutional shareholders and firm performance (Tobin's Q and ROA). Cornett et al., (2007) suggested that institutional investors with the power to monitor the management's performance or pressure insensitive investors can increase firm performance. On the other hand, the institutional investors with no power or pressure-sensitive investors were found to have no correlation with firm performance.

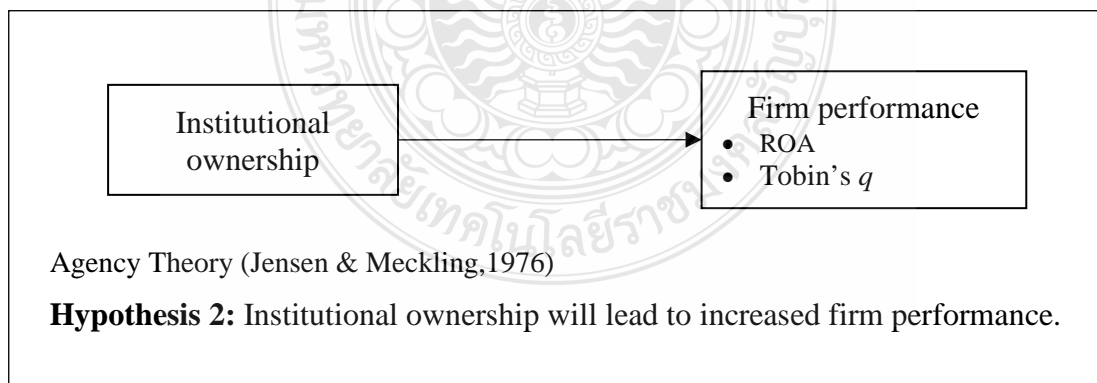
Secondly, institutional shareholders have a negative relationship to firm performance. Practical evidence suggests that major shareholders are concentrated ownership and are able to access to internal information, which is important information for decision-making. The concentrated ownership of institutional shareholders can lead to agency problems since they have a lot of voting rights and the opportunity to determine financial and operational policies according to their own group's expectations. These can cause conflicts of interests between the majority of shareholders and the shareholders who do not have control over the business. Highly concentrated structure of shareholders can be easily exploited since the shareholders influence the decision of the board of directors. In other words, major shareholders influence corporate future performance. Daryaei & Fattahi (2020) suggested that large shareholders might not support the management to improve their performance according to the theory of profitability. In other words, if the management is unable to manage effectively, institutional shareholders will have the opportunity to take up management positions in the future upon the vote of the shareholders. Based on this assumption, corporate governance mechanisms may be reduced as institutional shareholders and the management do not operate for the best interest of the company, and do not support policies that are beneficial to minor shareholders (Bushee, 1998). Tsouknidis (2019) found a significant negative correlation of non-strategic institutional investors who aim to hold stocks in the short term tend to have no incentive to constantly monitor the performance of management. Kirchmaier & Grant (2006) found that institutional investors who are major shareholders have a negative relationship with long-term share price performance of public companies in

European economies, and indicated that it is difficult for institutional shareholders to contribute to the efficient operation of future interests.

Thirdly, institutional ownership has an inverted U-shaped relationship with firm performance despite evidence of the uncertainty of the relationship of institutional investor shareholders with firm performance. Bushee (1998) found that institutional shareholders had a non-linear relationship with firm performance. It was found that institutional investors must hold 30% of the shares and have long-term investment objectives in order to increase firm performance. However, the performance would decrease if the proportion of institutional investors is more than 30 percent. This is in line with Daryaei & Fattahi (2020), who found that the U-shaped relationship between institutional ownership and firm performance confirms the validity of the efficient monitoring. Navissi & Naiker (2006) and Daryaei & Fattahi (2020) confirmed that institutional investor ownership does not play a role in creating a corporate governance mechanism that increases firm performance. Thus, the influence of institutional shareholders on operating results cannot be clearly concluded since the shares held by institutional investors also depend on other characteristics of the company (Bushee, 1998; Tsouknidis, 2019; Daryaei & Fattahi, 2020). Thus, the hypotheses are as follows:

**H2a.** Institutional ownership increases ROA.

**H2b.** Institutional ownership increases Tobin's Q.



**Figure 2.3** Linking institutional ownership and firm performance



**Table 2.2** Summary of studies on institutional ownership and firm performance

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Abedin et al., (2022)	To investigate the effect of institutional ownership on firm performance	X: Foreign institutional investors Y: ROA, Tobin's Q Control: size, leverage, liquidity, asset growth, price volatility, property, plant and equipment divided by total assets, year dummy	Foreign institutional investors positive significant effect on Tobin's Q and ROA
Ilyas et al., (2022)	To investigate the effect of foreign and domestic institutional investors on the value holdings.	X: Foreign institutional investors Mod: Excess cash holdings Y: firm market value Control: earnings, net assets, R&D expenditures, interest expenses and dividends	<ul style="list-style-type: none"> <li>• Foreign institutional investors no significant Tobin's Q</li> <li>• Foreign institutional investors positive significant Tobin's Q for higher excess cash holdings</li> </ul>
Saleh et al., (2022)	To investigate the moderating role of CEO power on the relationship between institutional ownership and performance	X: Institutional ownership Mod: CEO power Y: firm market value Control: earnings, net assets, R&D expenditures, interest expenses and dividends	<ul style="list-style-type: none"> <li>• Institutional ownership and CEO power positively with firm performance.</li> <li>• Institutional ownership positive significant Tobin's Q for higher CEO power</li> </ul>
Daryaei & Fattahi, (2020)	To investigate the effect of institutional ownership on firm performance.	X: Institutional ownership Y: ROA, ROE, Tobin's Q Control: size and leverage	<ul style="list-style-type: none"> <li>• Institutional ownership below 28.5% and 43.5% positive significant on ROA and Tobin's Q</li> <li>• Institutional ownership above 28.5% and 43.5% negative significant on ROA and Tobin's Q</li> <li>• Institutional ownership from 4.2% to 14.1% positive significant on ROE.</li> </ul>
Sakawa & Watanabel, (2020)	To investigate the effect of institutional ownership on the performance	X: Institutional ownership Y: ROA, Tobin's Q Control: firm size, financial leverage, free cash flow, firm risk, the board size, outside director ratio, a stock option dummy, big auditors dummy	Institutional ownership positive significant with ROA and Tobin's Q

**Table 2.2** Summary of studies on institutional ownership and firm performance (Cont.)

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Tsouknidis, (2019)	To investigate the effect of institutional ownership on the performance	X: Institutional ownership Y: ROA, Tobin's Q Control: firm size, financial leverage,	Institutional ownership negative significant with Tobin's Q
Nurleni et al., (2018)	To investigate the effect of managerial and institutional ownership on the corporate social responsibility (CSR) disclosure.	X: Institutional, managerial ownership, Y: CSR disclosure.	<ul style="list-style-type: none"> <li>• Institutional ownership positive significant with CSR disclosure</li> <li>• Managerial ownership positive significant with CSR disclosure</li> </ul>
Sean Cleary & Jun Wang (2017)	To investigate the effect of institutional investors' investment horizons (IIH) on a wide variety of key corporate policies.	X: institutional ownership (% institutional investors into three groups) Y: market value of leverage Control: size, Tobin's Q, capital expenditures, growth, asset tangibility, financial health, dividends and ROA	Institutional ownership positive significant with market value of leverage
Jory, Ngo, & Sakaki (2017)	To investigate the effect of institutional ownership stability and dividend payout ratio	X: institutional ownership (% institutional ownership based on a five-year rolling period) Y: dividend payout ratio Control: market capitalization, market-to-book ratio, growth, ratio of cash and bank balances-to-total assets, ROA.	Institutional ownership positive significant with dividend payout ratio
Dana AL-Najjar (2015)	To investigate the effect of institutional ownership and firm performance	X: institutional ownership (% of institutional ownership) Y: firm performance (ROA and ROE) Control: Size, tangibility, business risk, debt to asset and marketability.	Institutional ownership no significant with ROA and ROE
P. Wang (2014) Sources: emerald insight	To investigate the effect of foreign institutions and stock returns	X: institutional ownership (% of institutional ownership) Y: stock returns (ROE) Control: book-to-market ratio, market capitalization, stock closing price, age, cash dividend	Institutional ownership positive significant with ROE

**Table 2.2** Summary of studies on institutional ownership and firm performance (Cont.)

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Ferreira & Matos, (2008)	To investigate the effect institutional ownership and firm value	X: institutional ownership Y: Tobin's Q Control: SIZE, growth opportunities, leverage, cash holdings, cross-listing	Institutional ownership positive significant with Tobin's Q
Cornett et al., (2007)	To investigate the effect institutional ownership and profitability	X: institutional ownership Y: profitability (ROA and ROE) Control: book-to-market ratio, market capitalization, stock closing price, age, cash dividend	Institutional ownership positive significant with ROA and ROE
Navissi & Naiker (2006)	To investigate the effect institutional ownership and firm value	X: Institutional ownership (levels of shareholdings - 10,20,30,40,50 and more 50%) Y: firm value (market value to the book value of equity) Control: Size	<ul style="list-style-type: none"> <li>• Institutional ownership (up to 30%) positive significant with firm value</li> <li>• Institutional ownership (beyond 30%) negative significant with firm value</li> </ul>

### 2.5.3 Managerial efficiency (M\_Score) and firm performance

The objective of this study is to quantify managerial efficiency. Previous scholarly investigations have established that certain characteristic specific to managers, such as talent, reputation, ability, or style, have a significant impact on outcomes. Consequently, these factors hold considerable importance for research in the fields of economics, management, finance, accounting, and their practical applications. In order to assess managerial efficiency, scholars commonly employ various indicators, known as proxies, including but not limited to firm size, growth rate, historical abnormal performance, compensation levels, tenure, media coverage, and educational background.

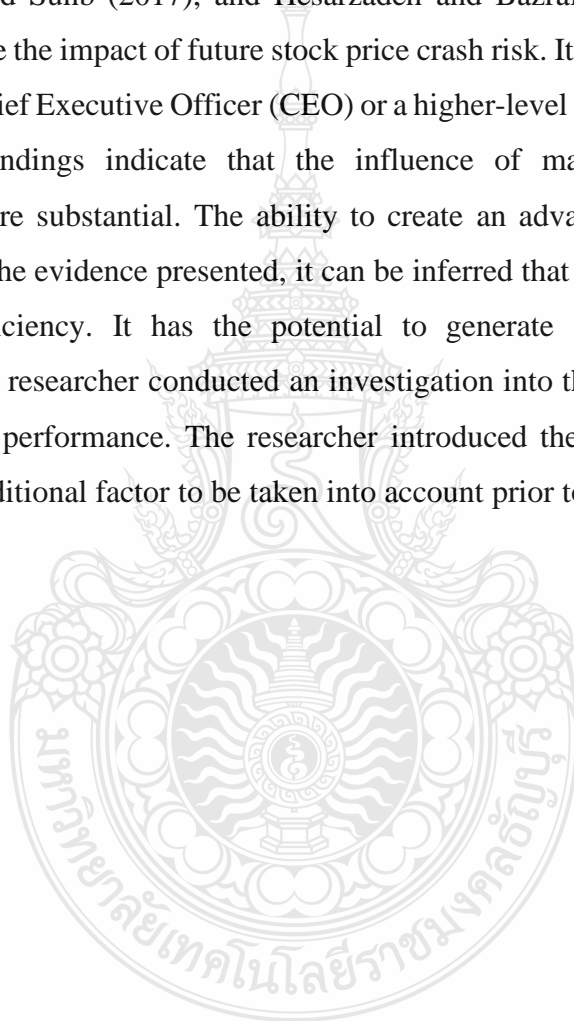
Scholars have additionally deduced the effectiveness of managers by employing data envelopment analysis (DEA) in distinct sectors. However, it should be noted that a majority of these measures also encompass substantial aspects of the organization that lie beyond the purview of managerial influence. Efficiency is a metric employed to evaluate the proficiency of managers in effectively managing resources, particularly within

companies engaged in diversification. In order to obtain more comprehensive data, it is elucidated that the utilization of company resources enhances effectiveness. In their study, Demerjian et al. (2012) examined the impact of managerial effectiveness on the ability of managers to modify organizational resources. The outcome is to assess the effectiveness of a manager and prioritize the highest level of performance. In order for an organization to function effectively, it is imperative for managers to possess a high level of efficiency. I would like to inquire about your assessment of managerial performance. The implementation of the Data Envelopment Analysis (DEA) can serve as a valuable method for assessing managerial efficiency. Managerial efficiency plays a significant role in influencing various aspects of firm performance, including executive compensation, investment decisions, corporate governance, economic effects of corporate ownership, and cross-country productivity differences.

The evaluation of proper input and output selection is crucial due to the dependence of the ratio on the factors employed. The perspective of managerial efficiency was examined by Demerjian et al. (2012). The input factors in this context encompass the cost of goods sold, selling general and administrative expenses, property, plant, and equipment, operating lease expenses, research and development costs, as well as goodwill and other intangible assets. On the other hand, the output variable is represented by net sales. The generation of revenue is influenced by various inputs, all of which are subject to managerial discretion and can be impacted by managerial efficiency. Demerjian et al. (2012) introduced the MA-Score as a metric for assessing managerial efficiency. The utilization of the ranked managerial efficiency measure developed by Demerjian et al. (2012) has been observed among numerous researchers. The relationship was examined through various approaches, as demonstrated by the study conducted by Luo and Zhou (2017). The study examined the impact of managerial aptitude on the sentiment expressed in earnings announcements, as well as its influence on the market's reaction to such sentiment. This study discovered that individuals who possess the skill to effectively lead teams tend to employ a more optimistic language in their financial statements.

This finding expands upon the existing body of knowledge regarding factors that influence tone, which includes operational performance, managerial incentives, growth prospects, and company size. In addition to this research, it has been observed

that stock markets exhibit more pronounced positive responses to optimistic language used in earnings announcements released by companies with highly competent management teams. In their study, Habib and Hasan (2017) examined the relationship between managerial ability and two key variables: investment efficiency and future stock price crash risk. Research has revealed a significant correlation between the proficiency of Chief Executive Officers (CEOs) and their investment decisions. According to Cox (2017), Huang and Sunb (2017), and Hesarzadeh and Bazrafshan (2019), it has the potential to mitigate the impact of future stock price crash risk. It has been confirmed that the efficacy of a Chief Executive Officer (CEO) or a higher-level capability is established. In general, the findings indicate that the influence of managerial efficiency on performance is more substantial. The ability to create an advantage in competition is evident. Based on the evidence presented, it can be inferred that there is a demonstration of managerial efficiency. It has the potential to generate a favorable impact on advancements. The researcher conducted an investigation into the impact of managerial efficiency on firm performance. The researcher introduced the concept of managerial efficiency as an additional factor to be taken into account prior to making investments.



**Table 2.3** Summary of studies on managerial efficiency and performance

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Jouber, (2022)	To investigate the moderating role of managerial ability on the relationship between female leaders and corporate social performance	X : Female leaders Mod : Managerial ability Y: Corporate social performance Control : firm size, ROA, leverage, cash flow from operations, age	Female leaders has a positive effect on corporate social performance for higher managerial ability
Magerakis, (2022)	To investigate the moderating role of managerial discretion on the relationship between managerial ability and cash holding	X : Managerial ability Mod : Managerial discretion Y: Cash holding Control : leverage, net working capital to total assets , cash flow to assets, R&D expenditures, firm size, firm age, Tobin's Q, capital expenditures, acquisition activity, debt, net equity issuance relative to assets, industry cash flow risk, a dummy year and industry	Managerial ability has a positive effect on cash holding for higher discretion
Xu et al., (2022)	To investigate the impact of age diversity on firm performance and the mediating role of managerial ability	X : Age diversity Med : Managerial ability Y: Tobin's Q Control : firm size, capital expenditure, growth, R&D	<ul style="list-style-type: none"> <li>• Age diversity negative significant with firm performance</li> <li>• Managerial ability plays a mediating role in the relationship between age diversity and Tobin's Q</li> </ul>
Chen & Chen (2020)	To investigate the impact of managerial ability on the quality of environmental disclosures	X : Managerial ability Y: Environmental disclosures. Control : market-to-book ratio, loss and leverage	Managerial ability negative significant with environmental capital expenditure

**Table 2.3** Summary of studies on managerial efficiency and performance (Cont.)

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Velte, (2020)	To investigate the moderating role of characteristics of the chief executive officer (CEO) on the relationship between CEO power and corporate social responsibility (CSR) performance.	X : CEO power Mod : Characteristics of CEO (age, gender, managerial ability and overconfidence) Y: Corporate social responsibility (CSR) performance Control : Corporate governance dimension, ROA, leverage, market-to-book ratio, dividend payout ratio, current ratio, industry and year effects.	<ul style="list-style-type: none"> <li>• CEO power negative significant with corporate social responsibility (CSR) performance for younger CEOs.</li> <li>• CEO power negative significant with corporate social responsibility (CSR) performance for female CEOs.</li> <li>• CEO power positive significant with corporate social responsibility (CSR) performance for high managerial ability</li> <li>• CEO power negative significant with corporate social responsibility (CSR) performance for f overconfidence CEOs.</li> </ul>
Hesarzadeh & Bazrafshan (2019)	To investigate the impact of managerial ability on regulatory review risk	X: Managerial ability Y: Regulatory review risk Control: accrual quality, accrual earnings management, real earnings management, market cap, age, loss, ROA, growth, Big 4	Managerial ability negative significant with regulatory review risk
Habib & Hasan (2017)	To investigate the impact of managerial ability on firm-level investment efficiency and future stock price crash risk.	X: Managerial ability Y: Investment efficiency and future stock price crash risk. control: firm-specific, size, growth, leverage, ROA,	<ul style="list-style-type: none"> <li>• Managerial ability positive significant with investment efficiency</li> <li>• Managerial ability negative significant with future stock price crash risk</li> </ul>
Huanga & Sunb (2017)	To investigate the impact of managerial ability and real earnings management	X: Managerial ability Y: Real earnings management Control: size , ZSCORE, ROA, CFO, growth,	Managerial ability negative significant with real earnings management

**Table 2.3** Summary of studies on managerial efficiency and performance (Cont.)

<b>Authors</b>	<b>Purpose</b>	<b>Variables</b>	<b>Results</b>
Cox (2017)	To investigate the impact of managerial ability and growth opportunities on the operating and return performance	X: Managerial ability Y: Market cap, Stock return, Tobin's Q Control: Cash ratio, R&D intensity, net debt issuance, leverage, net equity and growth	Managerial ability positive significant with market cap, stock return and Tobin's Q
Luo & Zhou (2017)	To investigate the impact of managerial ability on the tone of earnings announcements	X: Managerial ability Y: Tone of earnings announcement Control: ROA, size, MTB, , stock return volatility, CEO equity-based wealth, year and industry	Managerial ability positive significant with tone of earnings announcements

#### **2.5.4 Impact of Managerial Efficiency on Environmental, Social and Governance Performance**

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).

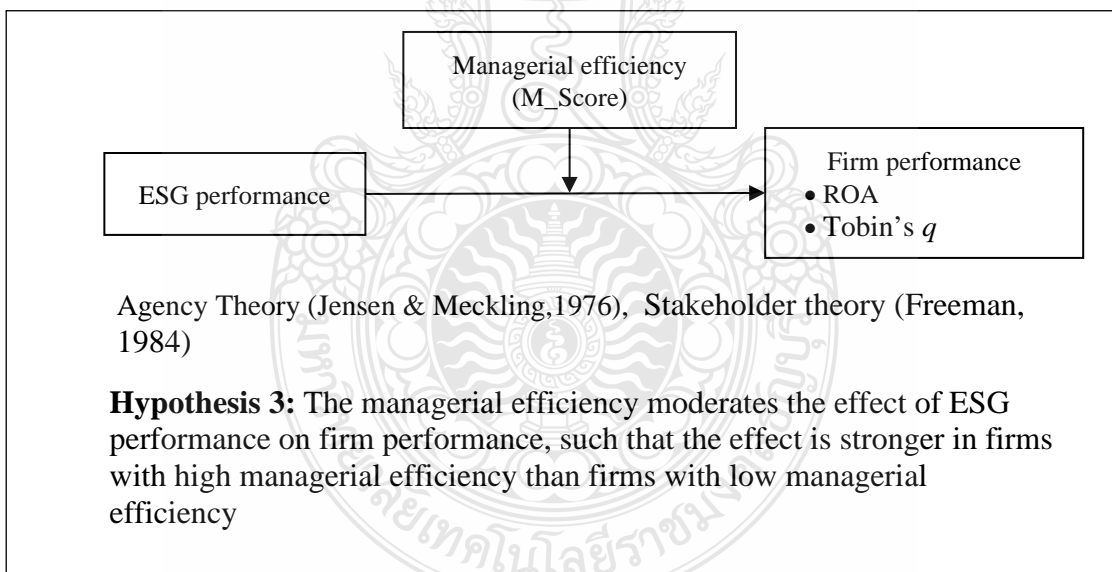
Stakeholder theory and agency theory confirm the link between managerial efficiency and CSR performance. This suggests that the effectiveness of senior management impacts strategic decisions, sustainable business operations, and business outcomes. Welch & Yoon (2022) found that managers with greater efficiencies can optimize ESG performance, leading to improved firm performance due to their skills, expertise, experience, and knowledge necessary to promote business innovation, which



is crucial for business survival and growth (Shao et al., 2020). Previous studies showed 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) 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 as follow:

H3a. Managerial efficiency moderates the positive relationship between ESG performance on ROA

H3b. Managerial efficiency moderates the positive relationship between ESG performance on Tobin's Q



**Figure 2.4** Linking ESG performance, managerial efficiency and firm performance

### 2.5.5 Moderating Effect of Managerial Efficiency on Firm Performance

The available data aforementioned have not provided obvious evidence regarding firm performance. According to Jensen & Meckling (1976), institutional investors can represent good corporate governance mechanisms, which leads to a question

whether institutional investors actually increase firm performance. Since the occurrence of economic crisis in 1997, Southeast Asia has become a concrete example of the importance of corporate governance in developing countries. The economic losses and losses of investor capital come from the inefficiency of corporate governance mechanisms due to lack of monitoring and directing of the management, fraud, and misconduct of the management. Obviously, the management has significant influence firm performance. Thus, the characteristics of the management become an important factor in determining firm performance. The management that produces maximum efficiency is one of the characteristics that ensure honesty, transparency, and teamwork. Thus, managerial efficiency refers to the ability of the management based on their business skills, knowledge, and expertise in the industry to maximize corporate benefits within limited resources (Hendriksen, 1992; Demerjian et al., 2012).

Salehi et al., (2021), Ting et al., (2021), and Demerjian et al., (2012) found a significant positive correlation between managers' efficiency and firm performance. Kumar & Zbib, (2022) stated that during the COVID-19 pandemic, companies with high managerial efficiency have better stock price reactions than other companies in the same industry. It was also found that companies with high managerial efficiency witnessed higher raw and cumulative abnormal returns during the COVID-19 pandemic than those with low managerial efficiency. Companies with high managerial efficiency were found to achieve better returns on equity despite financial constraints caused by economic crisis. In this way, higher capabilities of the management can lead to more efficient management. In particular, the management's decisions can positively affect firm performance during crisis (Andreou et al., 2015). Hambrick & Quigley, (2014) discovered that capable managers can invest more than other managers. This is in line with Cheung et al. (2017), who found higher levels of managerial discretion allow more capable managers to raise firm performance.

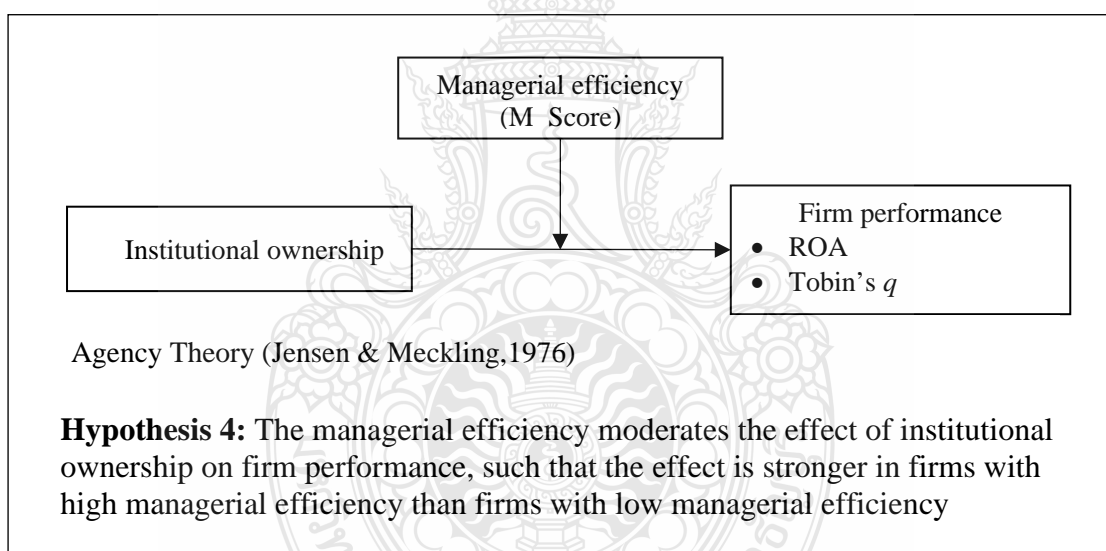
Conflicts in findings regarding the correlation of institutional ownership and firm performance show that institutional ownership has to be well managed to improve firm performance. Corporate governance mechanisms can be implemented effectively with institutional ownership can (Simamora, 2023). High and well-managed corporate governance mechanisms are considered as a risk assessment, evaluation, monitoring, and

controlling process when business uncertainty occurs, which can improve firm performance (Berthelot et al., 2010). Internal factors, such as manager contributions can also effectively improve firm performance. Since managers are in charge of business strategy, managerial efficiency is critical in determining the best shareholder value.

It is interesting to figure out whether managerial efficiency allows outlining better performance and value orientations that support the performance of Thai-listed companies. Thus, the hypothesis is proposed as follows:

**H4a.** Managerial efficiency moderates the positive relationship between institutional ownership on ROA

**H4b.** Managerial efficiency moderates the positive relationship between institutional ownership on Tobin's Q



**Figure 2.5** Linking institutional ownership, managerial efficiency and firm performance.

Figure 2.5 presents the proposed model regarding a positive relationship between institutional ownership and firm performance moderated by managerial efficiency.

### 2.5.6 Control variables

This study employs five control variables to control company characteristics that can influence firm performance, namely firm size, financial leverage, firm growth, and year and industry fixed effects. While controlling differences in company characteristics, our 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).

**Firm size (SIZE):** The firm size can impact its firm performance. The large firm the simpler it will be for it to obtain internal and external funding sources more small firms (Berger et al., 1995). The firm size is a reflection of its total assets. It can be said that the size of a company has a direct effect on the performance of the company, as large-scale companies tend to have strong performance due to their influence on future performance. The magnitude of a company is determined using the natural logarithms of total assets.

**Firm leverage (LEV):** Firm leverage is the capacity of businesses to use assets or funds with a fixed obligation to increase their profits. The greater the level of leverage, the greater the risk that the firm must assume and the greater the expected profit (Lang, 1996). In this study, leverage is measured as the ratio of total debt to equity; the greater the leverage ratio, the greater the firm's risk.

**Firm growth (GR):** Firms with high sales or asset growth values may have optimistic profit projections for the foreseeable future. Stakeholders view an indication of positive profit projections as an excellent opportunity for firm performance in the future. Utilizing growth rates on company growth, this study determines the level of growth.

Another control variable is **industry and year fixed effect**, in econometrics and panel data analysis, industry and year-fixed effects are common concepts. In a panel dataset, they are specific categories of dummy variables used to account for unobserved heterogeneity and time-specific effects. In econometrics, panel data refers to data acquired for the same group of individuals, firms, or entities over multiple time periods. For instance, a panel dataset may contain information on the financial performance of various companies over multiple years.

**Industry fixed effect:** Industry fixed effects are used to control for differences between industries or sectors that are not observable. In panel data analysis, distinct industry characteristics that are not captured by observable variables may influence the dependent variable of interest (e.g., company profits or productivity) despite not being captured by observable variables. By incorporating industry-fixed effects, econometricians can account for these unobserved industry-specific factors and isolate the effects of other relevant variables.

**Year fixed effect:** Year-fixed effects are employed to capture time-specific effects that are shared by all entities in a dataset during a given year. They are used to account for variables that influence all observations in the same manner over time. These year-specific effects may be the result of macroeconomic factors, policy changes, or other temporal influences that have a similar impact on all entities.

For example, including year-fixed effects can help control for factors such as global economic cycles that may affect all countries in a given year. In both instances, regression models incorporate fixed effects as dummy variables. The value of a dummy variable is either 0 or 1, indicating the absence or presence of a specific effect, accordingly. Controlling for other variables, the coefficient of these fixed effects provides information about the average effect of belonging to a particular industry or year. Incorporating industry and year-fixed effects in panel data analysis is essential for obtaining consistent and unbiased estimates, as they help address potential endogeneity and omitted variable bias issues that may arise as a result of unobserved heterogeneity and time-specific factors.

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

This study concentrates on how environment, social and governance performance and institutional ownership contribute to firm performance. In order to answer the research questions and examine the hypotheses, this chapter consists of sample and data sources, variables, and statistical models.

#### **3.1 Statistical Analysis Model**

The hypotheses were tested with regression analyses in SPSS and the Hayes PROCESS for SPSS developed by Hayes (2013). PROCESS is specifically designed to test complex models of moderation. With the Hayes PROCESS macro, it was possible to test the model in a more conservative and accurate way.

#### **3.2 Research and Sampling Design**

This research uses the non-probability sampling method, specifically the purposive sampling method, to choose a sample from the available population. In this method, the sample is chosen based on how well it meets the research needs. The sample has no negative shareholders' equity value. This sample research also uses listed firms with a book value of equity positive. According to Simamora (2023), companies with negative equity are more likely to engage in divestments than investments. It denotes that no risk investments in businesses with negative equity will be made. Furthermore, the positive book value of equity is used to avoid the bias inherent in Tobin's Q measurement. The sample includes 373 non-financial firms (2,104 firm-year observations) listed on the Market of the Stock Exchange of Thailand (SET), for which data are manually collected from 2016 to 2021. The data are collected from SETSMART, which provides the financial statement information as well as financial market data of Thailand companies.

**Table 3.1** Research sample

<b>Sample selection process</b>	<b>Firms</b>	<b>Obs.</b>
Non- finance firms listed in Thailand Stock Exchange 2016–2021	523	3,138
Data missing (insufficient data to construct variables)	(150)	(900)
Total	373	2,238
Negative equity		(14)
Data outlier		(120)
Net sample		2,104

The sample selection process begins with downloading data from 2016 to 2021. The obtain financial statement data from the SET SMART database and companies' websites. After merging the above data sets, eliminate observations with insufficient data to construct the variables and further delete 150 firms. The final sample consists of 2,104 firm-year observations.

**Table 3.2** Describes the sample fiscal year

<b>Year</b>	<b>No. of observations</b>	<b>(%)</b>	<b>Cumulative (%)</b>
2016	299	14.21%	14.21%
2017	334	15.87%	30.09%
2018	362	17.21%	47.29%
2019	368	17.49%	64.78%
2020	368	17.49%	82.27%
2021	373	17.73%	100.00%
	2,104	100%	

Table 3.2 presents the distribution of observations by fiscal year. In terms of the number of yearly observations, there is an upward trend for the period of 2016 - 2021.

**Table 3.3** Sample distribution by industry

Industry	Description	Firms	Observation
1	Argo & Food Industry	47	267
2	Consumer Products	27	151
3	Industrials	68	375
4	Property & Construction	78	437
5	Resources	41	235
6	Services	79	454
7	Technology	33	185
	Total	373	2,104

Table 3.3 presents the sample distribution by industry (based on the Stock Exchange of Thailand.)

### 3.3 Research Variables

#### 3.3.1 Dependents Variable

The study's dependents 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 by total assets.

ROA is to gauge the company's profitability by measuring how effectively it utilizes its assets to generate profit. It calculates the net income as a percentage of the total assets, providing insights into the company's ability to generate profits relative to its asset base. A higher ROA suggests that the company is efficient in generating profits from its assets. The formula for ROA is as follows:

$$\text{Net Income} / \text{Total Assets}$$

Tobin's Q is a financial measure that assesses the market value of a company in relation to the total value of its assets. It is utilized to evaluate long-term performance and



growth by comparing the market value of a company's outstanding equity and debt with its total assets. If Tobin's Q is greater than 1, it indicates that the market value of the company's assets surpasses the book value, suggesting that the company has generated value for its shareholders. Conversely, if Tobin's  $q$  is below 1, it suggests that the company's assets are valued lower than their book value. The formula for Tobin's Q is as follows:

$$(\text{Market Value of Equity} + \text{Market Value of Debt}) / \text{Total Assets}$$

### **3.3.2 Independents Variable**

ESG performance: The methodology for designing ESG performance and institutional ownership are considered independent variables. 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 are conducted based on the Thai Institute of Directors Association (IOD). Finally, the overall ESG score is determined by assigning weights of 24%, 35%, and 41% to the E, S, and G factors, respectively (SEC, 2023).

Institutional ownership: Institutional ownership is percentage of shares held by the top five institutional investors with an ownership interest (%TOP5)

### **3.3.3 Moderator Variable**

The moderator variable in this study is managerial efficiency (M\_Score), which is measured based on industry and year, as developed by Demerjian et al. (2012). Higher score indicates a higher efficiency of manager. To proxy the construct of managerial efficiency, a two-step method is used. In the first stage, data envelopment analysis (DEA) is 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 revenues to represent outputs (firm efficiency).

$$\theta = \frac{\text{Sales}}{\text{COGS} + \text{SG\&A} + \text{OpsLese} + \text{PPE} + \text{GW} + \text{OtherInt} + \text{R\&D}}$$

$\theta$  is firm efficiency. Sale revenue is the output, as firms' main goal is to generate sales. Firm efficiency refers to the maximization of sales at the lowest possible cost per sale. The cost to produce sales has seven inputs (Demerjian et al., 2012).

There are firm and top manager-specific factors that contribute to the firm's efficacy. Factors unique to top managers are used to evaluate managerial skills. In the second stage, total firm efficiency is 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. The following model is proposed:

$$\theta = \beta_0 + \beta_1 \text{FirmSize} + \beta_2 \text{FirmMarket} + \beta_3 \text{FreeCashFlow} + \beta_4 \text{FirmAge} + \beta_5 \text{BusinessSegment} + \beta_6 \text{ForeignCurrency} + \text{YearDummy} + \varepsilon$$

### 3.3.4 Controls Variable

To address endogeneity concerns and based on the literature on ESG performance, firm performance, and managerial efficiency, our 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).

**Table 3.4** Definition of variables

<b>Variables</b>	<b>Notation</b>	<b>Description</b>
Return on assets	ROA	Net income divided by total assets
Tobin's Q	Q	The market value of equity and debt capital divided by total assets.
ESG performance	ESG	Determined by assigning weights of 24%, 35%, and 41% to the E, S, and G factors, respectively
Institutional ownership	INS	The percentage of shares held by the top five institutional investors with an ownership (%TOP5).
Managerial efficiency	M_Score	Demerjian et al. (2012) model
Firm size	LnFS	Logarithm of total assets
Firm Leverage	LEV	The firm's debt-to-equity ratio
Sales growth	GR	The firm's annual sales growth rate
Industry	INDUS	A dummy variables (fixed effect)
Year	TIMES	A dummy variables (fixed effect)

### 3.4 Study Model

The dependent variable of this study is firm performance, which consists of two components: financial and market performance, 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.

#### ESG Model

$$\begin{aligned}
 Perf_{i,t} = & \beta_0 + \beta_1 ESG_{i,t} + \beta_2 M\_Score_{i,t} \\
 & + \beta_3 ESG * M\_Score_{i,t} + \beta_4 LnFS_{i,t} + \beta_5 LEV_{i,t} + \beta_6 GR_{i,t} \\
 & + Year/Industry Fixed Effects + \varepsilon_{i,t} \dots\dots\dots (1)
 \end{aligned}$$

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

$$\begin{aligned}
ROA_{i,t} = & \beta_0 + \beta_1 ESG_{i,t} + \beta_2 M\_Score_{i,t} \\
& + \beta_3 ESG * M\_Score_{i,t} + \beta_4 LnFS_{i,t} + \beta_5 LEV_{i,t} + \beta_6 GR_{i,t} \\
& + Year/Industry Fixed Effects + \varepsilon_{i,t} \dots\dots\dots (2)
\end{aligned}$$

$$\begin{aligned}
Q_{i,t} = & \beta_0 + \beta_1 ESG_{i,t} + \beta_2 M\_Score_{i,t} + \beta_3 ESG * M\_Score_{i,t} + \beta_4 LnFS_{i,t} + \beta_5 LEV_{i,t} + \beta_6 GR_{i,t} \\
& + Year/Industry Fixed Effects + \varepsilon_{i,t} \dots\dots\dots (3)
\end{aligned}$$

**Institutional ownership model**

$$\begin{aligned}
Perf_{i,t} = & \beta_0 + \beta_1 INS_{i,t} + \beta_2 M\_Score_{i,t} \\
& + \beta_3 INS * M\_Score_{i,t} + \beta_4 LnFS_{i,t} + \beta_5 LEV_{i,t} + \beta_6 GR_{i,t} \\
& + Year/Industry Fixed Effects + \varepsilon_{i,t} \dots\dots\dots (4)
\end{aligned}$$

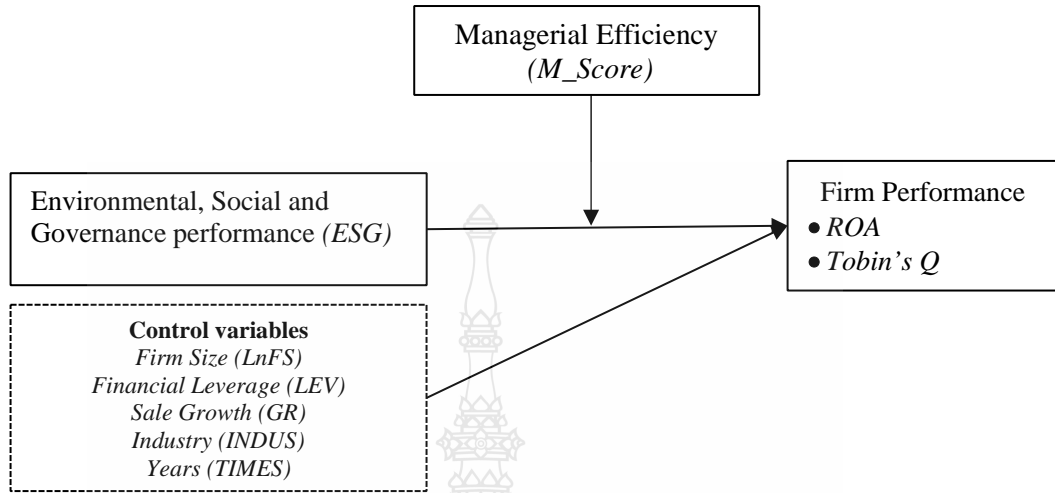
This equation is further divided into two sub-equations based on the following performance criteria:

$$\begin{aligned}
ROA_{i,t} = & \beta_0 + \beta_1 INS_{i,t} + \beta_2 M\_Score_{i,t} \\
& + \beta_3 INS * M\_Score_{i,t} + \beta_4 LnFS_{i,t} + \beta_5 LEV_{i,t} + \beta_6 GR_{i,t} \\
& + Year/Industry Fixed Effects + \varepsilon_{i,t} \dots\dots\dots (5)
\end{aligned}$$

$$\begin{aligned}
Q_{i,t} = & \beta_0 + \beta_1 INS_{i,t} + \beta_2 M\_Score_{i,t} + \beta_3 INS * M\_Score_{i,t} + \beta_4 LnFS_{i,t} + \beta_5 LEV_{i,t} + \beta_6 GR_{i,t} \\
& + Year/Industry Fixed Effects + \varepsilon_{i,t} \dots\dots\dots (6)
\end{aligned}$$

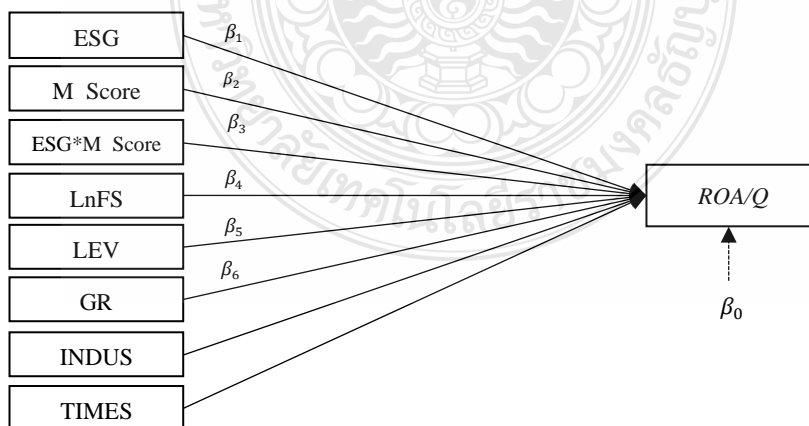
where Perf represents the dependent variable which is firm performance measured against two models (ROA and Q).  $\beta_0$  represents the constant while  $\beta_{1-6}$  represents the slope of the independent and controls variables.

### 3.4.1 Model Test: The two-way Interaction Effect between the ESG, and Firm Performance on Managerial Efficiency



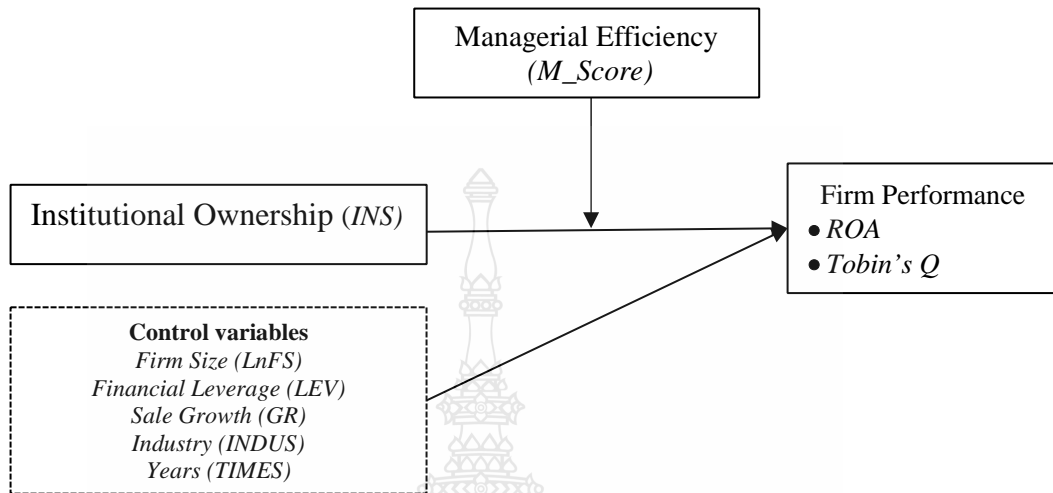
**Figure 3.1** Two-way interaction effect between ESG performance and firm performance on managerial efficiency conceptual diagram

Model 1 for PROCESS for SPSS (Hayes, A.F., 2013), The first model examines the effect of environment, social and governance performance on firm performance (H1a/b) and interaction effect (H3a/b). It represents a conceptual diagram in figure 3.1 and a statistical diagram as shown in figure 3.2.



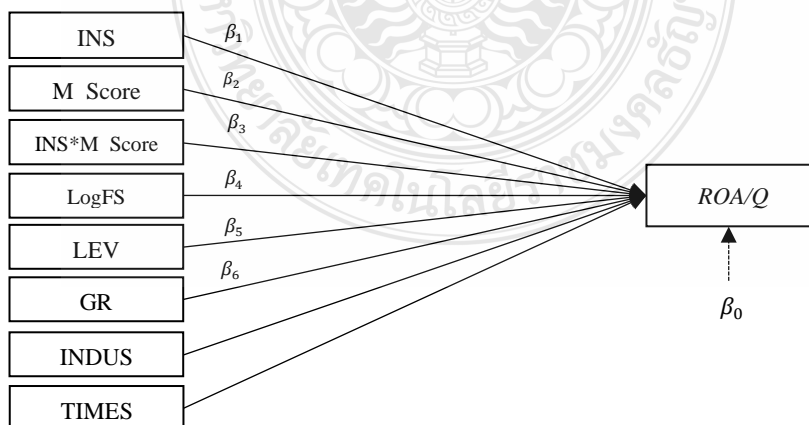
**Figure 3.2** Two-way interaction effect between ESG performance and firm performance on managerial efficiency statistical diagram

### 3.4.2 Model Test: The two-way Interaction Effect between the Institutional Ownership, and Firm Performance on Managerial Efficiency



**Figure 3.3** Two- way interaction effect between institutional ownership and firm performance on managerial efficiency conceptual diagram

Model 2 for PROCESS for SPSS (Hayes, A.F., 2013), The second model examines the effect of institutional ownership on firm performance (H2a/b) and interaction effect (H4a/b). It represents a conceptual diagram in figure 3.3 and a statistical diagram as shown in figure 3.4



**Figure 3.4** Two- way interaction effect between institutional ownership and firm performance on managerial efficiency statistical diagram

### **3.5 Data Preparation**

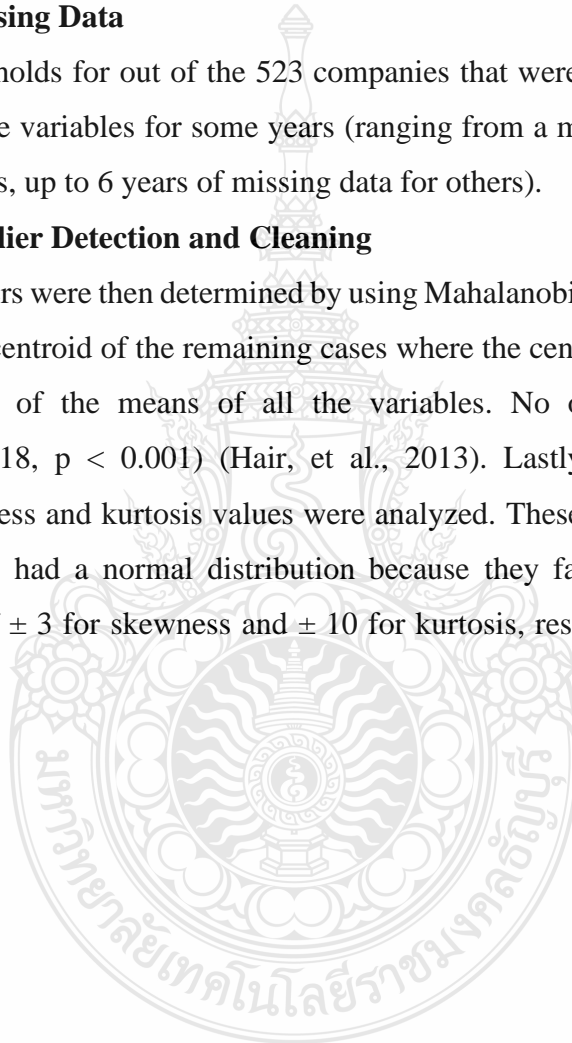
Careful preparation of data was prepared and assumptions were checked to ensure that the sample was consistent with the assumptions of the analysis techniques. Monitoring will help ensure that proposed analysis is feasible and runs smoothly, valid results are obtained and analytical results are not unduly influenced by anomalies or errors.

#### **3.5.1 Missing Data**

The thresholds for out of the 523 companies that were included, 373 had data required to compute variables for some years (ranging from a missing data for one year for some companies, up to 6 years of missing data for others).

#### **3.5.2 Outlier Detection and Cleaning**

The outliers were then determined by using Mahalanobis distance is the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all the variables. No outliers were estimated (Mahalanobis 53.818,  $p < 0.001$ ) (Hair, et al., 2013). Lastly, to verify for normal distribution, skewness and kurtosis values were analyzed. These values suggest that the data in the sample had a normal distribution because they fall within the suggested threshold values of  $\pm 3$  for skewness and  $\pm 10$  for kurtosis, respectively, as advised by Kline (2016).



## CHAPTER 4

### RESEARCH RESULT

The objective of this chapter is to address the results of the PROCESS analysis used to test the hypotheses as presented in Chapter 3. The results and the previous empirical studies are discussed in this part.

#### 4.1 Descriptive statistics

**Table 4.1** Descriptive statistics on the variables of the study

Variables	Obs.	Mean	Median	SD	Min	Max
<i>Panel A: Firm performance</i>						
ROA	2,104	4.94	4.33	7.24	-19.27	29.88
Q	2,104	1.423	1.165	0.700	0.524	3.055
<i>Panel B: Independent variables</i>						
ESG	2,104	0.592	0.478	0.257	0.296	1.000
E	2,104	0.321	0.000	0.444	0.000	1.000
S	2,104	0.517	0.286	0.326	0.143	1.000
G	2,104	0.813	0.800	0.157	0.600	1.000
INS	2,104	20.08	12.62	19.95	0.00	70.92
<i>Panel C: Moderator variable</i>						
M_Score	2,104	0.743	0.714	0.355	0.002	1.799
<i>Panel D: Control variables</i>						
FS	2,104	39,868	6,434	158,426	450	3,078,019
LnFS	2,104	15.934	15.677	1.540	13.016	20.848
LEV	2,104	0.876	0.736	0.599	0.102	2.356
GR	2,104	3.72	2.15	21.72	-38.89	59.38

**Note:** This table presents the number of observations, pooled mean, median, standard deviation, minimum and maximum of the dependent variables (return on assets: ROA, Tobin's Q: Q), independent variables (environmental social governance: ESG, institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, firm leverage: LEV, firm growth: GR). The sample consists of 2,104 firm-year observations from 2016 to 2021, representing 373 individual public firms in Thailand. Units of variable measurement: E, S, G, ESG, M\_Score (Score); INS, ROA, GR (%); Q, LEV; (Ratio); FS (millions Bath), LnFS – The natural logarithm of firm size

Table 4.1 presents a summary of the descriptive statistics for the variables in this model. Panel A displays the firm performance variables, with the mean and median



values of return on assets (ROA) of 4.9% (4.33%) and Tobin's Q (Q) of 1.423 times (1.165 times). Panel B contains the ESG scores, ranging from 0 to 1. The mean and median values of ESG are 0.592 score (0.478 score). The mean and median values of environmental dimension (E) are 0.321 score (0.00 score). The mean and median values of social dimension (S) are 0.517 score (0.286 score). The mean and median values of governance (G) are 0.813 score (0.80 score). The governance (G) scores are higher than the others. The mean and median values of institutional ownership (INS) is 20.08% (12.62%) Panel C shows the moderator variable (M\_Score) with the mean and median values of 0.743 score (0.714 score). Panel D provides descriptive statistics for control variables, such as firm size (FS), nature logarithm of firm size (LnFS), leverage (LEV), and firm growth (GR), with means of 15.934, 0.876, times and 3.72%, respectively, and medians of 15.677, 0.736, times and 2.15%, respectively. For firm size (FS), the lowest value is 450 million Baht, the highest value is 3,078,019 million Baht, and the average value is 39,868 million Baht.

## **4.2 Variables Diagnostics.**

### **4.2.1 Normality Test**

Before testing the hypothesis, the normality test was conducted in this study. The results are shown in Table 4.2

**Table 4.2** Normality test of sample distribution

Variables	N	Skewness		Kurtosis	
		statistic	Std. error	statistic	Std. error
Dependent: ROA	2,104	.373	.053	2.071	.107
Q	2,104	.998	.053	-.185	.107
Independent: ESG	2,104	.678	.053	-1.219	.107
INS	2,104	.999	.053	-.050	.107
Moderator: M_Score	2,104	.867	.053	1.167	.107
Control: FS	2,104	11.89	.053	178.59	.107
LnFS	2,104	.670	.053	.063	.107
LEV	2,104	.442	.053	-1.037	.107
GR	2,104	.519	.053	.208	.107

**Note:** This table presents the normality test (skewness and kurtosis) of the dependent variables (return on assets: ROA, Tobin's Q: Q), independent variables (environmental social governance: ESG, institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 2,104 firm-year observations from 2016 to 2021, representing 373 individual public firms in Thailand.

According to Table 4.2, The data were not normally distributed, abnormally distributed data may not have an impact on the study's credibility. Since the sample was large, it was assumed that the data were not normally distributed. Thus, the natural logarithms (LnFS) of these variables were used to solve this issue. The range of skewness was between 0.373 and 0.999, while the range of kurtosis was between -1.219 and 2.071. These values suggest that the data in the sample had a normal distribution because they fall within the suggested threshold values of  $\pm 3$  for skewness and  $\pm 10$  for kurtosis, respectively, as advised by Kline (2016).

#### 4.2.2 Correlation and Auto-Correlation

In order to assess the importance of the regression analysis in this study, a statistical technique used to investigate the assumptions and relationships between the variables in a multiple regression analysis had to be applied after the model was estimated. This is achieved by adopting diagnostic tests that take into account the correlation among variables, such as multicollinearity, which includes tolerance and VIF, and heteroscedasticity. The dataset's autocorrelation is determined using the Durbin–Watson

testing on a scale of 1.5–2.5 for the indices and time series to determine if any form of autocorrelation exists.

**Table 4.3** The result of correlation and auto-correlation analysis

Variables	ESG model		INS model	
	Correlations		Correlations	
	Tolerance	VIF	Tolerance	VIF
ESG/ INS	0.724	1.381	1.049	0.953
M_Score	0.857	1.166	1.141	0.876
<i>ESG x M_Score/ INS x M_Score</i>	.939	1.065	1.020	0.980
LN_FS	0.564	1.774	1.374	0.728
LEV	0.758	1.320	1.314	0.761
GR	0.901	1.110	1.111	0.900
Model	Autocorrelation test Durbin–Watson (DW)		Autocorrelation test Durbin–Watson (DW)	
ROA	1.995		1.989	
Q	1.917		1.873	

**Note:** This table presents the correlation (tolerance, VIF) and auto-correlation (Durbin–Watson) analysis of the dependent variables (return on assets: ROA, Tobin’s Q: Q), independent variables (environmental social governance: ESG, institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: lnFS; LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR).

The study used mean centering variables before analyzing moderated PROCESS regression equations has been proposed for statistical (reduced multicollinearity) and substantive (better comprehension of the resulting regression equations) grounds. In the least squares regression, this article compares centered and raw score analysis. The two methods are shown to be functionally comparable, producing identical hypothesis tests linked with the moderation effect and regression equations. PROCESS for SPSS developed by Hayes (2013) was utilized in this study. Hayes recommended using mean centering before regression analysis since the antecedent variable (X) and the interaction term (XM) are highly correlated. This can lead to multicollinearity and results in poor estimation of regression coefficients, large standard errors, and decreased power of the statistical test of interaction.

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 4.3 provides information on the collinearity statistics, tolerance, and variance inflation factor (VIF),

and it indicates that they are all within acceptable limits (tolerance > 0.1 and VIF < 10). 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 4.3

#### 4.3 Panel Regression Tests (Hausman Test for Fixed vs Random Effects)

A test for poolability [pooled ordinary least square (OLS) versus fixed effect] and the Hausman (1978) test can also be used to choose between fixed effects (FE) and random effects (RE) estimation methods in panel data analysis. Panel data refers to a dataset that combines both cross-sectional and time-series observations for the same individuals or entities over multiple time periods.

The null hypothesis of orthogonality in regression models suggests that the test statistic H, which follows a chi-square distribution with degrees of freedom equal to the number of regressors in the model, is used to test the significance of individual regression coefficients. A *p*-value of 0.05 is interpreted as evidence that, at conventional levels of significance, the two models differ sufficiently to reject the null hypothesis and, consequently, to reject the random effects model in favor of the fixed effects model (Hausman, 1978). According to estimation models, the Hausman test has been applied to each model to determine whether the fixed effect model or the random effect model is more applicable (Table 4.4).

**Table 4.4** Goodness of fit for the panel data models

Model test	<i>p</i> -value	Accept/reject	Result
Model 1 ESG → ROA	0.000	$H_0$ : reject	Fixed effects
Model 2 ESG → Tobin's Q	0.000	$H_0$ : reject	Fixed effects
Model 3 INS → ROA	0.000	$H_0$ : reject	Fixed effects
Model 4 INS → Tobin's Q	0.000	$H_0$ : reject	Fixed effects

**Note:** This table presents the goodness of fit for the panel data models of the dependent variables model 1-4 (return on assets: ROA, Tobin's Q: Q)

#### **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, institutional ownership and firm performance. Please refer to table 4.7 and 4.14 detailed robustness checks the outcomes of the effect and the findings of the moderated multiple regression analysis.

#### **4.5 PROCESS Regression Analysis**

In this study, the proposed model and hypotheses were evaluated using the Hayes Process (2013). Hayes's conditional process analysis, also known as the analysis of moderated, estimates models that enable for the moderation of a mechanism using ordinary least squares regression-based path analysis (Hayes et al., 2017). Hayes et al. (2017) describe the process macro introduced by Hayes (2013) as a computational instrument with models preprogrammed into the process that estimates all path analyses for each equation individually. The Hayes process was utilized because it generates all the necessary statistics (conditional indirect effects and the index of moderated) and implements bootstrapping in a manner that facilitates inferences based on these statistics. Additionally, the process avoids the piecemeal nature of "estimation with regression" associated with indirect effect and concentrates on integration across the pieces (Hayes et al., 2017). Using the Hayes process macro, the entire model was simultaneously evaluated, allowing for a more conservative and accurate evaluation.

#### **4.6 Proposed Model and Hypotheses Testing: ESG Model**

##### **4.6.1 Results from Regression Moderating Effect of Managerial Efficiency (M\_Score) on ESG and Firm Performance Relationship**

##### **PROCESS Regression Analysis**

Table 4.5 – 4.6 presents the results of the moderation analysis of the relationship between ESG and firm performance (ROA and Tobin's Q) through the methodology of Hayes (2013). The results indicate that there is a significant interaction between managerial efficiency and ROA, as evidenced by the  $p$ -value 0.001 ( $p < 0.01$ ) and LLCI

and ULCI values (0.017 and 0.067, respectively). Similarly, for the interaction between managerial efficiency and Tobin's Q, the  $p$ -value 0.023 is significant ( $p < 0.05$ ), 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 4.5** PROCESS regression moderating effect of managerial efficiency on ESG and ROA relationship

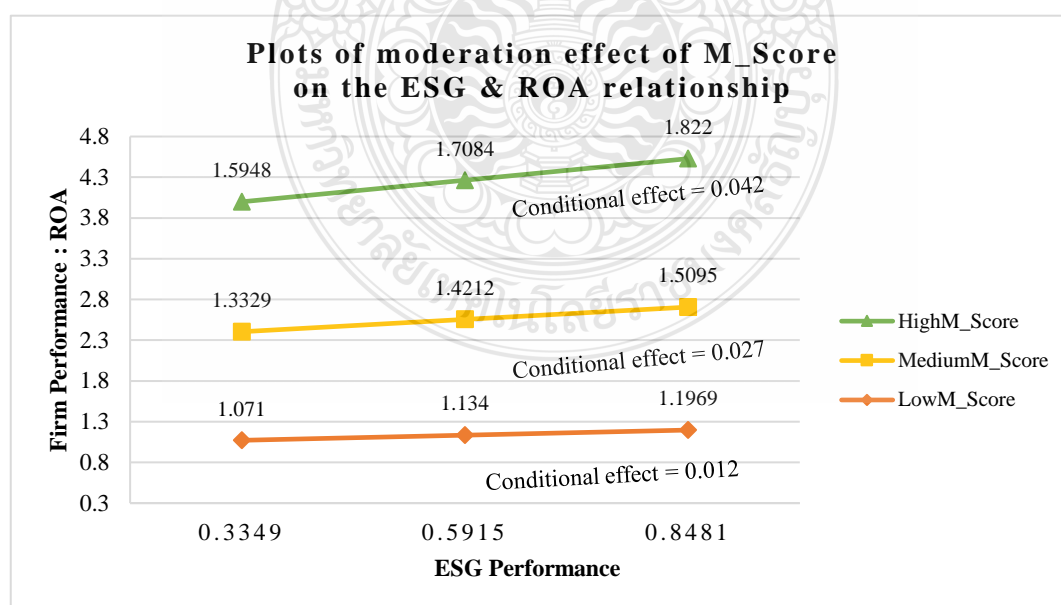
Model 1 ROA							
Variables	Expected	B	SE $\beta$	$t$ -value	$p$ -value	LLCI	ULCI
constant		-0.061	0.017	-3.601	0.000	-0.094	-0.028
ESG	H1a: +	-0.004	0.012	-0.335	0.738	-0.026	0.019
M_Score	+	0.061	0.009	6.937	0.000***	0.044	0.078
Int_1	H3a: +	0.042	0.013	3.260	0.001***	0.017	0.067
LnFS	+	0.006	0.001	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%, $R$ Square Change = 3.1%, $F$ 80.436***							
Conditional effects of the focal predictor at values of the moderator(s):							
M_Score	M_Score	effect	SE $\beta$	$t$ -value	$p$ -value	LLCI	ULCI
Low	0.388	0.012	0.008	1.627	0.104	-0.003	0.027
Medium	0.743	0.027	0.006	4.803	0.000***	0.016	0.038
High	1.098	0.042	0.007	6.078	0.000***	0.028	0.055
Conditional effect of focal predictor at values of the moderator:							
Statistical significance	M_Score	effect	SE $\beta$	$t$ -value	$p$ -value	LLCI	ULCI
insignificant	0.002	-0.004	0.012	-0.328	0.743	-0.026	0.019
	0.092	0.000	0.011	-0.002	0.998	-0.021	0.021
	0.182	0.004	0.010	0.390	0.697	-0.015	0.022
	0.272	0.008	0.009	0.863	0.388	-0.010	0.024
	0.361	0.011	0.008	1.435	0.151	-0.004	0.027

**Table 4.5** PROCESS regression moderating effect of managerial efficiency on ESG and ROA relationship (Cont.)

Variables	Expected	Model 1 ROA				LLCI	ULCI
		B	SE $\beta$	t- value	p-value		
indicate	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
positive significance	0.432	0.014	0.007	1.961	0.0500**	0.000	0.028
	0.451	0.015	0.007	2.118	0.0343**	0.001	0.029
	0.541	0.019	0.006	2.908	0.0037**	0.006	0.031
	0.631	0.022	0.006	3.767	0.000***	0.011	0.034
	0.721	0.026	0.006	4.610	0.000***	0.015	0.037
	0.811	0.030	0.006	5.317	0.000***	0.019	0.041
	0.901	0.034	0.006	5.797	0.000***	0.022	0.045
	0.990	0.037	0.006	6.035	0.000***	0.025	0.050
	1.080	0.041	0.007	6.084	0.000***	0.028	0.054
	1.170	0.045	0.008	6.015	0.000***	0.030	0.060
	1.260	0.049	0.008	5.885	0.000***	0.032	0.065
1.350	0.052	0.009	5.731	0.000***	0.035	0.070	
1.440	0.056	0.010	5.573	0.000***	0.036	0.076	
1.530	0.060	0.011	5.422	0.000***	0.038	0.082	
1.619	0.064	0.012	5.281	0.000***	0.040	0.087	
1.709	0.067	0.013	5.153	0.000***	0.042	0.093	
1.799	0.071	0.014	5.037	0.000***	0.043	0.099	

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on ESG and firm performance relationship analysis of the dependent variable (return on assets: ROA), independent variable (environmental social governance: ESG), moderator variable (managerial efficiency: M\_Score) control variables (firm size: lnFS, firm leverage: LEV, firm growth: GR). The sample consists of 2,104 firm-year observations from 2016 to 2021, representing 373 individual public firms in Thailand.

\*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively



**Figure 4.1** Moderating effect of managerial efficiency on ESG and ROA relationship

Figure 4.1 show the investigate the nature of the interactions term, plots of the effects of ESG performance on ROA at different levels of managerial efficiency (M\_Score) were constructed. As depicted in Figure 4.1 and in support of Hypothesis 3a, the moderating effect demonstrates that at low managerial efficiency, ESG performance has no impact on ROA, whereas, at medium and high managerial efficiency (up to 0.432 score), ESG performance has a significant positive effect on ROA.

**Table 4.6** PROCESS regression moderating effect of managerial efficiency on ESG and Tobin's Q relationship

Model 2 Tobin's Q							
Variables	Expected	B	SE $\beta$	t- value	p-value	LLCI	ULCI
constant		1.301	0.162	8.045	0.000	0.984	1.618
ESG	H1b: +	0.137	0.110	1.245	0.213	-0.079	0.354
M_Score	+	0.645	0.084	7.638	0.000***	0.479	0.810
Int_1	H3b: +	0.278	0.123	2.268	0.023**	0.038	0.518
LnFS	+	-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
<i>N = 2,104, R Square= 40.48%, R Square Change = 5.1%, F 83.447***</i>							
Conditional effects of the focal predictor at values of the moderator(s):							
M_Score	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
Low	0.388	0.245	0.073	3.377	0.001***	0.103	0.388
Medium	0.743	0.344	0.054	6.354	0.000***	0.238	0.450
High	1.098	0.443	0.066	6.694	0.000***	0.313	0.573
Conditional effect of focal predictor at values of the moderator:							
Statistical significance	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
insignificant	0.002	0.138	0.110	1.253	0.210	-0.078	0.354
	0.092	0.163	0.101	1.619	0.106	-0.035	0.360
indicate positive significance	0.164	0.183	0.093	1.961	0.050**	0.000	0.366
	0.182	0.188	0.092	2.053	0.040**	0.008	0.368
	0.272	0.213	0.083	2.568	0.010***	0.050	0.376
	0.361	0.238	0.075	3.177	0.002***	0.091	0.385
	0.451	0.263	0.068	3.883	0.000***	0.130	0.396
	0.541	0.288	0.062	4.668	0.000***	0.167	0.409
	0.631	0.313	0.057	5.476	0.000***	0.201	0.425
	0.721	0.338	0.055	6.201	0.000***	0.231	0.445
	0.811	0.363	0.054	6.720	0.000***	0.257	0.469
	0.901	0.388	0.056	6.961	0.000***	0.279	0.497
	0.990	0.413	0.060	6.942	0.000***	0.296	0.529
	1.080	0.438	0.065	6.747	0.000***	0.311	0.565
	1.170	0.463	0.072	6.463	0.000***	0.322	0.603
	1.260	0.488	0.079	6.151	0.000***	0.332	0.643
	1.350	0.513	0.088	5.847	0.000***	0.341	0.685
	1.440	0.538	0.097	5.566	0.000***	0.348	0.727

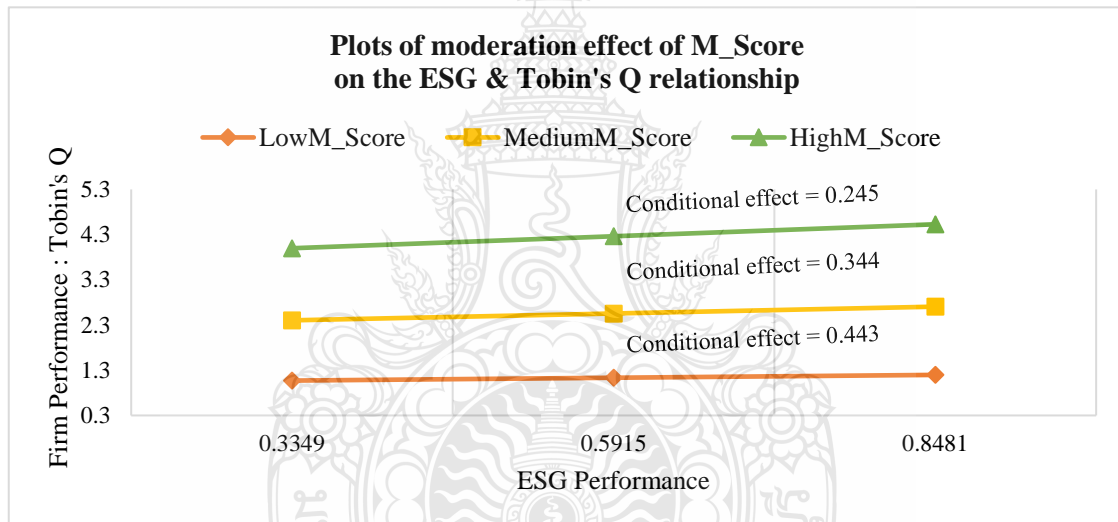


**Table 4.6** PROCESS regression moderating effect of managerial efficiency on ESG and Tobin’s Q relationship (Cont.)

Model 2 Tobin’s Q							
Variables	Expected	B	SE $\beta$	t- value	p-value	LLCI	ULCI
	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
indicate	1.530	0.563	0.106	5.312	0.000***	0.355	0.770
positive	1.619	0.588	0.116	5.086	0.000***	0.361	0.814
significance	1.709	0.613	0.125	4.886	0.000***	0.367	0.859
	1.799	0.638	0.135	4.708	0.000***	0.372	0.903

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on ESG and firm performance relationship analysis of the dependent variable (Tobin’s Q: Q), independent variable (environmental social governance: ESG), moderator variable (managerial efficiency: M\_Score) control variables (firm size: lnFS, firm leverage: LEV, firm growth: GR). The sample consists of 2,104 firm-year observations from 2016 to 2021, representing 373 individual public firms in Thailand.

\*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively



**Figure 4.2** Moderating effect of managerial efficiency (M\_Score) on ESG and Tobin’s Q relationship

To investigate the nature of the interactions term, plots of the effects of ESG performance on Tobin’s Q at different levels of managerial efficiency (M\_Score) were constructed. As depicted in Figure 4.2 and in support of Hypothesis 3b, the moderating effect demonstrates that at low managerial efficiency, ESG performance has no impact on Tobin’s Q, whereas, at managerial efficiency up to 0.164, ESG performance has a significant positive effect on Tobin’s Q.

Table 4.5 – 4.6 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. These results suggest that ESG practices do not have a substantial impact on the company's performance. 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 and conscientiousness, which has a direct impact on the relationship between ESG and firm performance. These findings imply that effective management is a crucial factor in a company's ESG performance and overall success. 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.

#### **Robustness checks (multiple regression analysis)**

Table 4.7 presents robustness checks 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 Tobin's Q, including beta coefficients, *t*-statistics, and *p*-values.

**Table 4.7** Multiple regression moderating effect of managerial efficiency on ESG and firm performance relationship (ROA and Tobin's Q)

Variables	Expected sign	Model 1 ROA	Model 2 Q
ESG	H1a/b: +	-0.0039 (-0.335)	0.1374 (1.245)
M_Score	+	0.061 (6.397***)	0.6445 (7.638***)
ESG × M_Score	H3a/b: +	0.0417 (3.260***)	0.2780 (2.268**)
LnFS	+	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%
Adj R Square		39.12%	39.99%
R Square change		3.1%	5.1%
F		80.436***	83.447***

**Note:** This table presents multiple regression moderating effect of managerial efficiency (M\_Score) on ESG and firm performance (beta, *t*-value) relationship analysis of the dependent variables (return on assets: ROA, Tobin's Q: Q), independent variable (environmental social governance: ESG), moderator variable (managerial efficiency: M\_Score) control variables (firm size: LnFS, firm leverage: LEV, firm growth: GR). The sample consists of 2,104 firm-year observations from 2016 to 2021, representing 373 individual public firms in Thailand.

\*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively (regression coefficients below the *t*-values in parentheses)

Table 4.7 reveals that there is no significant relationship between the performance of environmental, social, and governance (ESG) and the firm performance in the Thai listed companies, regarding both the return on assets (ROA) and Tobin's Q (Q). 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 relationship between managerial efficiency (M\_Score) and conscientiousness, which has a direct impact on the relationship between ESG and firm performance. Specifically, the statistical values reveal that for ROA, the beta coefficient

is 0.0417, the  $t$ -value is 3.260, and the  $p$ -value is less than 0.01. Similarly, for tobin's  $q$ , 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.

#### **4.6.2 Additional specification test**

In this subsection, an additional specification is conducted. The additional test is motivated by Dremptic et al., (2020) and Bissoondoyal-Bheenick et al., (2023) that examination of the contemporaneous relationship between ESG and firm performance. However, the role of firm size in explaining the relationship between ESG and firm performance. Nonetheless, the firm size can be explaining the relationship between ESG and firm performance. Larger firms are more likely to invest in ESG activities due to economies of scale in order to better reflect stakeholder demands, and larger firms often have more resources and capabilities, which can give them a competitive advantage in addressing environmental, social, and governance (ESG) performance.



**Table 4.8** Descriptive statistics on the variables of large and small samples

Variables	<i>Large firms (n = 713)</i>				<i>Small firms (n = 1,391)</i>			
	Mean	SD	Min	Max	Mean	SD	Min	Max
<i>Panel A: Firm performance</i>								
ROA	7.07	6.64	-16.79	29.88	3.84	7.30	-19.27	29.48
Q	1.71	0.74	0.55	3.05	1.28	0.63	0.52	3.06
<i>Panel B: Independent variables</i>								
ESG	0.62	0.32	0.04	1.00	0.40	0.25	0.04	1.00
E	0.53	0.48	0.00	1.00	0.21	0.38	0.00	1.00
S	0.67	0.35	0.14	1.00	0.44	0.28	0.14	1.00
G	0.88	0.15	0.60	1.00	0.78	0.15	0.60	1.00
INS	21.08	20.28	0.00	70.92	19.57	19.76	0.00	70.92
<i>Panel C: Moderator variable</i>								
M_Score	0.76	0.41	0.02	1.80	0.73	0.32	0.00	1.80
<i>Panel D: Control variables</i>								
FS	105,964	259,584	711	3,078,019	5,989	8,224	450	107,873
LnFS	17.49	1.27	13.47	20.85	15.13	0.93	13.02	18.50
LEV	1.01	0.58	0.11	2.36	0.81	0.60	0.10	2.35
GR	5.86	20.24	-38.18	59.37	2.63	22.37	-38.89	59.38

**Note:** This table presents the number of observations, pooled mean, median, standard deviation, minimum and maximum of the dependent variables (return on assets: ROA, Tobin's Q: Q), independent variables (environmental social governance: ESG, institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, firm leverage: LEV, firm growth: GR). The sample consists of 713 firm-year observations of large firm and 1,391 firm-year observations of small firm from 2016 to 2021, representing 373 individual public firms in Thailand. Units of variable measurement: E, S, G, ESG, M\_Score (Score); INS, ROA, GR (%); Q, LEV; (Ratio) and FS (millions Bath); LnFS – The natural logarithm of firm size

Table 4.8 presents a summary of the descriptive statistics for the variables in large and small firms. Panel A displays the firm performance variables, with the mean large (small) firms' values of return on assets (ROA) of 7.07% (3.84%) and Tobin's Q (Q) of 1.71 times (1.28 times). Panel B contains the ESG scores, ranging from 0 to 1. The mean large (small) firms' of ESG are 0.62 score (0.40 score). The mean large (small) firms' value of environmental dimension (E) is 0.53 score (0.21 score). The mean large (small) firms' values of social dimension (S) are 0.67 score (0.44 score). The mean large (small) firms of governance (G) are 0.88 score (0.78 score). The governance dimension (G) scores are higher than the others. The mean large (small) firms' value of institutional ownership (INS) is 21.08% (19.57%) Panel C shows the moderator variable (M\_Score) with the large (small) firms' values of 0.76 score (0.73 score). Panel D provides

descriptive statistics for control variables large (small) firms, such as firm size (FS), nature logarithm of firm size (LnFS), firm leverage (LEV), and firm growth (GR), with mean large firms of 17.49, 1.01 times and 5.86% respectively, and mean small firms of 15.93, 0.60 times, 2.63%, respectively. For firm size (FS), the lowest mean value of large is 105,964 million Baht, the mean value of small is 5,989 million Baht.

### Additional specification ESG model test

#### 4.6.2.1 Reconciling the evidence by using the large firms of samples

**Table 4.9** PROCESS regression moderating effect of managerial efficiency on ESG and firm performance (ROA and Tobin's Q) relationship on large firms

Model 3 ROA							
Variables	Expected	B	SE $\beta$	t- value	p-value	LLCI	ULCI
constant		0.245	0.033	7.429	0.000	0.180	0.309
ESG	+	0.024	0.013	1.810	0.071	-0.002	0.049
M_Score	+	0.064	0.010	6.341	0.000***	0.044	0.084
Int_1	+	-0.005	0.014	-0.352	0.725	-0.033	0.023
LnFS	+	-0.010	0.002	-5.060	0.000***	-0.014	-0.006
LEV	-	-0.038	0.004	-10.201	0.000***	-0.045	-0.031
GR	+	0.085	0.010	8.794	0.000***	0.066	0.104
<i>N</i> = 713, <i>R Square</i> = 48.25%, <i>F</i> 38.116***							
Model 4 Q							
Variables	Expected	B	SE $\beta$	t- value	p-value	LLCI	ULCI
constant		4.545	0.345	13.181	0.000	3.868	5.222
ESG	+	0.201	0.136	1.481	0.139	-0.066	0.468
M_Score	+	0.626	0.106	5.923	0.000***	0.418	0.833
Int_1	+	0.060	0.150	0.403	0.687	-0.234	0.354
LnFS	+	-0.181	0.020	-8.879	0.000***	-0.222	-0.141
LEV	-	-0.001	0.039	-0.016	0.987	-0.077	0.076
GR	+	0.262	0.102	2.580	0.010***	0.063	0.462
<i>N</i> = 713, <i>R Square</i> = 54.19%, <i>F</i> 48.353***							

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on ESG and firm performance relationship analysis of the dependent variable (return on assets: ROA and Tobin's Q: Q), independent variable (environmental social governance: ESG), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 713 firm-year observations from 2016 to 2021, representing 130 individual public firms in Thailand. \*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively

Table 4.9 presents the results of the moderation analysis of the relationship between ESG and firm performance (ROA and Tobin's Q) through the methodology of Hayes (2013). The results indicate that there is a no significant interaction between managerial efficiency and ROA, as evidenced by the *p*-value ( $p > 0.05$ ,  $p = 0.725$ ) and

LLCI and ULCI values (-0.033 and 0.023, respectively). Similarly, for the interaction between managerial efficiency and Tobin's Q, the  $p$ -value is significant ( $p > 0.05$ ,  $p = 0.687$ ), and the LLCI and ULCI values are -0.234 and 0.354, respectively. These findings demonstrate that the no relationship between ESG and firm performance is moderated by managerial efficiency.

#### 4.6.2.2 Reconciling the evidence by using the small firms of samples

It is important to note that the research on ESG performance and large companies is an evolving field, and findings may differ across studies due to variations in methodologies, timeframes, and geographic contexts. However, the overall trend suggests that integrating ESG considerations into the strategies and operations of large companies can have a positive impact on financial performance, risk management, stakeholder relationships, and long-term sustainability. It should be recognized that small and large firms differ in terms of resources and stakeholder expectations, but both can contribute to sustainable practices and benefit from integrating ESG considerations into their operations. The specific approach to ESG may vary depending on the size, industry, and operational context of each firm.

While research findings on ESG practices vary across countries, they emphasize the need for a contextual approach to understanding ESG performance. Particularly, the study acknowledges the importance of small firms in the context of the Stock Exchange in Thailand, as a developing country, when examining ESG performance. Thus, this study is the first to comprehensively evaluate the impact of ESG on firm performance using a multi-year dataset of small firms in Thailand. Furthermore, it is the only study to demonstrate the moderating effect of managerial efficiency on the relationship between ESG and financial performance.

**Table 4.10** PROCESS regression moderating effect of managerial efficiency on ESG and ROA relationship on small firms

<b>Model 5 ROA</b>							
<b>Variables</b>	<b>Expected</b>	<b>B</b>	<b>SE <math>\beta</math></b>	<b>t- value</b>	<b>p-value</b>	<b>LLCI</b>	<b>ULCI</b>
constant		-0.034	0.030	-1.143	0.253	-0.093	0.025
ESG	+	-0.066	0.014	-4.593	0.000***	-0.095	-0.038
M_Score	+	0.042	0.009	4.923	0.000***	0.025	0.059
Int_1	+	0.126	0.016	7.946	0.000***	0.095	0.158
LnFS	+	0.004	0.002	1.983	0.048**	0.000	0.008
LEV	-	-0.035	0.003	-11.698	0.000***	-0.041	-0.029
GR	+	0.067	0.007	9.417	0.000***	0.053	0.081
<i>N = 1,391, R Square= 40.84%, R Square Change = 12.72%, F 55.747***</i>							
Conditional effects of the focal predictor at values of the moderator(s):							
M_Score	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
Low	0.411	-0.014	0.009	-1.587	0.113	-0.032	0.003
Medium	0.733	0.026	0.007	4.046	0.000***	0.014	0.039
High	1.055	0.067	0.008	8.997	0.000***	0.052	0.082
Conditional effect of focal predictor at values of the moderator:							
Statistical significance	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
indicate negative significance	0.002	-0.066	0.014	-4.584	0.000***	-0.094	-0.038
	0.097	-0.054	0.013	-4.137	0.000***	-0.080	-0.028
	0.191	-0.042	0.012	-3.575	0.000***	-0.065	-0.019
	0.286	-0.030	0.011	-2.859	0.004***	-0.051	-0.010
	0.378	-0.019	0.009	-1.962	0.050**	-0.037	0.000
in significance	0.380	-0.018	0.009	-1.938	0.053	-0.037	0.000
	0.475	-0.006	0.008	-0.749	0.454	-0.023	0.010
	0.569	0.006	0.008	0.762	0.446	-0.009	0.020
indicate positive significance	0.633	0.014	0.007	1.962	0.050**	0.000	0.028
	0.664	0.018	0.007	2.590	0.010***	0.004	0.031
	0.759	0.030	0.006	4.592	0.000***	0.017	0.042
	0.853	0.042	0.006	6.474	0.000***	0.029	0.054
	0.948	0.054	0.007	7.944	0.000***	0.040	0.067
	1.042	0.065	0.007	8.903	0.000***	0.051	0.080
	1.137	0.077	0.008	9.438	0.000***	0.061	0.093
	1.231	0.089	0.009	9.692	0.000***	0.071	0.107
	1.326	0.101	0.010	9.782	0.000***	0.081	0.122
	1.420	0.113	0.012	9.782	0.000***	0.091	0.136
	1.515	0.125	0.013	9.737	0.000***	0.100	0.150
	1.610	0.137	0.014	9.670	0.000***	0.109	0.165
	1.704	0.149	0.016	9.594	0.000***	0.119	0.180
	1.799	0.161	0.017	9.516	0.000***	0.128	0.194

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on ESG and firm performance relationship analysis of the dependent variable (return on assets: ROA), independent variable (environmental social governance: ESG), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 1,391 firm-year observations from 2016 to 2021, representing 243 individual public firms in Thailand.

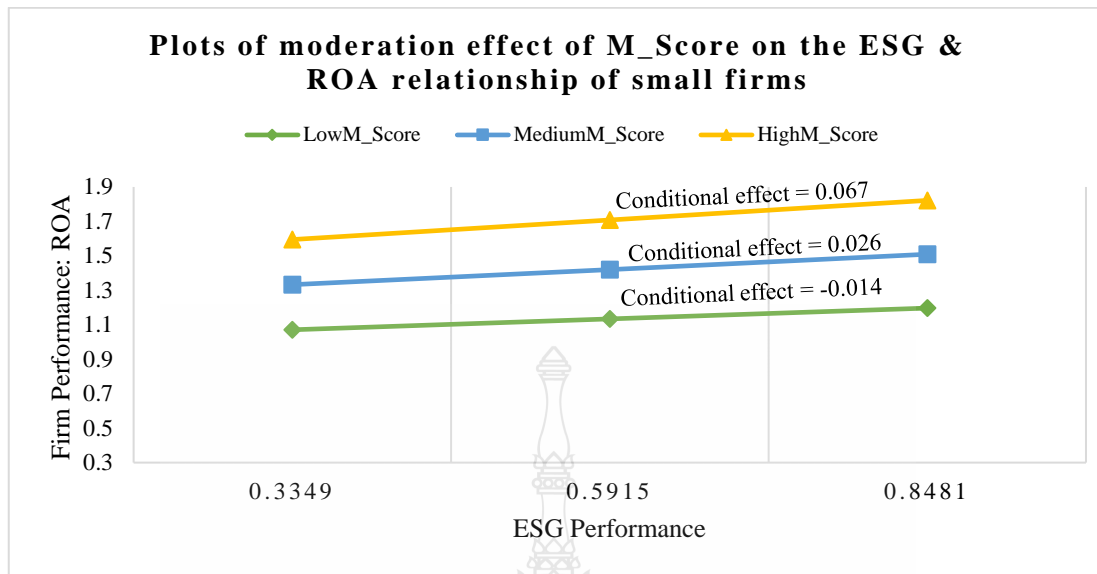
\*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively



Table 4.10 shows the results of moderated PROCESS regression analysis of small firms, and the results of the interaction of ESG and managerial efficiency (M\_Score) with beta coefficients, *t*-statistics, and *p*-values. Upon analyzing the relationship between ESG and financial performance in small listed companies with a market capitalization below 10,000 million baht, the findings reveal that in Model 5 (ROA), the coefficient value is -0.066 with a *p*-value of 0.000 ( $p < 0.01$ ). This indicates a significant negative relationship between ESG performance and ROA.

These results are consistent with the findings of previous studies conducted by Duque-Grisales & Aguilera-Caracuel (2021) and Tampakoudis et al. (2021), who observed a negative relationship between ESG and ROA. These studies explained that ESG does not play a significant role in enhancing firm efficiency and its impact on corporate performance is less prominent in smaller firms. The analysis also reveals that the instigator variable (Int\_1) in Model 5 demonstrates the interaction effect of ESG and M\_Score on ROA. The interaction effect accounts for R square of 40.84% and exhibits a positive and statistically significant coefficient of 0.126 ( $p < 0.01$ ). These additional data analysis results indicate that managerial efficiency acts as a moderating variable, influencing the relationship between ESG and financial performance.

Figure 4.3 shows investigate the nature of the interactions term, plots of the effects of ESG performance on ROA at different levels of managerial efficiency (M\_Score) were constructed. The moderating effect demonstrates that at low managerial efficiency, ESG performance has no impact on ROA, whereas, at medium and high managerial efficiency (up to 0.633 score), ESG performance has a significant positive effect on ROA.



**Figure 4.3** Moderating effect of managerial efficiency on ESG and ROA relationship of small firms

**Table 4.11** PROCESS regression moderating effect of managerial efficiency on ESG and Tobin's Q relationship on small firms

Model 6 Q							
Variables	Expected	B	SE $\beta$	t- value	p-value	LLCI	ULCI
constant		3.725	0.261	14.280	0.000	3.213	4.236
ESG	+	-0.216	0.125	-1.726	0.085	-0.461	0.030
M_Score	+	0.499	0.074	6.772	0.000***	0.355	0.644
Int_1	+	0.614	0.138	4.459	0.000***	0.344	0.885
LnFS	+	-0.183	0.017	-10.633	0.000***	-0.217	-0.150
LEV	-	0.041	0.026	1.569	0.117	-0.010	0.092
GR	+	0.121	0.062	1.954	0.051	-0.001	0.242
<i>N = 1,391, R Square = 40.39%, R Square Change = 4.86%, F 54.716***</i>							
Conditional effects of the focal predictor at values of the moderator(s):							
M_Score	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
Low	0.411	0.037	0.078	0.468	0.640	-0.117	0.190
Medium	0.733	0.235	0.056	4.157	0.000***	0.124	0.345
High	1.055	0.433	0.065	6.698	0.000***	0.306	0.559
Conditional effect of focal predictor at values of the moderator:							
Statistical significance	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
insignificant	0.002	-0.214	0.125	-1.719	0.086	-0.459	0.030
	0.092	-0.159	0.114	-1.400	0.162	-0.382	0.064
	0.182	-0.104	0.103	-1.009	0.313	-0.306	0.098
	0.272	-0.049	0.093	-0.526	0.599	-0.231	0.133
	0.361	0.006	0.083	0.076	0.939	-0.157	0.170
	0.451	0.062	0.075	0.826	0.409	-0.085	0.208
	0.541	0.117	0.067	1.746	0.081	-0.014	0.248

**Table 4.11** PROCESS regression moderating effect of managerial efficiency on ESG and Tobin's Q relationship on small firms (Cont.)

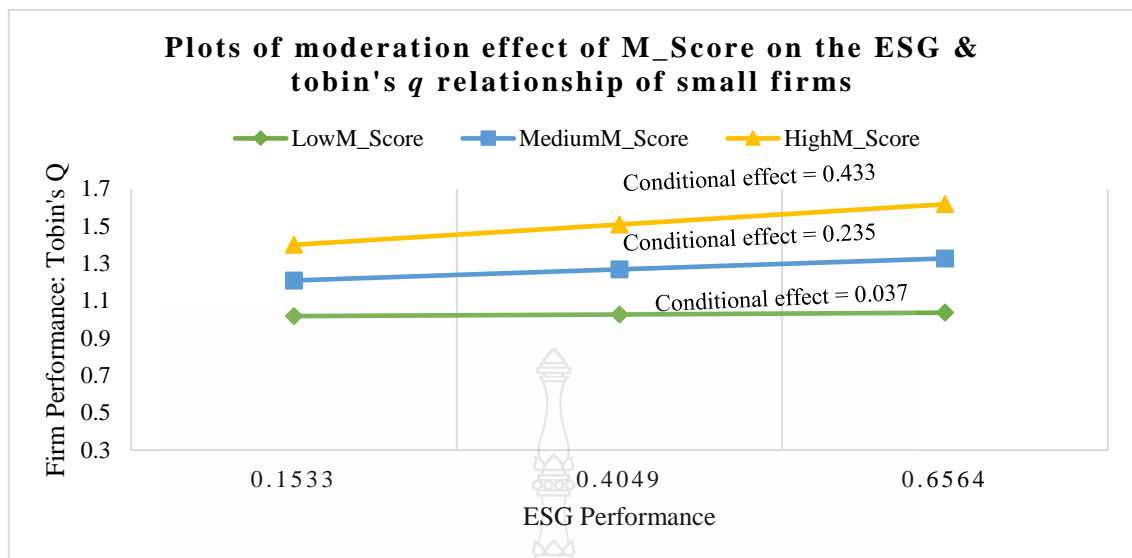
Variables	Expected	Model 6 Q					
		B	SE $\beta$	t- value	p-value	LLCI	ULCI
	0.560	0.128	0.065	1.962	0.050**	0.000	0.257
	0.631	0.172	0.061	2.829	0.005***	0.053	0.291
	0.721	0.227	0.057	4.000	0.000***	0.116	0.339
	0.811	0.282	0.055	5.102	0.000***	0.174	0.391
	0.900	0.338	0.057	5.962	0.000***	0.226	0.449
	0.990	0.393	0.061	6.496	0.000***	0.274	0.511
indicate	1.080	0.448	0.066	6.743	0.000***	0.318	0.578
positive	1.170	0.503	0.074	6.799	0.000***	0.358	0.648
significance	1.260	0.558	0.083	6.748	0.000***	0.396	0.721
	1.350	0.613	0.092	6.646	0.000***	0.432	0.795
	1.439	0.669	0.103	6.525	0.000***	0.468	0.870
	1.529	0.724	0.113	6.400	0.000***	0.502	0.946
	1.619	0.779	0.124	6.281	0.000***	0.536	1.022
	1.709	0.834	0.135	6.169	0.000***	0.569	1.100
	1.799	0.889	0.147	6.067	0.000***	0.602	1.177

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on ESG and firm performance relationship analysis of the dependent variable (Tobin's Q: Q), independent variable (environmental social governance: ESG), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 1,391 firm-year observations from 2016 to 2021, representing 243 individual public firms in Thailand.

\*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively

Table 4.11 shows the results of moderated PROCESS regression analysis, and the results of the interaction of ESG and managerial efficiency (M\_Score) with beta coefficients, t-statistics, and p-values. Upon analyzing the relationship between ESG and Tobin's Q in small firms, the findings reveal that in Model 6, the coefficient value is -0.216 with a p-value of 0.085 ( $p > 0.05$ ). This indicates an insignificant relationship between ESG and Tobin's Q.

These studies explained that ESG does not play a significant role in enhancing firm efficiency and its impact on corporate performance is less prominent in smaller firms. The analysis also reveals that the instigator variable (Int\_1) in Model 6 demonstrates the interaction effect of ESG and M\_Score on Tobin's Q. The interaction effect accounts for R square of 40.39% and exhibits a positive and statistically significant coefficient of 0.614 ( $p < 0.01$ ). These additional data analysis results indicate that managerial efficiency acts as a moderating variable, influencing the relationship between ESG and Tobin's Q.



**Figure 4.4** Moderating effect of managerial efficiency on ESG and Tobin's Q relationship of small firms

Based on the results obtained from bootstrapping (Table 4.11), the relationship between ESG and Tobin's Q is found to be significant only for individuals with high and medium scores on managerial efficiency (up to 0.560). Specifically, for Tobin's Q, the findings indicate that managerial efficiency positively moderates the indirect relationship between ESG and Tobin's Q.

#### 4.7 Proposed Model and Hypotheses Testing: Institutional Ownership Model

##### 4.7.1 Results from Regression Moderating Effect of Managerial Efficiency on Institutional Ownership and Firm Performance Relationship

###### PROCESS Regression Analysis

Table 4.12 – 4.13 present the results of the moderation analysis of the relationship between institutional ownership (INS) and firm performance (ROA and Tobin's Q) through the methodology of Hayes, A.F. (2013). The results indicate that there is an institutional ownership (INS) has a positive relationship with the performance of both models. In Model 7, the coefficient value is 0.0001, and the  $p$ -value is 0.026 ( $p < 0.05$ ) and LLCI and ULCI values (0.000 and 0.0003, respectively). In Model 8, the coefficient value is 0.002, and the  $p$ -value is 0.000 ( $p < 0.01$ ) and LLCI and ULCI values (0.001 and 0.004, respectively).

Similarly, for the interaction between managerial efficiency and firm performance ROA, the  $p$ -value is significant ( $p < 0.01$ ), and the LLCI and ULCI values are 0.000 and 0.001, respectively. Tobin's Q, the  $p$ -value is significant ( $p < 0.01$ ), and the LLCI and ULCI values are 0.004 and 0.011, respectively. These findings demonstrate that the relationship between institutional ownership and firm performance is moderated by managerial efficiency.

**Table 4.12** PROCESS regression moderating effect of managerial efficiency on institutional ownership and ROA relationship

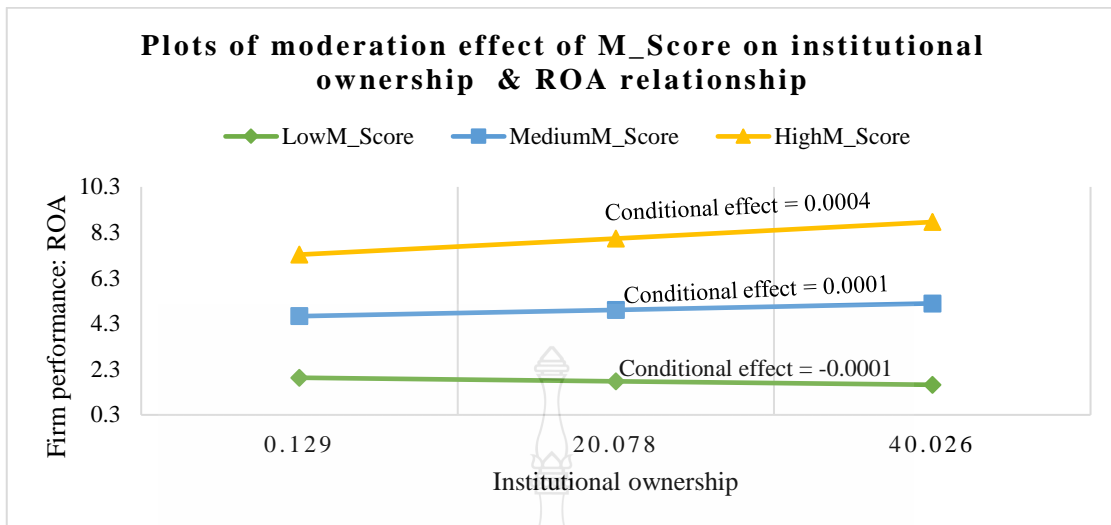
<b>Model 7 ROA</b>							
<b>Variables</b>	<b>Expected</b>	<b>B</b>	<b>SE <math>\beta</math></b>	<b><math>t</math>- value</b>	<b><math>p</math>-value</b>	<b>LLCI</b>	<b>ULCI</b>
constant		-0.033	0.015	-2.158	0.031	-0.063	-0.003
INS	H2a: +	0.0001	0.0001	2.222	0.026**	0.0000	0.0003
M_Score	+	0.088	0.004	23.699	0.000***	0.081	0.096
Int_1	H4a: +	0.001	0.000	3.248	0.001***	0.000	0.001
LnFS	+	0.008	0.001	8.375	0.000***	0.006	0.010
LEV	-	-0.040	0.002	-16.654	0.000***	-0.044	-0.035
GR	+	0.074	0.006	12.283	0.000***	0.062	0.086
<i>N = 2,104, R Square = 38.98%, R Square Change = 3.1%, F 78.389***</i>							
Conditional effects of the focal predictor at values of the moderator(s):							
M_Score	M_Score	effect	SE $\beta$	$t$ - value	$p$ -value	LLCI	ULCI
Low	0.388	-0.0001	0.0001	-0.851	0.395	0.0000	0.0001
Medium	0.743	0.0001	0.0001	2.222	0.026**	0.0000	0.0003
High	1.098	0.0004	0.0001	3.826	0.000***	0.0002	0.0005
Conditional effect of focal predictor at values of the moderator:							
Statistical significance	M_Score	effect	SE $\beta$	$t$ - value	$p$ -value	LLCI	ULCI
indicate negative significance	0.002	-0.0003	0.0002	-2.070	0.039**	0.0000	0.0000
	0.061	-0.0003	0.0001	-1.961	0.050**	0.0000	0.0000
insignificant	0.097	-0.0003	0.0001	-1.887	0.059	0.0000	0.0000
	0.191	-0.0002	0.0001	-1.648	0.100	0.0000	0.0000
	0.286	-0.0001	0.0001	-1.328	0.184	0.0000	0.0001
	0.380	-0.0001	0.0001	-0.894	0.372	0.0000	0.0001
	0.475	0.0000	0.0001	-0.301	0.764	0.0000	0.0001
	0.570	0.0000	0.0001	0.484	0.628	0.0000	0.0002
	0.664	0.0001	0.0001	1.426	0.154	0.0000	0.0002
	0.716	0.0001	0.0001	1.961	0.050**	0.0000	0.0002

**Table 4.12** PROCESS regression moderating effect of managerial efficiency on institutional ownership and ROA relationship (Cont.)

Variables	Expected	Model 7 ROA				LLCI	ULCI
		B	SE $\beta$	t- value	p-value		
	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
indicate	0.759	0.0002	0.0001	2.366	0.018**	0.0000	0.0003
positive	0.853	0.0002	0.0001	3.095	0.002***	0.0001	0.0003
significance	0.948	0.0003	0.0001	3.538	0.000***	0.0001	0.0004
	1.042	0.0003	0.0001	3.761	0.000***	0.0002	0.0005
	1.137	0.0004	0.0001	3.853	0.000***	0.0002	0.0006
	1.232	0.0004	0.0001	3.877	0.000***	0.0002	0.0007
	1.326	0.0005	0.0001	3.870	0.000***	0.0002	0.0008
	1.421	0.0006	0.0001	3.847	0.000***	0.0003	0.0008
	1.515	0.0006	0.0002	3.819	0.000***	0.0003	0.0009
	1.610	0.0007	0.0002	3.790	0.000***	0.0003	0.0010
	1.704	0.0007	0.0002	3.761	0.000***	0.0004	0.0011
	1.799	0.0008	0.0002	3.734	0.000***	0.0004	0.0012

*Note:* This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on institutional ownership (INS) and firm performance relationship analysis of the dependent variable (return on assets: ROA), independent variable (institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 2,104 firm-year observations from 2016 to 2021, representing 373 individual public firms in Thailand. \*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively

Table 4.12 shows that the institutional ownership has a positive relationship with the ROA. In Model 7, the coefficient value is 0.0001, and the  $p$ -value is 0.026 ( $p < 0.05$ ). Institutional ownership can enhance corporate governance mechanisms and operational capability. Thus, the hypothesis H2a is accepted since the positive relationship between institutional ownership and ROA is at statistical significance levels of 0.05, which is in line with agency theory (Jensen & Meckling, 1976) and the studies conducted by Navissi & Naiker (2006) and Nurleni et al., (2018). The results of the analysis of the influence of the control variable (Int\_1) and the analysis of the influence of managerial efficiency (M\_Score) for ROA show that managerial efficiency has a significant influence on the relationship between institutional ownership, institutional ownership and ROA. plots of the effects of institutional ownership on ROA (Figure 4.5)



**Figure 4.5** Moderating effect of managerial efficiency on institutional ownership and ROA relationship

Figure 4.5 shows that institutional ownership has no effect on firm performance at low managerial efficiency, institutional ownership has a level effect on firm performance at managerial efficiency, and institutional ownership has a significantly positive influence on firm performance at medium and high managerial efficiency (up to 9.716 score).



**Table 4.13** PROCESS regression moderating effect of managerial efficiency on institutional ownership and Tobin's Q relationship

Variables	Expected	Model 8 Q				LLCI	ULCI
		B	SE $\beta$	t- value	p-value		
constant		1.549	0.146	10.621	0.000	1.263	1.835
INS	H2b: +	0.002	0.001	3.913	0.000***	0.001	0.004
M_Score	+	0.832	0.036	23.308	0.000***	0.762	0.902
Int_1	H4b: +	0.008	0.002	4.198	0.000***	0.004	0.011
LnFS	+	0.010	0.009	1.093	0.274	-0.008	0.028
LEV	-	-0.064	0.023	-2.836	0.005***	-0.109	-0.020
GR	+	0.170	0.058	2.953	0.003***	0.057	0.283

*N = 2,104, R Square= 40.01%, R Square Change = 5.1%, F 81.822\*\*\**

Conditional effects of the focal predictor at values of the moderator(s):

M_Score	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
Low	0.388	0.0001	0.001	-0.373	0.709	-0.002	0.001
Medium	0.743	0.002	0.001	3.913	0.000***	0.001	0.004
High	1.098	0.005	0.001	5.647	0.000***	0.003	0.007

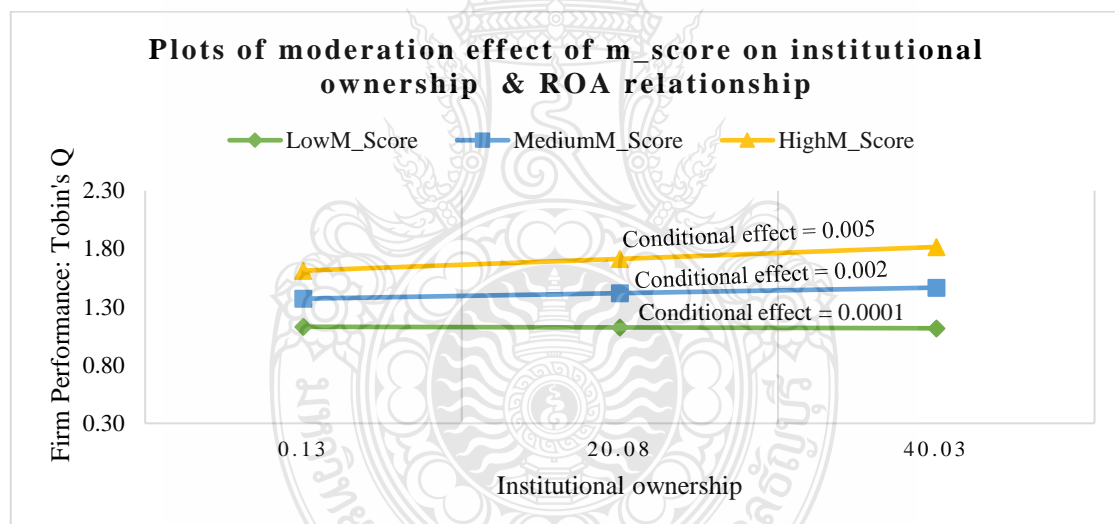
Conditional effect of focal predictor at values of the moderator:

Statistical significance	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
indicate negative significance	0.002	-0.003	0.002	-2.241	0.025**	-0.006	0.000
	0.094	-0.003	0.001	-1.961	0.050**	-0.005	0.000
insignificant	0.097	-0.003	0.001	-1.953	0.051	-0.005	0.000
	0.191	-0.002	0.001	-1.581	0.114	-0.004	0.000
	0.286	-0.001	0.001	-1.091	0.275	-0.003	0.001
	0.380	0.000	0.001	-0.437	0.662	-0.002	0.001
	0.475	0.000	0.001	0.438	0.662	-0.001	0.002
	0.570	0.001	0.001	1.563	0.118	0.000	0.002
	0.599	0.001	0.001	1.961	0.050**	0.000	0.003
	0.664	0.002	0.001	2.864	0.004***	0.001	0.003
	0.759	0.003	0.001	4.095	0.000***	0.001	0.004
	0.853	0.003	0.001	4.979	0.000***	0.002	0.005
indicate positive significance	0.948	0.004	0.001	5.448	0.000***	0.003	0.005
	1.042	0.005	0.001	5.624	0.000***	0.003	0.006
	1.137	0.005	0.001	5.643	0.000***	0.004	0.007
	1.232	0.006	0.001	5.591	0.000***	0.004	0.008
	1.326	0.007	0.001	5.512	0.000***	0.004	0.009
	1.421	0.008	0.001	5.428	0.000***	0.005	0.010
	1.515	0.008	0.002	5.345	0.000***	0.005	0.011
	1.610	0.009	0.002	5.269	0.000***	0.006	0.012
	1.704	0.010	0.002	5.199	0.000***	0.006	0.013
	1.799	0.010	0.002	5.137	0.000***	0.007	0.014

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on institutional ownership (INS) and firm performance relationship analysis of the dependent variable (Tobin's Q: Q), independent variable (institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size, firm leverage: LEV, firm growth: GR). The sample consists of 2,104 firm-year observations from 2016 to 2021, representing 373 individual public firms in Thailand. \*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively.



The institutional ownership has a positive relationship with Tobin's Q, as shown in Table 4.13, where the coefficient value is 0.002 and the  $p$ -value is 0.000 ( $p < 0.01$ ). Institutional ownership can improve corporate governance mechanisms and operational effectiveness. In accordance with agency theory (Jensen & Meckling, 1976) and the studies conducted by Navissi & Naiker (2006) and Nurleni et al. (2018), the positive relationship between institutional ownership and tobin's  $q$  is statistically significant at the 0.01% level. The results of the analyses of the influence of the control variable (Int\_1) and the influence of managerial efficiency (M\_Score) for model 8 indicate that managerial efficiency has a significant impact on the relationship between institutional ownership, and performance. Figure 4.6 demonstrates that managerial efficiency moderates the positive relationship between institutional ownership and tobin's  $q$  and the conditional effects of the focal predictor at values of the moderator.



**Figure 4.6** Moderating effect of managerial efficiency on institutional ownership and Tobin's Q relationship

### Robustness Checks (Multiple Regression Analysis)

Table 4.14 presents robustness checks the outcomes of the institutional ownership and firm performance direct effect and the findings of the moderated multiple regression analysis. It provides a summary of the interaction between the two models, ROA and Tobin's Q, including beta coefficients,  $t$ -statistics, and  $p$ -values.

**Table 4.14** Multiple regression moderating effect of managerial efficiency on ESG and firm performance (ROA and Tobin's Q) relationship

Variables	Expected sign	Model 7 ROA	Model 8 Q
INS	H2a/b: +	0.0001 (2.222**)	0.0024 (3.913***)
M_Score	+	0.0883 (23.699***)	0.8323 (23.308***)
$INS \times M\_Score$	H4a/b: +	0.0006 (3.248***)	0.0076 (4.198***)
LnFS	+	0.0079 (8.375***)	0.0099 (1.093)
LEV	-	-0.0395 (-16.654***)	-0.0644 (-2.835***)
GR	+	0.0738 (12.283***)	0.1700 (2.953***)
Industry Effects		Yes	Yes
Year Effects		Yes	Yes
Constant		-0.0607 (-3.601***)	1.3008 (8.045***)
N		2,104	2,104
R Square		38.98%	40.48%
Adj R Square		38.48%	39.99%
F		78.389***	81.821***

**Note:** This table presents multiple regression moderating effect of managerial efficiency (M\_Score) on institutional ownership and firm performance relationship analysis of the dependent variables (return on assets: ROA, Tobin's Q: Q), independent variable (institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 2,104 firm-year observations from 2016 to 2021, representing 373 individual public firms in Thailand. \*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively (regression coefficients below the t-values in parentheses)

Table 4.14 reveal that there is positive significant relationship between the institutional ownership and firm performance in the Thai listed companies, regarding both the return on assets (ROA) and Tobin's Q. The results of the moderated regression analysis demonstrate that there is a significant and positive relationship between managerial efficiency and conscientiousness, which has a direct impact on the relationship between institutional ownership and firm performance.

#### 4.7.2 Additional Specification Institutional Ownership Test

To clarify the findings of Models 7 and 8, the data regarding the influence of managerial efficiency (M\_Score) on the relationship between institutional ownership and firm performance were analyzed. Model 7 and Model 8 were analyzed by year and by industry. A clear influence of the dependent variable has not been found. However, the

influence of the regulatory variable according to the firm size based on the classification of listed companies and market capitalization groups.

#### 4.7.2.1 Reconciling the Evidence by Using the Large Firms of Samples

**Table 4.15** PROCESS regression moderating effect of managerial efficiency on institutional ownership and firm performance relationship on large firms

<b>Model 9 ROA</b>							
<b>Variables</b>	<b>Expected</b>	<b>B</b>	<b>SE <math>\beta</math></b>	<b>t- value</b>	<b>p-value</b>	<b>LLCI</b>	<b>ULCI</b>
constant		0.266	0.029	9.094	0.000	0.209	0.324
INS	+	0.000	0.000	2.258	0.024**	0.000	0.000
M_Score	+	0.061	0.005	12.348	0.000***	0.052	0.071
Int_1	+	0.000	0.000	0.169	0.866	-0.001	0.001
LnFS	+	-0.008	0.002	-4.461	0.000***	-0.011	-0.004
LEV	-	-0.039	0.004	-10.617	0.000***	-0.047	-0.032
GR	+	0.085	0.010	8.753	0.000***	0.066	0.104
<i>N = 713, R Square= 48.00%, F 37.745***</i>							
<b>Model 10 Q</b>							
<b>Variables</b>	<b>Expected</b>	<b>B</b>	<b>SE <math>\beta</math></b>	<b>t- value</b>	<b>p-value</b>	<b>LLCI</b>	<b>ULCI</b>
constant		4.613	0.308	14.966	0.000	4.008	5.218
INS	+	0.001	0.001	1.213	0.226	-0.001	0.003
M_Score	+	0.678	0.052	12.980	0.000***	0.575	0.780
Int_1	+	0.002	0.003	0.648	0.517	-0.004	0.007
LnFS	+	-0.148	0.018	-8.221	0.000***	-0.184	-0.113
LEV	-	-0.018	0.039	-0.466	0.642	-0.095	0.058
GR	+	0.257	0.102	2.512	0.012**	0.056	0.458
<i>N = 713, R Square= 53.50%, F 47.041***</i>							

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on institutional ownership and firm performance relationship analysis of the dependent variable (return on assets: ROA and Tobin's Q: Q), independent variable (institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 713 firm-year observations from 2016 to 2021, representing 130 individual public firms in \*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively

Table 4.15 presents the results of the moderation analysis of the relationship between institutional ownership and firm performance (ROA and Tobin's Q) through the methodology of Hayes (2013). The results indicate that there is a insignificant interaction between managerial efficiency and ROA, as evidenced by the *p*-value ( $p > 0.05$ ,  $p = 0.866$ ) and LLCI and ULCI values (-0.001 and 0.001, respectively). Similarly, for the interaction between managerial efficiency and Q, the *p*-value is significant ( $p > 0.05$ ,  $p = 0.517$ ), and the LLCI and ULCI values are -0.004 and 0.007, respectively. These findings

demonstrate that the no relationship between institutional ownership and firm performance is moderated by managerial efficiency.

#### 4.7.2.2 Reconciling the Evidence by Using the Small Firms of Samples

It is crucial to note that the research on institutional ownership and large companies is an evolving field, with findings that may vary between studies due to differences in methodologies, time frames, and geographic contexts. The overall trend, however, indicates that incorporating institutional ownership considerations into the strategies and operations of large companies can have a positive effect on financial performance, risk management, stakeholder relationships, and long-term sustainability. It should be acknowledged that minor and large businesses possess different resources.

While research findings on institutional ownership differ from country to country, they highlight the importance of a contextual approach to understanding institutional ownership. When examining institutional ownership performance, the study acknowledges the significance of minor firms in the context of Thailand's Stock Exchange, a developing nation. This is the first study to evaluate the effect of institutional ownership on firm performance using a multi-year dataset of Thai small firms. In addition, it is the only study to demonstrate the moderating influence of managerial efficiency on the association between institutional ownership and firm performance.

**Table 4.16** PROCESS regression moderating effect of managerial efficiency on institutional ownership and ROA relationship on small firms

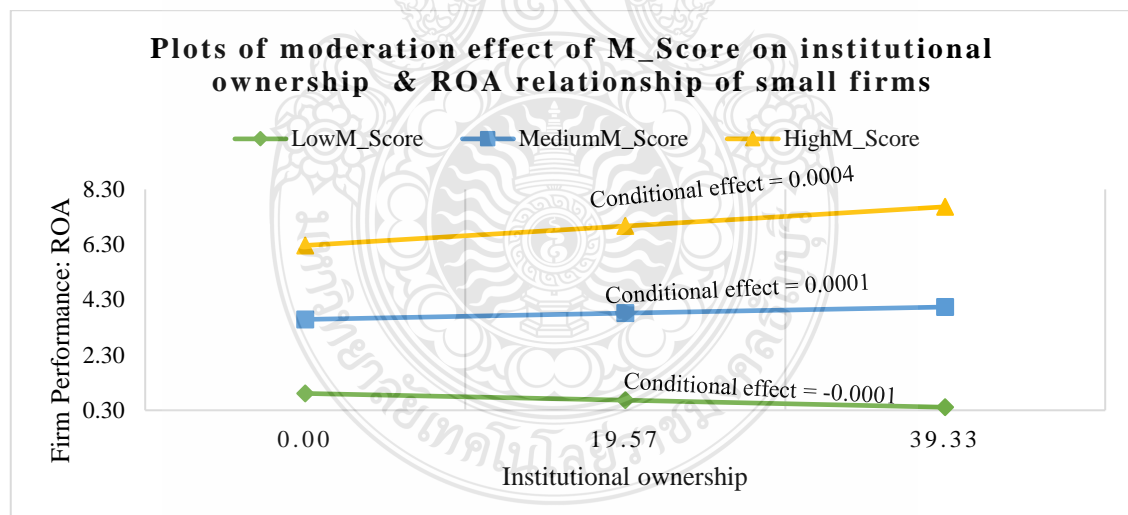
Model 11 ROA							
Variables	Expected	B	SE $\beta$	t- value	p-value	LLCI	ULCI
constant		-0.078	0.031	-2.537	0.011	-0.138	-0.018
INS	+	-0.0001	0.000	-2.163	0.031**	-0.001	0.000
M_Score	+	0.083	0.008	10.837	0.000***	0.068	0.098
Int_1	+	0.001	0.000	2.928	0.004***	0.000	0.001
LnFS	+	0.005	0.002	2.625	0.009***	0.001	0.009
LEV	-	-0.035	0.003	-11.288	0.000***	-0.041	-0.029
GR	+	0.067	0.007	9.086	0.000***	0.052	0.081
<i>N = 1,391, R Square= 37.17%, R Square Change = 13.9%, F 47.789***</i>							
Conditional effects of the focal predictor at values of the moderator(s):							
M_Score	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
Low	0.411	-0.0001	0.0001	-1.121	0.263	0.0000	0.0001
Medium	0.733	0.0001	0.0001	1.416	0.157	0.0000	0.0003
High	1.055	0.0004	0.0001	3.009	0.003***	0.0001	0.0006
Conditional effect of focal predictor at values of the moderator:							
Statistical significance	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
indicate negative significance	0.002	0.000	0.000	-2.161	0.031**	-0.001	0.000
in significance	0.097	0.000	0.000	-2.029	0.043**	-0.001	0.000
	0.136	0.000	0.000	-1.962	0.050**	-0.001	0.000
	0.191	0.000	0.000	-1.851	0.064	-0.001	0.000
	0.286	0.000	0.000	-1.607	0.108	-0.001	0.000
	0.380	0.000	0.000	-1.261	0.208	0.000	0.000
	0.475	0.000	0.000	-0.769	0.442	0.000	0.000
	0.569	0.000	0.000	-0.085	0.932	0.000	0.000
	0.664	0.000	0.000	0.770	0.442	0.000	0.000
	0.759	0.000	0.000	1.642	0.101	0.000	0.000
	0.798	0.000	0.000	1.962	0.050**	0.000	0.000
indicate positive significance	0.853	0.000	0.000	2.326	0.020**	0.000	0.000
	0.948	0.000	0.000	2.754	0.006***	0.000	0.001
	1.042	0.000	0.000	2.987	0.003***	0.000	0.001
	1.137	0.000	0.000	3.106	0.002***	0.000	0.001
	1.231	0.001	0.000	3.162	0.002***	0.000	0.001
	1.326	0.001	0.000	3.186	0.002***	0.000	0.001
	1.420	0.001	0.000	3.194	0.002***	0.000	0.001
	1.515	0.001	0.000	3.192	0.002***	0.000	0.001
	1.610	0.001	0.000	3.186	0.002***	0.000	0.001
	1.704	0.001	0.000	3.178	0.002***	0.000	0.001
	1.799	0.001	0.000	3.169	0.002***	0.000	0.002

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on institutional ownership and firm performance relationship analysis of the dependent variable (return on assets: ROA), independent variable (institutional ownership: INS), moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 1,391 firm-year observations from 2016 to 2021, representing 243 individual public firms in Thailand.

\*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively

Table 4.16 shows the results of moderated PROCESS regression analysis, and the results of the interaction of institutional ownership and managerial efficiency (M\_Score) with beta coefficients, *t*-statistics, and *p*-values. Upon analyzing the relationship between institutional ownership and financial performance in small listed companies with a market capitalization below 10,000 million baht, the findings reveal that in Model 11 (ROA), the coefficient value is -0.0001 with a *p*-value of 0.031 ( $p < 0.05$ ). This indicates a significant negative relationship between institutional ownership and ROA.

Interestingly, a company with a high level of managerial efficiency can lead to a positive relationship between the proportion of institutional ownership and firm performance. This indicates that institutional ownership in small companies with a good corporate governance mechanism can lead to efficient management. Obviously, managerial efficiency moderates the positive relationship between institutional ownership on firm performance and conditional effects of the focal predictor at values of the moderator, plots of the effects of institutional ownership on firm performance (Figure 4.7)



**Figure 4.7** Moderating effect of managerial efficiency on institutional ownership and ROA relationship of small firms

**Table 4.17** PROCESS regression moderating effect of managerial efficiency on institutional ownership and Tobin's Q relationship of small firms

Variables	Expected	Model 12 Q				LLCI	ULCI
		B	SE $\beta$	t- value	p-value		
constant		3.469	0.260	13.362	0.000	2.960	3.978
INS	+	-0.004	0.002	-2.232	0.026**	-0.007	-0.001
M_Score	+	0.598	0.065	9.198	0.000***	0.470	0.725
Int_1	+	0.009	0.002	3.991	0.000***	0.004	0.013
LnFS	+	-0.168	0.017	-9.831	0.000***	-0.201	-0.134
LEV	-	0.038	0.026	1.433	0.152	-0.014	0.089
GR	+	0.118	0.062	1.892	0.059	-0.004	0.240

*N* = 1,391, *R Square* = 37.17%, *R Square Change* = 13.9%, *F* 47.789\*\*\*

Conditional effects of the focal predictor at values of the moderator(s):

M_Score	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
Low	0.411	-0.0002	0.001	-0.252	0.801	-0.002	0.002
Medium	0.733	0.003	0.001	3.707	0.000***	0.001	0.004
High	1.055	0.005	0.001	5.318	0.000***	0.003	0.007

Conditional effect of focal predictor at values of the moderator:

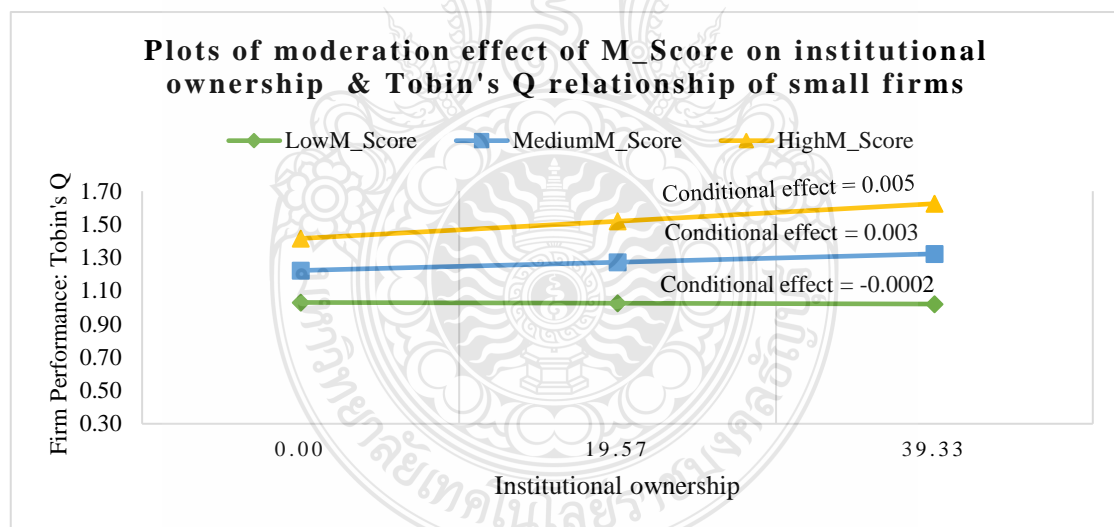
Statistical significance	M_Score	effect	SE $\beta$	t- value	p-value	LLCI	ULCI
indicate negative significance	0.002	-0.004	0.002	-2.227	0.026**	-0.007	0.0004
in significance	0.096	-0.003	0.002	-1.962	0.050**	-0.006	0.000
	0.097	-0.003	0.002	-1.958	0.050**	-0.006	0.000
	0.191	-0.002	0.001	-1.608	0.108	-0.005	0.001
	0.286	-0.001	0.001	-1.139	0.255	-0.004	0.001
	0.380	-0.001	0.001	-0.503	0.615	-0.003	0.002
	0.475	0.000	0.001	0.363	0.717	-0.001	0.002
	0.569	0.001	0.001	1.494	0.135	0.000	0.003
indicate positive significance	0.604	0.001	0.001	1.962	0.050**	0.000	0.003
	0.664	0.002	0.001	2.802	0.005***	0.001	0.003
	0.759	0.003	0.001	4.001	0.000***	0.001	0.004
	0.853	0.004	0.001	4.805	0.000***	0.002	0.005
	0.948	0.004	0.001	5.193	0.000***	0.003	0.006
	1.042	0.005	0.001	5.314	0.000***	0.003	0.007
	1.137	0.006	0.001	5.305	0.000***	0.004	0.008
	1.231	0.007	0.001	5.244	0.000***	0.004	0.009
	1.326	0.008	0.002	5.165	0.000***	0.005	0.011
	1.420	0.009	0.002	5.084	0.000***	0.005	0.012
	1.515	0.009	0.002	5.008	0.000***	0.006	0.013
	1.610	0.010	0.002	4.938	0.000***	0.006	0.014
	1.704	0.011	0.002	4.875	0.000***	0.007	0.015
	1.799	0.012	0.002	4.819	0.000***	0.007	0.017

**Note:** This table presents PROCESS regression moderating effect of managerial efficiency (M\_Score) on institutional ownership and firm performance relationship analysis of the dependent variable (Tobin's Q: Q), independent variable (institutional ownership: INS, moderator variable (managerial efficiency: M\_Score) control variables (firm size: FS, LnFS – The natural logarithm of firm size; firm leverage: LEV, firm growth: GR). The sample consists of 1,391 firm-year observations from 2016 to 2021, representing 243 individual public firms in Thailand.

\*\*\*, \*\* indicate statistical significance at the 0.01, 0.05 levels, respectively

The table 4.17 shows the coefficient value is -0.004, and the  $p$ -value is 0.026 ( $p < 0.05$ ), which indicates that institutional ownership has a negative relationship with Tobin's Q. Likewise, Bushee (1998), Kirchmaier&Grant (2006), and Daryaei & Fattahi (2020) explained that institutional ownership cannot be good corporate governance mechanisms in small companies as aforementioned. However, from examining the influence from the instigator (Int\_1), it was found that managerial efficiency had a significant influence on the relationship between the institutional ownership and firm performance, the coefficient value is 0.009, and the  $p$ -value is 0.000 ( $p < 0.01$ ). The results of additional data analysis indicate that managerial efficiency acts as a regulating variable that can change the relationship and the relationship of the institutional ownership and Tobin's Q.

To examine the nature of the interactions, the effects of institutional ownership on Tobin's Q at various score of managerial efficiency were plotted. According to Figure 4.8, managerial efficiency (M\_Score) as a moderating variable must be at a high level in order to influence the relationship between institutional ownership and higher Tobin's Q.



**Figure 4.8** Moderating effect of managerial efficiency on institutional ownership and ROA relationship of small firms



#### 4.8 Summary of Research Hypotheses

The moderating effect of managerial ability on the effect of ESG performance, institutional ownership and firm performance, the hypothesis testing results can be summarized as follows.

**Table 4.18** Summary of research hypotheses

Hypotheses	Result
<b>Hypothesis 1:</b> The ESG performance will lead to increased firm performance.	Insignificance
<b>Hypothesis 2:</b> Institutional ownership will lead to increased firm performance.	Positive significance
<b>Hypothesis 3:</b> The managerial efficiency moderates the effect of ESG performance on firm performance, such that the effect is stronger in firms with high managerial efficiency than in firms with low managerial efficiency	Positive significance
<b>Hypothesis 4:</b> Managerial efficiency moderates the effect of institutional ownership on firm performance, such that the effect is stronger in firms with high managerial efficiency than in firms with low managerial efficiency	Positive significance

## **CHAPTER 5**

### **CONCLUSION AND RECOMMENDATIONS**

The final chapter of this dissertation is conclusions and recommendations, including the research methodology, and findings that should be used as a basis for making implications of this study, and highlights the contributions, and limitations. This chapter additionally includes recommendations for further study. This chapter has been organized into five sections, including section 5.1 conclusion of this study, section 5.2 discusses the research results, section 5.3 highlights contributions of this study and discusses the implications of study findings, section 5.4 the main limitations of the study, and section 5.5 provides suggestions for further research.

#### **5.1 Conclusion**

This dissertation aims to examine the effect of environmental, social, and governance (ESG) performance and institutional ownership on firm performance (ROA and tobin's  $q$ ) and to examine the moderating role of the managerial efficiency between environmental, social, and governance (ESG) performance, institutional ownership and firm performance. The study uses the non-probability sampling method, specifically the purposive sampling method, to choose a sample from the available population. The sample is chosen based on how well it meets the research needs. The sample includes 373 non-financial firms (2,104 firm-year observations) listed on the Stock Exchange of Thailand (SET), for which data are manually collected from 2016 to 2021. The data are collected from SETSMART, which provides the financial statement information as well as financial market data of Thai listed companies. The statistical method used to analyze the data was Andrew Hayes's Process regression to test the hypothesis. The alternative measurement for moderation was multiple linear regression, conducting a robustness check for moderation by re-calculating moderation through multiple regression analysis. The robustness test results show similar results of the moderation of managerial efficiency between ESG performance, institutional ownership, and firm performance.

The research question was separated into four categories, as follows:

**Research Question 1:** Does ESG performance affect the firm performance of listed companies in Thailand?

**Research Question 2:** Does institutional ownership affect the firm performance of listed companies in Thailand?

**Research Question 3:** Does managerial efficiency moderate the effect of ESG performance on firm performance and when does it moderate?

**Research Question 4:** Does managerial efficiency moderate the effect of institutional ownership on firm performance and when does it moderate?

The objectives of this study were: 1) To determine the influence of environmental, social, and governance (ESG) performance on firm performance. 2) To determine the influence of institutional ownership on firm performance. 3) To explore a potential moderation effect of managerial efficiency on the relationship between environmental, social, and governance (ESG) performance on firm performance and 4) To explore a potential moderation effect of managerial efficiency on the relationship between institutional ownership on firm performance.

According to the research questions and objectives, the hypotheses were proposed as follows:

**Hypothesis 1:** ESG performance will lead to increased firm performance.

**Hypothesis 2:** Institutional ownership will lead to increased firm performance.

**Hypothesis 3:** Managerial efficiency moderates the effect of ESG performance on firm performance, such that the effect is stronger in firms with high managerial efficiency than in firms with low managerial efficiency after controlling for firm characteristics.

**Hypothesis 4:** Managerial efficiency moderates the effect of institutional ownership on firm performance, such that the effect is stronger in firms with high managerial efficiency than in firms with low managerial efficiency after controlling for firm characteristics.

## 5.2 Research Results and Discussions

The following is a classification of the summary of research findings and discussion of the findings based on the research question:

**Research Question 1:** Does ESG performance affect the firm performance of listed companies in Thailand?

In research question 1, there is no significant relationship between ESG and financial performance (ROA) and market performance (Tobin's Q). The univariate analysis shows that firms with strong ESG performance have no link with company performance when compared to other firms. The study concludes that enhancing ESG performance does not translate to better firm performance, which aligns with the findings of previous research conducted by Utz et al. (2014) and Junius et al. (2020). It can be explained that environmental social governance performance disclosure did not in ability to achieve effective utilization of assets and investors were unconvinced that ESG performance reflects the corporate social responsibility performance of the company and that ESG performance will deliver high long-term returns.

**Research Question 2:** Does institutional ownership affect the firm performance of listed companies in Thailand?

In research question 2, the results of the study showed that institutional ownership had a positive significance with financial performance (ROA) and market performance (Tobin's Q). As hypothesized by revealing that when the company shares are held by institutional ownership, firm performance increases, as a result, a large number of shares are held by institutional investors can lead to advantages and increase firm performance (Navissi & Naiker, 2006; Nurleni et al., 2018). The higher percentage of institutional ownership can increase firm performance since they are investors with knowledge, expertise, and the ability to monitor the management at a lower cost than retail investors (Ferreira & Matos, 2008). Institutional ownership with the power to monitor the management's performance or pressure-insensitive investors can increase firm performance. On the other hand, institutional ownership with no power or pressure-sensitive investors were found to have no relationship with firm performance (Cornett et al., 2007).

**Research Question 3:** Does managerial efficiency moderate the effect of ESG performance on firm performance and when does it moderate?

In research question 3, 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 performance on firm performance. The study found that managerial efficiency positively moderates the impact of ESG performance on firm performance. The positive effect of ESG performance on firm performance is stronger when managerial efficiency increases. Specifically, the positive impact of ESG performance on firm performance increases only when the managerial efficiency is reflected in average and above-average managerial efficiency. In contrast, ESG performance does not significantly affect firm performance when managerial efficiency is below average. This study contributes to the literature by finding that ESG performance tends to increase the firm performance only when the business has managerial efficiency that is average and above-average managerial efficiency.. (Andreou et al., 2015; Shao et al., 2020; Zhang, 2023).

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; Lee et al., 2023).

In addition, the study was conducted based on firm size and the results showed that small firms found ESG performance had a negative significance with financial performance (ROA) and no significance with market performance (Tobin's Q), Based on the findings of Yoon et al., (2018) an increase in ESG performance could result in a decrease in financial performance because it increases the firm's costs, and Oware & Mallikarjunappa (2022) research supports this notion. Saygili et al., (2022) discover that social and governance performance have a positive impact on financial performance,

whereas environmental disclosure has the opposite effect. It is crucial for small firms to carefully evaluate the costs and benefits of specific ESG initiatives and develop a comprehensive strategy that aligns with business goals and capabilities.

However, the influence of managerial efficiency in small firms was found to be can change relationship of ESG performance on ROA and Tobin's Q. Specifically, the positive impact of managerial efficiency on firm performance increases only when the firm efficiency is reflected in average and above-average managerial efficiency. In contrast, managerial efficiency has no significant effect on firm performance when managerial efficiency is below average. This study offers evidence regarding the significance of managerial efficiency 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.

**Research Question 4:** Does managerial efficiency moderate the effect of institutional ownership on firm performance and when does it moderate?

In response to research question 4. This study aims to investigate the impact of institutional ownership on firm performance, as well as the potential moderating effect of managerial efficiency on this relationship. The results of the managerial efficiency influence test showed that managerial efficiency had a positive influence on firm performance (ROA) and market performance (Tobin's Q) that are affected by institutional ownership. In contrast, managerial efficiency has no significant effect on firm performance when managerial efficiency is below average. In other words, shares held by institutional investors, together with efficient management are important factors affecting firm performance (Demerjian et al., 2012; Salehi et al., 2021; Ting et al., 2021; Simamora, 2023).

The study examined insights into managerial efficiency conducted based on firm size and the results showed that large companies did not find the influence of managerial efficiency as a relationship between institutional ownership and firm performance. However, the influence of institutional ownership in small firms was found negatively significant to firm performance. The study found that managerial efficiency positively

moderates the impact of institutional ownership on firm performance in small firms. The positive effect of institutional ownership on firm performance is stronger when managerial efficiency increases. Specifically, the positive impact of institutional ownership on firm performance increases only when the managerial efficiency is reflected in average and above-average managerial efficiency. In contrast, institutional ownership has no significant effect on firm performance when managerial efficiency is below average. This study provides new evidence of managerial efficiency as an indicator of firm efficiency. Institutional ownership should be considered in conjunction with managerial efficiency in order to examine managerial efficiency and to reflect whether institutional ownership can be deemed as good firm performance.

### **5.3 Contributions of the Study**

#### **5.3.1 Academic Contributions**

The results this study contribute to academic literatures in three folds as follows.

(1) This study shows that ESG (Environmental, Social, and Governance) performance data can improve company performance. ESG activities that lead to truly efficient practices can enhance operational efficiency, reduce risks, create revenue opportunities, and lower business costs. This study reflects through managerial efficiency that if a company reports on ESG performance but does not actually improve its operations, it won't lead to better outcomes. The results of this study support the stakeholder theory, which is widely accepted as an ethical and responsible approach to conducting business, leading to sustainable success (Freeman, 1984).

Furthermore, this research also supports agency theory since the findings reveal that ESG activities that lead to efficient practices can help mitigate the conflicts of interest between shareholders or principals and managers or agents, commonly referred to as agency theory (Jensen & Meckling, 1976). In other words, they can maximize benefits for shareholders, or in the context of this research, enhance managerial efficiency (Fama & Jensen, 1983).

This study provides additional insights into ESG performance data based on the size of businesses. It highlights an intriguing observation that in small-sized companies, engaging in ESG activities can lead to a decrease in company performance. This suggests

that for small-sized companies, ESG operations may still pose a relatively high cost when compared to the benefits gained. Conversely, if small firms conduct ESG performance efficiently and achieve high management efficiency, ESG performance will lead to better firm performance as well as large firms.

(2) This study demonstrates that institutional ownership is an integral part of effective corporate governance, which supports agency theory. The results show that the proportion of institutional investor ownership has a positive impact on company performance. In other words, institutional investors can align the interests of principals (shareholders) and agents (managers) more effectively and improve operational outcomes. In accordance with corporate governance principles, institutional investors are viewed as external monitors who possess knowledge, expertise, and the ability to act as effective oversight mechanisms for efficient managerial performance. Therefore, companies with higher levels of institutional investor ownership tend to exhibit better operational results (Jensen & Meckling, 1976).

Additionally, this study delves deeper into the analysis of institutional ownership data, categorizing it based on the size of companies. The study found a notable difference between small and large companies concerning institutional ownership. Specifically, in small-sized companies, the proportion of institutional investor ownership has a negative impact on company performance. This suggests that in small-sized companies, institutional investors may not effectively serve as external monitors for corporate governance. However, if small-sized companies can attract institutional investors who can contribute to efficient operations, which in this research context refers to achieving high managerial efficiency, they can also improve their overall company performance like larger companies.

(3) The focuses of ESG-related research can be divided into the national, corporate, and individual levels. While national and corporate-level factors have been the spotlight of much research in CSR and sustainability accounting, individual-level factors have been relatively under-researched. This lack of research on individual-level determinants of ESG performance is critical since it is at the individual level where decisions regarding ESG performance are made (Kao et al., 2023). Therefore, this study seeks to address this gap in the literature by examining the role of managerial efficiency



in determining voluntary ESG performance. In addition, given that ESG information can increase its reliability and credibility, this study further considers whether managerial efficiency is associated with the relationship between ESG performance on company performance.

The contributions of this study can be summarized in several aspects. First, by focusing on managerial efficiency, this study provides a unique perspective on ESG performance that complements the existing literature. The empirical results align with the idea that managerial efficiency is a critical factor in promoting ESG performance. Second, this study provides empirical evidence that supports the notion that managerial efficiency can affect not only ESG performance but also overall company performance. This is particularly important given the increasing importance of ESG performance. Finally, the study contributes to the literature on ESG performance and disclosure by focusing on the Thai context, which has received less attention in the existing literature compared to other developed countries. This provides a unique perspective on the determinants of ESG performance disclosure and managerial efficiency in a newly emerging market.

### **5.3.2 Practical Contribution**

The findings of this study are highly relevant to shareholders, board members, managers, investors, and regulators as follows:

#### **Shareholders and the Board of Directors**

The results demonstrate that higher managerial efficiency is associated with a greater tendency toward ESG performance. Our empirical findings have several meaningful implications.

Firstly, the positive correlation between managerial efficiency and both ESG performance and overall company performance underscores the importance of companies investing in the development and training of managers with the necessary competencies and skills to effectively disclose ESG information. To enhance ESG performance, companies with low managerial efficiency are advised to implement policies aimed at improving it. Such policies may include offering training, certification programs, or organizing seminars for managers to enhance their skills, knowledge, and expertise. This approach allows companies to leverage ESG performance as a competitive advantage, strengthening their position in the market.

Secondly, shareholders can consider strategies involving the hiring of additional personnel, such as consultants or specialized executives, who possess expertise in specific fields. Companies with more efficient executives can enhance their performance by embracing innovative production methods, adopting new technologies, and exploring new markets. These measures aim to improve cost management and revenue generation efficiency within the organization.

### **The top Management Teams**

Managers should disclose key ESG issues that align with the organizational strategy and the needs of stakeholders. This should be done by presenting concise, focused content that is easy to understand. Additionally, they should avoid disclosing excessive amounts of information that do not address the information needs of users. Furthermore, managers should present quantitative data, such as the amount of resources the company has reduced or recycled and the cost savings achieved. This helps demonstrate the results of corporate sustainability efforts from the past to the present and allows for comparisons with competitors and other businesses in the industry. Moreover, it is essential to continually monitor and improve company performance after the information has been disclosed or after receiving feedback from stakeholders.

Managerial efficiency serves as a valuable tool for enhancing work efficiency and evaluating ESG performance. If the management team has lower managerial efficiency compared to the industry average, it is essential to implement follow-up measures and improve team operations. This involves fostering a deeper understanding of operations by developing the potential of personnel, welcoming new teams with expertise in digital technologies for knowledge exchange and collaborating with business experts. These actions will facilitate continuous growth and the achievement of organizational goals within the dynamic business environment. Strengthening managerial efficiency is a crucial factor that paves the way for corporate future growth and success.

### **Investors**

Firstly, when considering investments in companies with ESG performance, it is essential to factor in managerial efficiency as an additional indicator. This consideration does not result in extra costs for the company, which could otherwise reduce investors' profits. Instead, it involves utilizing various assets and costs that

contribute to creating value, generating revenue, strengthening the company's financial position, and improving overall performance.

Secondly, retail investors should use the shareholding ratio of institutional investors as an initial screening tool when evaluating companies for investment, in addition to other factors. This applies to both large and small companies. However, institutional investors should exercise caution when it comes to stock holdings, especially in small conglomerates (with a market value of less than 3,000 million baht). The findings of this study provide new evidence indicating that managerial efficiency plays a significant role in the impact of institutional ownership on company performance, particularly in smaller firms. Therefore, when making important investment decisions, it is crucial to consider the ratio of institutional ownership in conjunction with managerial efficiency.

### **The Regulators**

Regulatory bodies should encourage registered companies to provide high-quality ESG disclosure that is aligned with their response to the United Nations Sustainable Development Goals (SDGs). Additionally, in terms of quantitative data, support should be given for reporting formats that include statistical data collection to demonstrate positive impacts resulting from ESG activities. This could encompass cost reductions, reduced resource consumption, the number of beneficiaries, community financial benefits, and more. Furthermore, there should be established criteria for companies' ESG disclosure, using consistent metrics to facilitate clearer data processing and a comprehensive understanding of the quantifiable impacts. Consequently, regulators must acknowledge this fact and seek solutions to the issue. The various objections raised against sustainability reporting underscore the expected challenges in adopting a uniform global standard for ESG performance activities.

Another aspect of these findings relevant to regulators is the cost-benefit analysis of ESG performance. The results reveal a significant adverse impact on profitability in small firms, contrary to the predictions and findings of most studies. It is plausible that these enterprises, particularly small firms, are engaging in ESG performance activities at exceptionally high costs. Therefore, for the proposed standard to gain acceptance and success among firms, regulators must assess its compliance costs

and ensure they are lower than the current expenses associated with providing such information.

## **5.4 Limitation and Future Research**

This study still has some limitations that will necessitate further investigation.

### **5.4.1 Limitations**

(1) The measures of the score of ESG performance

This study measures the score of ESG performance in two sections. The first section, environmental and social performance disclosure. The environmental and social performance disclosure data is based on the criteria of the Sustainable Development Goals (SDGs) adopted by the United Nations in 2019. The checklist method includes indicators for measuring environmental and social performance. Hence, a dummy variable will be used to measure the environmental and social performance disclosure score, where a score of 1 will be assigned if the item is detected; otherwise, a score of zero will be assigned. For example, if a company reports on the management of greenhouse gasses or the use of water resources, that data is a score of 1. It evaluates data based on disclosed company performance without statistically measuring the positive impact of ESG activities with quantitative data collection, such as cost reduction ratio or reduced resource use ratio. Because, when collecting quantitative data, especially environmental data such as electricity, water, waste, and greenhouse gas emissions, registered companies disclose information in different formats and use different metrics. Each indicator is very different, making it impossible to consolidate data into a single ESG score for each company.

In addition, the processing of operational data from registered companies is very limited. This limitation stems from the fact that companies do not disclose data on every topic, but only on topics that are considered material to their business. Thus, the data only covers the topics that the company has disclosed. Furthermore, quantitative data depicting actual consequences is restricted because corporations supply information in the form of descriptions or qualitative data but not quantitative data. The reports, for example, include descriptive data on energy use, electricity consumption, water consumption, waste, and

greenhouse gas emissions. Consequently, the data does not reflect the overall picture of the actual corporate activities of registered Thai companies.

The second section is governance performance disclosure. The corporate governance performance is measured based on the results of the Thai Institute of Directors Association (IOD) Corporate Governance Report. Only companies that have been assessed and received a score of 70 or above are included in this report. Scores are reported as 3, 4, and 5 and are therefore an interval scale rather than a ratio scale. Consequently, these scores may not accurately reflect differences in corporate governance performance among companies based on their actual practices. In addition, companies that scored less than 70 are not included in this study because their data are not disclosed, and they do not provide sufficient information as per the research objectives. This is because they may not align with the data collection model.

(2) This study does not include the financial sector since it measures the value of managerial efficiency according to the methodology outlined by Demerjian et al. (2012). Managerial efficiency refers to the contributions of managers in making optimal economic decisions. The efficiency of a firm is influenced by both firm-specific and manager-specific factors. The firm's efficiency is assessed using data envelopment analysis (DEA), a statistical procedure that measures the relative efficiency of decision-making units (DMUs) in transforming specific inputs into outputs. In the study by Demerjian et al. (2012), seven inputs and one output were considered. The inputs consist of net property, plant, and equipment; net operating leases; net R&D; purchased goodwill; other intangible assets; the cost of goods sold; selling, general, and administrative expenses. The output is represented by sales. Given that a company performance is influenced by both firm-specific and manager-specific factors, Demerjian et al. (2012) identified size, market share, age, free cash flow, and business operation complexity as firm-specific factors. Therefore, this study is limited in its ability to study the financial sector due to differences in operational characteristics compared to other industries.

#### **5.4.2 Future Research**

This study still has some limitations that will necessitate further investigation.

Firstly, in-depth interviews should be conducted in the future to confirm and generalize the findings of this current study and future research should address the research gaps by focusing on measuring the value of ESG performance quantitatively, emphasizing quantitative indicators. This can involve assessing the value based on changes and progress in ESG initiatives by comparing current reporting results (t) to the previous year's results (t-1). This approach would allow for measuring the level of progress in corporate operations, providing research results that reflect the overall performance of Thai-listed companies.

Secondly, future research should extend the study should be conducted within the financial sector. The financial sector stands out in its ESG operations, as it has the potential to create positive impacts on customers and society at large through responsible finance practices. Within this sector, ESG operations are often integrated into the product development process, and there is a focus on promoting financial inclusion for all segments of society. Moreover, future studies should explore measuring managerial efficiency based on the Balanced Scorecard concept and employing Data Envelopment Analysis (DEA) to evaluate the efficiency of companies operating in this sector.

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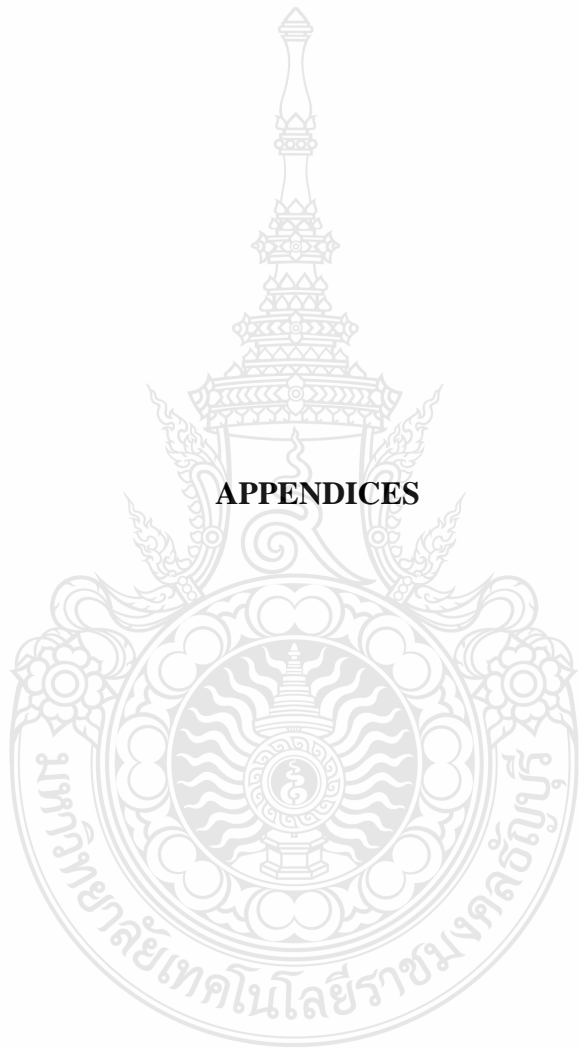
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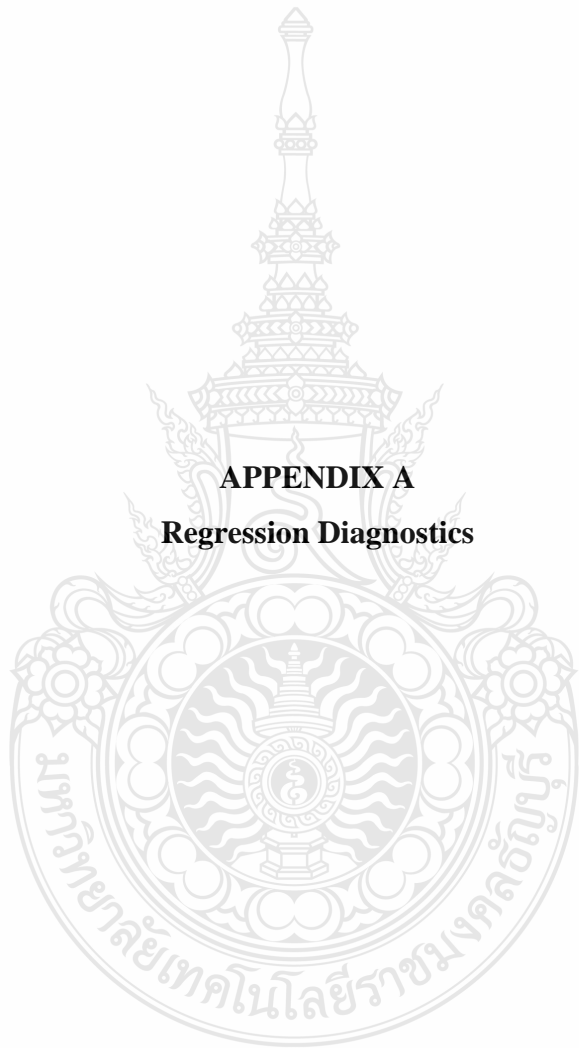
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**APPENDIX A**  
**Regression Diagnostics**



## Regression Diagnostics

For the OLS to produce coefficients that are best linear unbiased estimators, it was found that the data did not contradict the multiple regression assumptions to test hypotheses as follows: as explained in 1 to 5 as follows:

1. The means of the random errors were zero based on exogeneity of the independent variables. When the method of ordinary least square is used, this condition is always true.

1) Results from a residuals statistics examining the moderation role of the effect ESG on ROA via ME

**Table 1** The means of the random error's tests of ESG model

Dependent Variable	ROA				Q			
	Min	Max	Mean	SD	Min	Max	Mean	SD
Predicted Value	-0.093	0.233	0.049	0.046	0.342	3.101	1.423	0.445
Residual	-0.255	0.235	<b>0.000</b>	0.056	-2.095	1.795	<b>0.000</b>	0.540
Std. Predicted Value	-3.112	4.034	0.000	1.000	-2.428	3.768	0.000	1.000
Std. Residual	-4.509	4.159	0.000	0.996	-3.864	3.310	0.000	0.996

*Observation 2,104 sample*

2) Results from a residuals statistics examining the moderation role of the effect INS on ROA via ME

**Table 2** The means of the random errors tests of INS model

Dependent Variable	ROA				Q			
	Min	Max	Mean	SD	Min	Max	Mean	SD
Predicted Value	-0.092	0.239	0.049	0.045	0.390	3.138	1.423	0.443
Residual	-0.264	0.242	<b>0.000</b>	0.057	-2.132	1.770	<b>0.000</b>	0.542
Std. Predicted Value	-3.131	4.203	0.000	1.000	-2.333	3.874	0.000	1.000
Std. Residual	-4.641	4.251	0.000	0.996	-3.918	3.251	0.000	0.996

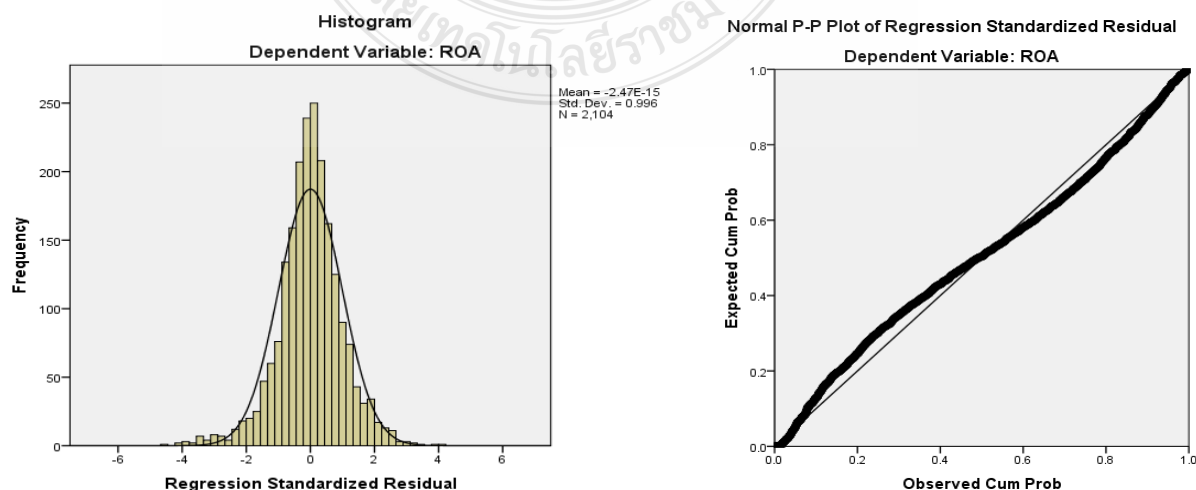
*Observation 2,104 sample*

2. The random errors were normally distributed based on the test of normality. The histogram was an inverted bell shape with a symmetrical appearance. According to Table 3, Even though the data were not normally distributed, abnormally distributed data may not have an impact on the study's credibility. Since the sample was large, it was assumed that the data were not normally distributed. Thus, the natural logarithms (SIZE) of these variables were used to solve this issue. The range of skewness was between 0.373 and 0.999, while the range of kurtosis was between -1.219 and 2.071. These values suggest that the data in the sample had a normal distribution because they fall within the suggested threshold values of  $\pm 3$  for skewness and  $\pm 10$  for kurtosis, respectively, as advised by Kline (2016).

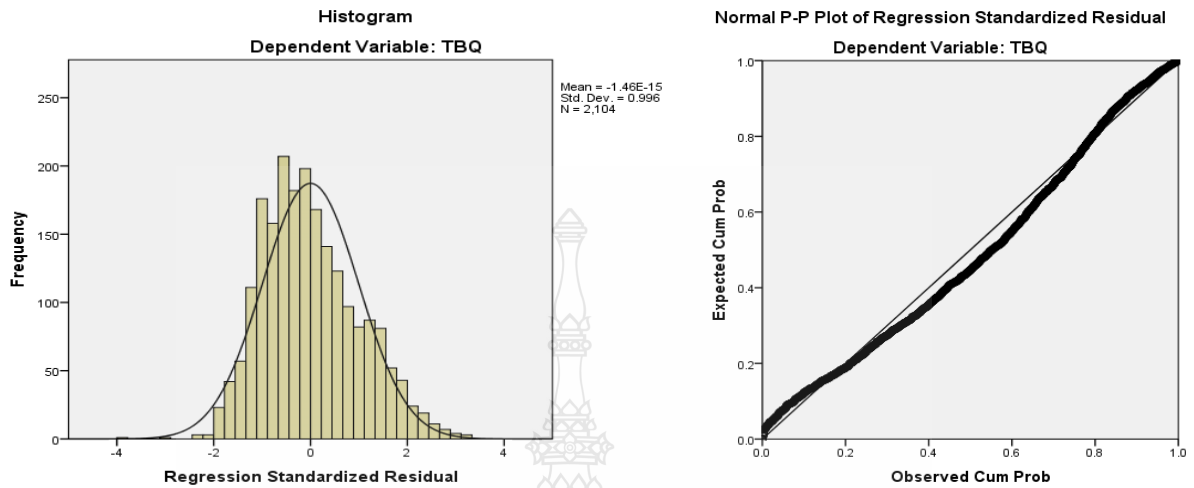
**Table 3 Normality test of sample distribution**

Variables	N	Skewness		Kurtosis	
	statistic	statistic	Std. error	statistic	Std. error
Dependent: ROA	2,104	.373	.053	2.071	.107
Q	2,104	.998	.053	-.185	.107
Independent: ESG	2,104	0.678	.053	-1.219	.107
INS	2,104	.999	.053	-.050	.107
Moderator: M_Score	2,104	.867	.053	1.167	.107
Control: FS*	2,104	11.89	.053	178.59	.107
LogFS	2,104	.670	.053	.063	.107
LEV	2,104	.442	.053	-1.037	.107
GR	2,104	.519	.053	.208	.107

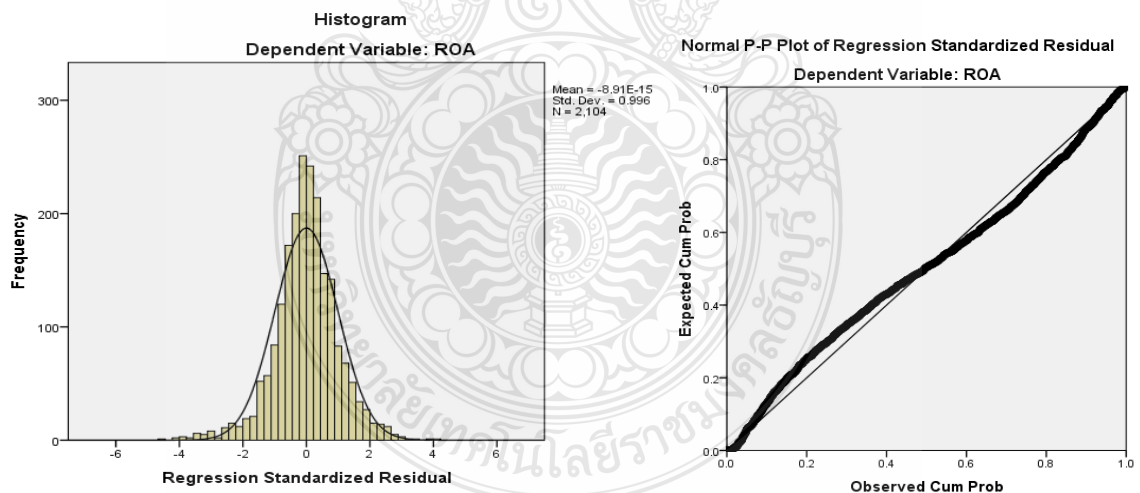
**Model 1** Results from a regression analysis examining the moderation role of the effect ESG on ROA via M\_Score



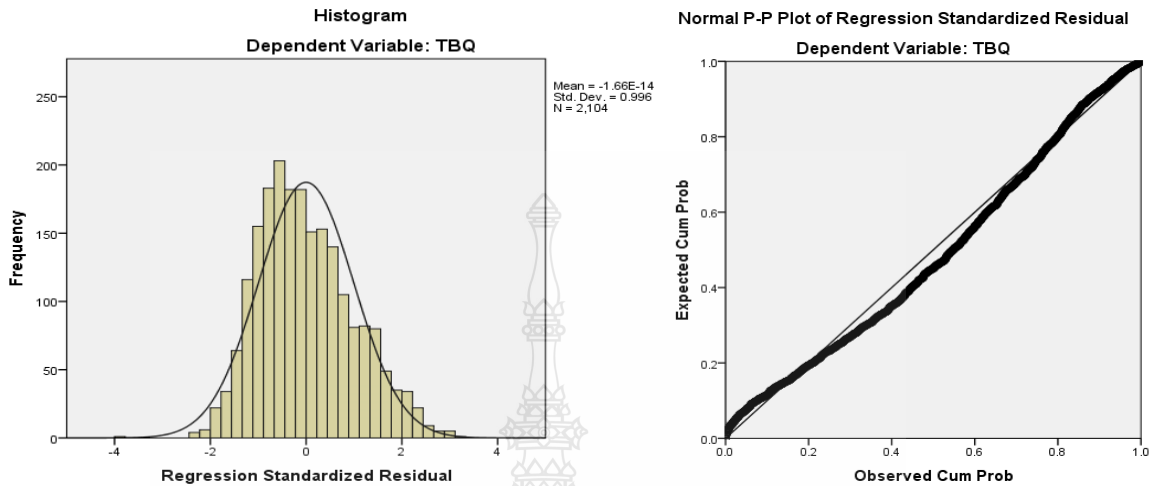
**Model 2** Results from a regression analysis examining the moderation role of the effect ESG on Q via M\_Score



**Model 3** Results from a regression analysis examining the moderation role of the effect INS on ROA via M\_Score



**Model 4** Results from a regression analysis examining the moderation role of the effect INS on Q via M\_Score



3. The random errors had constant variance (homoscedasticity)

Breusch and Pagan (1979) are used to test for the presence of heteroscedasticity, and a p-value higher than 0.05 indicates no heteroscedasticity in the residuals. Results from the heteroscedasticity test show that the p-value is higher than 0.05; hence, the no presence of heteroscedasticity under both ROA and Q.

**Table 4** Heteroscedasticity tests

	<i>ESG model</i>		<i>INS Model</i>	
	ROA	Q	ROA	Q
<i>p- value</i>	.089	.068	.244	.145

4. The random errors were independently distributed.

The dataset's autocorrelation is determined using the Durbin–Watson testing on a scale of 1.5–2.5 for the indices and time series to determine if any form of autocorrelation exists.

**Table 5** The auto-correlation test

Variables	ESG model		INS model	
	Autocorrelation test Durbin–Watson (DW)		Autocorrelation test Durbin–Watson (DW)	
ROA	1.995		1.989	
Q	1.917		1.873	

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 5

#### 5. Independent variables must not be correlated (multicollinearity).

In order to assess the importance of the regression analysis in this study, a statistical technique used to investigate the assumptions and relationships between the variables in a multiple regression analysis had to be applied after the model was estimated. This is achieved by adopting diagnostic tests that take into account the correlation among variables, such as multicollinearity, which includes VIF and tolerance.

**Table 6** The multicollinearity test

Variables	ESG model		INS model	
	Correlations		Correlations	
	Tolerance	VIF	Tolerance	VIF
ESG	0.724	1.381		
INS			0.953	1.049
ME	0.857	1.166	0.876	1.141
<i>ESG × M_Score</i>	0.939	1.065		
<i>INS × M_Score</i>			0.980	1.020
LN_FS	0.564	1.774	0.728	1.374
LEV	0.758	1.320	0.761	1.314
GR	0.901	1.110	0.900	1.111

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 6 provides information on the collinearity statistics, tolerance, and variance inflation factor (VIF), and it indicates 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.





**APPENDIX B**  
**Results of PROCESS Regression Assumptions Testing**

### **Results of PROCESS Regression Assumptions Testing**

The data set was checked whether it was in line with the assumptions of linear regression. Certain variables were found to be irregularly distributed. After applying natural log to solve the problem, no serious concerns were found. The summary of the four assumptions on moderating model.





## Output of PROCESS regression analysis

**Model 1** Results from a regression analysis examining the moderation role of the effect ESG on ROA via M\_Score

```

Run MATRIX procedure:
***** PROCESS Procedure for SPSS Version 4.1 *****
          Written by Andrew F. Hayes, Ph.D.          www.afhayes.com
          Documentation available in Hayes (2022). www.guilford.com/p/hayes3
*****
Model   : 1
  Y     : ROA
  X     : ESG
  W     : ME
Covariates:
  LogFS   LEV   GR   AGRO   CONSUMP   INDUS   PROPCON
RESOURC  SERVICE Y2021   Y2020   Y2019   Y2018   Y2017
Sample
Size:    2104
*****
OUTCOME VARIABLE:
  ROA
Model Summary
          R           R-sq      MSE      F      df1      df2      p
          0.6294      0.3961  0.0032  80.4957    17     2086  0.0000
Model
          coeff      se      t      p      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
LogFS     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
AGRO     -0.005    0.006  -0.944  0.345  -0.016  0.006
CONSUMP  -0.015    0.007  -2.313  0.021  -0.028 -0.002
INDUS    -0.005    0.005  -0.977  0.329  -0.015  0.005
PROPCON  -0.016    0.005  -3.190  0.001  -0.026 -0.006
RESOURC  -0.001    0.006  -0.122  0.903  -0.012  0.011
SERVICE  0.000    0.005  -0.058  0.954  -0.010  0.010
Y2021    -0.007    0.004  -1.611  0.107  -0.016  0.002
Y2020    -0.013    0.005  -2.806  0.005  -0.021 -0.004
Y2019    -0.008    0.004  -1.775  0.076  -0.017  0.001
Y2018    -0.009    0.004  -2.117  0.034  -0.018 -0.001
Y2017    -0.005    0.005  -1.001  0.317  -0.013  0.004

```

Product terms key:

Int\_1 : ESG x ME

Test(s) of highest order unconditional interaction(s):

R2-chng	df1	df2	p
X*W	.0031	1	2086 0.0011

-----

Focal predict: (X)

Mod var: ME (W)

Conditional effects of the focal predictor at values of the moderator(s):

ME	Effect	se	p	LLCI	ULCI
0.3882	0.0123	.0076	0.1039	-0.0025	0.0272
0.7432	0.0271	.0056	0.0000	0.0160	0.0382
1.0983	0.0419	.0069	0.0000	0.0284	0.0554

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
0.4319	17.3479	82.6521

Conditional effect of focal predictor at values of the moderator:

ME	Effect	se	t	p	LLCI	ULCI
0.0020	-0.0038	0.0115	-0.3281	0.7428	-0.0263	0.0188
0.0919	0.0000	0.0105	-0.0023	0.9982	-0.0206	0.0206
0.1817	0.0037	0.0095	0.3896	0.6969	-0.0150	0.0224
0.2716	0.0075	0.0086	0.8633	0.3881	-0.0095	0.0244
0.3614	0.0112	0.0078	1.4353	0.1513	-0.0041	0.0265
0.4319	0.0141	0.0072	1.9611	0.0500	0.0000	0.0283
0.4513	0.0150	0.0071	2.1179	0.0343	0.0011	0.0288
0.5411	0.0187	0.0064	2.9076	0.0037	0.0061	0.0313
0.6310	0.0224	0.0060	3.7669	0.0002	0.0108	0.0341
0.7208	0.0262	0.0057	4.6095	0.0000	0.0150	0.0373
0.8107	0.0299	0.0056	5.3168	0.0000	0.0189	0.0410
0.9005	0.0337	0.0058	5.7969	0.0000	0.0223	0.0451
0.9904	0.0374	0.0062	6.0354	0.0000	0.0253	0.0496
1.0802	0.0412	0.0068	6.0844	0.0000	0.0279	0.0544
1.1701	0.0449	0.0075	6.0150	0.0000	0.0303	0.0595
1.2599	0.0486	0.0083	5.8849	0.0000	0.0324	0.0649
1.3498	0.0524	0.0091	5.7308	0.0000	0.0345	0.0703
1.4396	0.0561	0.0101	5.5731	0.0000	0.0364	0.0759
1.5295	0.0599	0.0110	5.4218	0.0000	0.0382	0.0815
1.6193	0.0636	0.0120	5.2813	0.0000	0.0400	0.0872
1.7092	0.0674	0.0131	5.1529	0.0000	0.0417	0.0930
1.7990	0.0711	0.0141	5.0365	0.0000	0.0434	0.0988

Data for visualizing the conditional effect of the focal predictor:  
 Paste text below into a SPSS syntax window and execute to produce plot.

```

DATA LIST FREE/
      ESG      ME      ROA      .
BEGIN DATA.
      0.3349   0.3882   0.0155
      0.5915   0.3882   0.0187
      0.8481   0.3882   0.0219
      0.3349   0.7432   0.0421
      0.5915   0.7432   0.0491
      0.8481   0.7432   0.0561
      0.3349   1.0983   0.0688
      0.5915   1.0983   0.0795
      0.8481   1.0983   0.0903
END DATA.
GRAPH/SCATTERPLOT=
  ESG      WITH      ROA      BY      ME.
***** ANALYSIS NOTES AND ERRORS *****
Level of confidence for all confidence intervals in output:
  95.0000
W values in conditional tables are the mean and +/- SD from the mean.
----- END MATRIX -----

```



**Model 2** Results from a regression analysis examining the moderation role of the effect ESG on Q via M\_Score

```

Run MATRIX procedure:
***** PROCESS Procedure for SPSS Version 4.1 *****
          Written by Andrew F. Hayes, Ph.D.          www.afhayes.com
          Documentation available in Hayes (2022). www.guilford.com/p/hayes3
*****
Model   : 1
  Y     : Q
  X     : ESG
  W     : ME
Covariates:
  LogFS   LEV   GR   AGRO   CONSUMP  INDUS   PROPCON  RESOURC
SERVICE Y2021 Y2020 Y2019 Y2018   Y2017
Sample
Size: 2104
*****
OUTCOME VARIABLE:
  Q
Model Summary
      R      R-sq      MSE      F      df1      df2      p
      0.6362   0.4048   0.2940   83.4474      17      2086   0.0000
Model
      coeff      se      t      p      LLCI      ULCI
constant  1.3008   0.1617   8.0445   0.0000   0.9837   1.6179
ESG        0.1374   0.1104   1.2454   0.2131  -0.0790   0.3538
ME         0.6445   0.0844   7.6376   0.0000   0.4790   0.8100
Int_1     0.2780   0.1226   2.2680   0.0234   0.0376   0.5184
LogFS     -0.0171   0.0102  -1.6768   0.0937  -0.0372   0.0029
LEV       -0.0547   0.0227  -2.4120   0.0160  -0.0991  -0.0102
GR         0.1749   0.0573   3.0497   0.0023   0.0624   0.2873
AGRO      0.1812   0.0527   3.4393   0.0006   0.0779   0.2845
CONSUMP   -0.5310   0.0620  -8.5609   0.0000  -0.6527  -0.4094
INDUS     -0.4294   0.0500  -8.5943   0.0000  -0.5274  -0.3314
PROPCON   -0.4284   0.0479  -8.9413   0.0000  -0.5224  -0.3345
RESOURC   -0.1847   0.0550  -3.3600   0.0008  -0.2924  -0.0769
SERVICE   0.1539   0.0478   3.2201   0.0013   0.0602   0.2476
Y2021     -0.0653   0.0424  -1.5398   0.1238  -0.1485   0.0179
Y2020     -0.1515   0.0430  -3.5277   0.0004  -0.2358  -0.0673
Y2019     -0.1624   0.0424  -3.8285   0.0001  -0.2456  -0.0792
Y2018     -0.1260   0.0425  -2.9691   0.0030  -0.2093  -0.0428
Y2017      0.0541   0.0433   1.2508   0.2111  -0.0307   0.1390

```

Product terms key:						
Int_1	:	ESG	x	ME		
Test(s) of highest order unconditional interaction(s):						
	R2-chng	F	df1	df2	p	
X*W	0.0015	5.1438	1	2086	0.0234	
-----						
Focal predict:		ESG	(X)			
Mod var:		ME	(W)			
Conditional effects of the focal predictor at values of the						
ME	Effect	se	t	p	LLCI	ULCI
0.3882	0.2453	0.0726	3.3770	0.0007	0.1029	0.3878
0.7432	0.3440	0.0541	6.3539	0.0000	0.2379	0.4502
1.0983	0.4428	0.0661	6.6944	0.0000	0.3131	0.5725
Moderator value(s) defining Johnson-Neyman significance region(s):						
Value	% below	% above				
0.164	3.0894	96.9106				
Conditional effect of focal predictor at values of the moderator:						
ME	Effect	se	t	p	LLCI	ULCI
0.0020	0.1380	0.1101	1.2528	0.2104	-0.0780	0.3540
0.0919	0.1630	0.1007	1.6187	0.1057	-0.0345	0.3604
0.1640	0.1830	0.0933	1.9611	0.0500	0.0000	0.3660
0.1817	0.1879	0.0916	2.0526	0.0402	0.0084	0.3675
0.2716	0.2129	0.0829	2.5680	0.0103	0.0503	0.3755
0.3614	0.2379	0.0749	3.1767	0.0015	0.0910	0.3848
0.4513	0.2629	0.0677	3.8826	0.0001	0.1301	0.3957
0.5411	0.2879	0.0617	4.6679	0.0000	0.1669	0.4088
0.6310	0.3128	0.0571	5.4756	0.0000	0.2008	0.4249
0.7208	0.3378	0.0545	6.2008	0.0000	0.2310	0.4447
0.8107	0.3628	0.0540	6.7202	0.0000	0.2569	0.4687
0.9005	0.3878	0.0557	6.9607	0.0000	0.2785	0.4970
0.9904	0.4128	0.0595	6.9421	0.0000	0.2962	0.5294
1.0802	0.4377	0.0649	6.7468	0.0000	0.3105	0.5650
1.1701	0.4627	0.0716	6.4627	0.0000	0.3223	0.6031
1.2599	0.4877	0.0793	6.1513	0.0000	0.3322	0.6432
1.3498	0.5127	0.0877	5.8471	0.0000	0.3407	0.6846
1.4396	0.5377	0.0966	5.5655	0.0000	0.3482	0.7271
1.5295	0.5626	0.1059	5.3117	0.0000	0.3549	0.7704
1.6193	0.5876	0.1155	5.0857	0.0000	0.3610	0.8142
1.7092	0.6126	0.1254	4.8856	0.0000	0.3667	0.8585
1.7990	0.6376	0.1354	4.7083	0.0000	0.3720	0.9031

```

Data for visualizing the conditional effect of the focal predictor:
Paste text below into a SPSS syntax window and execute to produce plot.
DATA LIST FREE/
ESG          ME          Q          .
BEGIN DATA.
    0.3349    0.3882    1.071
    0.5915    0.3882    1.134
    0.8481    0.3882    1.1969
    0.3349    0.7432    1.3329
    0.5915    0.7432    1.4212
    0.8481    0.7432    1.5095
    0.3349    1.0983    1.5948
    0.5915    1.0983    1.7084
    0.8481    1.0983    1.822
END DATA.
GRAPH/SCATTERPLOT=
  ESG      WITH  Q      BY  ME      .
***** ANALYSIS NOTES AND ERRORS *****
Level of confidence for all confidence intervals in output:
  95.0000
W values in conditional tables are the mean and +/- SD from the mean.
----- END MATRIX -----

```



**Model 3** Results from a regression analysis examining the moderation role of the effect  
INS on ROA via M\_Score

```

Run MATRIX procedure:
***** PROCESS Procedure for SPSS Version 4.1 *****
          Written by Andrew F. Hayes, Ph.D.          www.afhayes.com
          Documentation available in Hayes (2022).
*****
Model   : 1
  Y     : ROA
  X     : INS
  W     : ME
Covariates:
  LogFS   LEV   GR   AGRO   CONSUMP   INDUS   PROPCON
RESOURC  SERVICE  Y2021  Y2020  Y2019  Y2018  Y2017
Sample
Size: 2104
*****
OUTCOME VARIABLE:
  ROA
Model Summary
      R      R-sq      MSE      F      df1      df2      p
      0.6243  0.3898  0.0032  78.3893  17      2086  0.0000

Model
      coeff      se      t      p      LLCI      ULCI
constant -0.0328  0.0152  -2.1578  0.0311  -0.0627  -0.0030
INS       0.0001  0.0001   2.2221  0.0264  0.0000  0.0003
ME        0.0883  0.0037  23.6988  0.0000  0.0810  0.0957
Int_1     0.0006  0.0002   3.2484  0.0012  0.0002  0.0010
LogFS     0.0079  0.0009   8.3749  0.0000  0.0060  0.0097
LEV      -0.0395  0.0024 -16.6542  0.0000 -0.0441 -0.0348
GR        0.0738  0.0060  12.2833  0.0000  0.0620  0.0856
AGRO     -0.0035  0.0055  -0.6330  0.5268 -0.0143  0.0073
CONSUMP  -0.0119  0.0065  -1.8447  0.0652 -0.0246  0.0008
INDUS    -0.0040  0.0052  -0.7631  0.4455 -0.0143  0.0063
PROPCON  -0.0169  0.0050  -3.3700  0.0008 -0.0267 -0.0071
RESOURC  -0.0005  0.0058  -0.0871  0.9306 -0.0118  0.0108
SERVICE -0.0003  0.0050  -0.0614  0.9510 -0.0101  0.0095
Y2021   -0.0060  0.0044  -1.3439  0.1791 -0.0147  0.0027
Y2020   -0.0118  0.0045  -2.6136  0.0090 -0.0206 -0.0029
Y2019   -0.0074  0.0044  -1.6566  0.0977 -0.0161  0.0014
Y2018   -0.0091  0.0044  -2.0351  0.0420 -0.0178 -0.0003
Y2017   -0.0029  0.0045  -0.6431  0.5202 -0.0118  0.0060

```

Product terms key:						
Int_1	:	INS	x	ME		
Test(s) of highest order unconditional interaction(s):						
		R2-chng	F	df1	df2	p
X*W		0.0031	10.5522		1 2086	0.0012
Focal predict:		INS	(X)			
Mod var:		ME	(W)			
Conditional effects of the focal predictor at values of the						
	ME	Effect	se	t	p	LLCI ULCI
	0.3882	-0.0001	0.0001	-0.8511	0.3948	-0.0003 0.0001
	0.7432	0.0001	0.0001	2.2221	0.0264	0.0000 0.0003
	1.0983	0.0004	0.0001	3.8259	0.0001	0.0002 0.0005
Moderator value(s) defining Johnson-Neyman significance region(s):						
Value	% below	% above				
0.0612	0.5228	99.4772				
0.7164	50.3327	49.6673				
Conditional effects of the focal predictor at values of the moderator(s):						
	ME	Effect	se	t	p	LLCI ULCI
	0.0020	-0.0003	0.0002	-2.0700	0.0386	-0.0006 0.0000
	0.0612	-0.0003	0.0001	-1.9611	0.0500	-0.0006 0.0000
	0.0966	-0.0003	0.0001	-1.8870	0.0593	-0.0005 0.0000
	0.1912	-0.0002	0.0001	-1.6478	0.0995	-0.0004 0.0000
	0.2857	-0.0001	0.0001	-1.3283	0.1842	-0.0003 0.0001
	0.3803	-0.0001	0.0001	-0.8937	0.3716	-0.0003 0.0001
	0.4749	0.0000	0.0001	-0.3006	0.7638	-0.0002 0.0001
	0.5695	0.0000	0.0001	0.4841	0.6284	-0.0001 0.0002
	0.6641	0.0001	0.0001	1.4262	0.1539	0.0000 0.0002
	0.7164	0.0001	0.0001	1.9611	0.0500	0.0000 0.0002
	0.7586	0.0002	0.0001	2.3656	0.0181	0.0000 0.0003
	0.8532	0.0002	0.0001	3.0947	0.0020	0.0001 0.0003
	0.9478	0.0003	0.0001	3.5383	0.0004	0.0001 0.0004
	1.0424	0.0003	0.0001	3.7606	0.0002	0.0002 0.0005
	1.1370	0.0004	0.0001	3.8525	0.0001	0.0002 0.0006
	1.2315	0.0004	0.0001	3.8772	0.0001	0.0002 0.0007
	1.3261	0.0005	0.0001	3.8696	0.0001	0.0002 0.0008
	1.4207	0.0006	0.0001	3.8474	0.0001	0.0003 0.0008
	1.5153	0.0006	0.0002	3.8194	0.0001	0.0003 0.0009
	1.6099	0.0007	0.0002	3.7899	0.0002	0.0003 0.0010
	1.7044	0.0007	0.0002	3.7610	0.0002	0.0004 0.0011
	1.7990	0.0008	0.0002	3.7335	0.0002	0.0004 0.0012



Data for visualizing the conditional effect of the focal predictor:  
Paste text below into a SPSS syntax window and execute to produce  
plot.

DATA LIST FREE/

INS	ME	ROA.
-19.9482	-0.3551	0.0193
0.0000	-0.3551	0.0177
19.9482	-0.3551	0.0162
-19.9482	0.0000	0.0463
0.0000	0.0000	0.0491
19.9482	0.0000	0.0519
-19.9482	0.3551	0.0733
0.0000	0.3551	0.0804
19.9482	0.3551	0.0876

END DATA.

GRAPH/SCATTERPLOT=

INS WITH ROA BY ME.

\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*

Level of confidence for all confidence intervals  
in output:

95.0000

W values in conditional tables are the mean and +/- SD from the  
mean.

NOTE: The following variables were mean centered prior to analysis:

ME INS  
----- END MATRIX -----

**Model 4** Results from a regression analysis examining the moderation role of the effect INS on Q via M\_Score

```

Run MATRIX procedure:
*****PROCESS Procedure for SPSS Version 4.1 *****
          Written by Andrew F. Hayes, Ph.D.          www.afhayes.com
          Documentation available in Hayes (2022).
          www.guilford.com/p/hayes3
*****
Model   : 1
  Y     : Q
  X     : INS
  W     : ME
Covariates:
  LogFS   LEV   GR   AGRO   CONSUMP   INDUS   PROPCON
RESOURC  SERVICE  Y2021   Y2020   Y2019   Y2018   Y2017
Sample
Size: 2104
*****
OUTCOME VARIABLE:
Q
  Model Summary
      R          R-sq      MSE          F          df1          df2          p
      0.6325      0.4001      0.2963      81.8217      17          2086      0.0000

Model
      coeff      se          t          p          LLCI          ULCI
constant  1.5487    0.1458    10.6208    0.0000    1.2628    1.8347
INS        0.0024    0.0006     3.9128    0.0001    0.0012    0.0036
ME         0.8323    0.0357    23.3075    0.0000    0.7623    0.9023
Int_1      0.0076    0.0018     4.1977    0.0000    0.0041    0.0112
LogFS      0.0099    0.0090     1.0933    0.2744   -0.0078    0.0276
LEV       -0.0644    0.0227    -2.8355    0.0046   -0.1089   -0.0199
GR         0.1700    0.0576     2.9528    0.0032    0.0571    0.2830
AGRO       0.1957    0.0528     3.7059    0.0002    0.0921    0.2992
CONSUMP   -0.4922    0.0619    -7.9477    0.0000   -0.6136   -0.3707
INDUS     -0.4167    0.0501    -8.3137    0.0000   -0.5150   -0.3184
PROPCON   -0.4400    0.0480    -9.1617    0.0000   -0.5342   -0.3458
RESOURC   -0.1760    0.0553    -3.1809    0.0015   -0.2846   -0.0675
SERVICE   0.1566    0.0480     3.2583    0.0011    0.0623    0.2508
Y2021     -0.0611    0.0426    -1.4342    0.1517   -0.1446    0.0224
Y2020     -0.1436    0.0431    -3.3335    0.0009   -0.2281   -0.0591
Y2019     -0.1615    0.0426    -3.7895    0.0002   -0.2451   -0.0779
Y2018     -0.1255    0.0426    -2.9443    0.0033   -0.2090   -0.0419
Y2017      0.0702    0.0434     1.6188    0.1056   -0.0148    0.1553

```

Product terms key:						
Int_1	:	INS	x	ME		
Test(s) of highest order unconditional interaction(s):						
	R2-chng	F	df1	df2	p	
X*W	0.0031	10.5522	1	2086	0.0012	
Focal predict: INS (X)						
Mod var: ME (W)						
Conditional effects of the focal predictor at values of the						
ME	Effect	se	t	p	LLCI	ULCI
0.3882	-0.0001	0.0001	-0.8511	0.3948	-0.0003	0.0001
0.7432	0.0001	0.0001	2.2221	0.0264	0.0000	0.0003
1.0983	0.0004	0.0001	3.8259	0.0001	0.0002	0.0005
Moderator value(s) defining Johnson-Neyman significance region(s):						
Value	% below	% above				
0.0612	0.5228	99.4772				
0.7164	50.3327	49.6673				
Conditional effect of focal predictor at values of the moderator:						
ME	Effect	se	t	p	LLCI	ULCI
0.0020	-0.0003	0.0002	-2.0700	0.0386	-0.0006	0.0000
0.0612	-0.0003	0.0001	-1.9611	0.0500	-0.0006	0.0000
0.0966	-0.0003	0.0001	-1.8870	0.0593	-0.0005	0.0000
0.1912	-0.0002	0.0001	-1.6478	0.0995	-0.0004	0.0000
0.2857	-0.0001	0.0001	-1.3283	0.1842	-0.0003	0.0001
0.3803	-0.0001	0.0001	-0.8937	0.3716	-0.0003	0.0001
0.4749	0.0000	0.0001	-0.3006	0.7638	-0.0002	0.0001
0.5695	0.0000	0.0001	0.4841	0.6284	-0.0001	0.0002
0.6641	0.0001	0.0001	1.4262	0.1539	0.0000	0.0002
0.7164	0.0001	0.0001	1.9611	0.0500	0.0000	0.0002
0.7586	0.0002	0.0001	2.3656	0.0181	0.0000	0.0003
0.8532	0.0002	0.0001	3.0947	0.0020	0.0001	0.0003
0.9478	0.0003	0.0001	3.5383	0.0004	0.0001	0.0004
1.0424	0.0003	0.0001	3.7606	0.0002	0.0002	0.0005
1.1370	0.0004	0.0001	3.8525	0.0001	0.0002	0.0006
1.2315	0.0004	0.0001	3.8772	0.0001	0.0002	0.0007
1.3261	0.0005	0.0001	3.8696	0.0001	0.0002	0.0008
1.4207	0.0006	0.0001	3.8474	0.0001	0.0003	0.0008
1.5153	0.0006	0.0002	3.8194	0.0001	0.0003	0.0009
1.6099	0.0007	0.0002	3.7899	0.0002	0.0003	0.0010
1.7044	0.0007	0.0002	3.7610	0.0002	0.0004	0.0011
1.7990	0.0008	0.0002	3.7335	0.0002	0.0004	0.0012

Data for visualizing the conditional effect of the focal predictor:  
Paste text below into a SPSS syntax window and execute to produce  
plot.

DATA LIST FREE/

	INS	ME	Q.
BEGIN DATA.			
	-19.9482	-0.3551	1.1303
	0.0000	-0.3551	1.1238
	19.9482	-0.3551	1.1173
	-19.9482	0.0000	1.3718
	0.0000	0.0000	1.4193
	19.9482	0.0000	1.4669
	-19.9482	0.3551	1.6132
	0.0000	0.3551	1.7149
	19.9482	0.3551	1.8165

END DATA.

GRAPH/SCATTERPLOT=

INS WITH Q BY ME.

\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*

Level of confidence for all confidence intervals in output:

95.0000

W values in conditional tables are the mean and +/- SD from the mean.

NOTE: The following variables were mean centered prior to analysis:

ME INS  
----- END MATRIX -----

## Biography

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