

**T.C.
SAKARYA UNIVERSITY
INSITUTION OF SOCIAL SCIENCES
DEPARTMENT OF ISLAMIC ECONOMICS AND FINANCE**

**IMPACT OF ECO-EFFICIENCY ON FIRM VALUE: EVIDENCE
FROM MANUFACTURING COMPANIES LISTED IN INDONESIA
SHARIA STOCK INDEX**

Nun Maziyyah MAHSYAR

MASTER DEGREE THESIS

Thesis Supervisor: Assoc. Prof. Hakan ASLAN

JUNE - 2024

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“This thesis was defended hybrid on 10/06/2024 and was unanimously accepted by the jury members whose names are listed below.”

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THE PREFACE

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10/06/2024

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ABBREVIATIONS

CFCs	: Chlorofluorocarbons
CH₄	: Methane Gas
CO₂	: Carbon Dioxide
DES	: Sharia Securities List
DSN-MUI	: The National Islamic Board of the Indonesian Ulama Council
EMS	: Environment Management System
ESG	: Environmental, Social, Governance
GDP	: Gross Domestic Product
GHG	: Greenhouse Gas
IDX	: Indonesia Stock Exchange
IMF	: International Monetary Fund
IPCC	: Intergovernmental Panel on Climate Change
ISSI	: Indonesia Sharia Stock Index
MAT	: Mean Annual Temperature
MOI	: Ministry of Industry (Indonesia)
MRA	: Moderated Regression Analysis
NO₂	: Nitrogen Monoxide
OECD	: Organisation for Economic Co-operation and Development
OJK	: Indonesia Financial Services Authority
PERMENPERIN	: Minister of Industry Regulation
RCP	: Representative Concentration Pathway
SIH	: Green Industry Standards
SO₂	: Sulfur Dioxide
UN	: United Nations
UNFCCC	: United Nations Framework Convention on Climate Change
WB	: World Bank
WBCSD	: World Business Council for Sustainable Development

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ABSTRACT	
Title of Thesis: Impact of Eco-Efficiency on Firm Value: Evindece from Manufacturing Companies Listed in Indonesia Sharia Stock Index	
Author of Thesis: Nun Maziyyah MAHSYAR	
Supervisor: Assoc. Prof. Hakan ASLAN	
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The activity of manufacturing sector has been contributing to the climate change issues. The stakeholders must actively participate in addressing the issues as it is their responsibility as human beings. This research thesis will investigate the influence of eco-efficiency on firm value. The study will aim to observe the direct effect of implementing the eco-efficiency against the firm value of the manufacturing companies listed in Indonesia sharia stock index from 2013 to 2022. The study will utilise moderated regression analysis, with leverage and profitability as the moderating variables, age as the novel aspect of this research. The results indicate that there is a negative impact of eco-efficiency on firm value. Additionally, the leverage can enhance the relationship between eco-efficiency and firm value, while profitability can weaken this relationship. The implication of this study suggests that the company's stakeholders should reassess the implementation strategy of eco-efficiency in order to enhance its effectiveness of efficiency. This is particularly important considering the presence of an evaluation process in the implementation of ISO 14001. Furthermore, it is imperative for the government to strictly enforce sustainable business policies, particularly for the most environmentally polluting company in Indonesia.	
Keywords: Eco-Efficiency, Firm Value, Listed Manufacturer, Sharia Index	

ÖZET	
Başlık: Eko-Etkinliğin Firma Değeri Üzerindeki Etkisi: Endonezya Şeriat Borsa Endeksinde İşlem Gören İmalat Şirketlerinden Kanitlar	
Yazar: Nun Maziyyah MAHSYAR	
Danışman: Doç. Dr. Hakan ASLAN	
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İmalat sektörünün faaliyetleri iklim değişikliği sorunlarına katkıda bulunmaktadır. Paydaşlar, insan olarak sorumlulukları olduğu için sorunların ele alınmasına aktif olarak katılmalıdır. Bu araştırma tezi, eko-verimliliğin firma değeri üzerindeki etkisini araştıracaktır. Çalışma, eko-verimlilik uygulamasının 2013'ten 2022'ye kadar Endonezya şeriat hisse senedi endeksinde listelenen imalat şirketlerinin firma değerine doğrudan etkisini gözlemlemeyi amaçlayacaktır. Çalışmada ılımlı regresyon analizi kullanılacak, ılımlı değişkenler olarak kaldıraç, karlılık ve bu araştırmanın yeni yönü olarak yaş kullanılacaktır. Sonuçlar, eko-verimliliğin firma değeri üzerinde negatif bir etkisi olduğunu göstermektedir. Ayrıca, kaldıraç eko-verimlilik, firma değeri arasındaki ilişkiyi güçlendirebilirken, karlılık bu ilişkiyi zayıflatabilir. Bu çalışmanın sonucu, şirket paydaşlarının eko-verimliliğin etkinliğini ve verimliliğini artırmak için eko-verimlilik uygulama stratejisini yeniden değerlendirmeleri gerektiğini göstermektedir. Bu, ISO 14001'in uygulanmasında bir değerlendirme sürecinin varlığı göz önüne alındığında özellikle önemlidir. Ayrıca, hükümetin özellikle Endonezya'da çevreyi en çok kirleten şirket için sürdürülebilir iş politikalarını sıkı bir şekilde uygulaması zorunludur.	
Anahtar Kelimeler: Eko-Verimlilik, Firma Değeri, Borsada İşlem Gören İmalat, Şeriat Endeksi	

INTRODUCTION

The climate change issue has become a consideration for all nations, including Indonesia. The stakeholders have issued many policies to tackle this issue because climate change can bring disadvantages for all living creatures. Many nations and institutions are willing to tackle the challenges of climate change including the World Bank (WB), the International Monetary Fund (IMF), and the United Nations (UN). Many empirical studies that support the mitigation of climate change such as (Black et al., 2023; Chateau et al., 2023; Havlík et al., 2015; Jaumotte et al., 2021; Ouraich & Tyner, 2014; Park et al., 2015), that become the working paper fully supported by IMF, UN, and WB. These mention that greenhouse gas (GHG) emissions globally must be cut from 25% to 50% by 2030 to mitigate climate change. According to the Intergovernmental Panel on Climate Change (IPCC) Report 2022, the earth's average temperature has climbed over 1.5° Celsius due to GHG emissions. The nations, including Indonesia, had decided to join the Paris Agreement to cut GHG worldwide emissions to accomplish the goal of reduction. The government of Indonesia set the greenhouse gas emissions target to 41% from 2020 to 2030 (Ministry of Environment and Forestry, 2023).

Gas emission released into the atmosphere is caused by the variety of human activities on earth that lead to the greenhouse effect in the atmosphere. The greenhouse gases consist of carbon dioxide (CO₂), sulfur dioxide (SO₂), nitrogen monoxide (NO), nitrogen dioxide (NO₂), methane gas (CH₄), and chlorofluorocarbons (CFCs). A decrease the energy, which is related to the emissions of air pollution will not only mitigate climate change but also contribute to the air quality and community health (Tsai & Lin, 2021).

According to the report of World Air Quality in 2022, Indonesia ranked 26 out of 131 countries and first in Southeast Asia for the worst air quality—many reasons behind this fact. The United Nations stated that manufacturing is one of the largest contributors to greenhouse gas emissions worldwide. According to a CNBC news report in 2023, the manufacturing sector is the most significant contributor to the emissions in Indonesia, particularly sulfur dioxide (SO₂), reaching 2.631 tonnes annually or 61.9%. Emissions generated by the manufacturing and industrial sectors mainly stem from the combustion of fossil fuels for energy generation in the production of various commodities such as cement, iron, steel, electronics, plastics, clothes, and other manufactured goods. The extraction of minerals and many industrial operations are known to generate gas

emissions, and this phenomenon is also observed in the construction sector. The machinery employed in manufacturing operations frequently uses fossil fuels such as coal, oil, or gas. Furthermore, it should be noted that certain raw materials, such as plastics, are manufactured using chemical compounds that originate from fossil fuel sources. The manufacturing sector constitutes a significant source of greenhouse gas emissions on a global scale.

The analysis of greenhouse gas emissions in the manufacturing sector revealed that the primary contributors are predominantly found in four key economic sectors: non-metallic minerals, textiles, basic metals, and food and beverage. Upon closer examination of the industrial or sub-sector level, other notable emitters could also be regarded as potential targets for initiatives aimed at reducing emissions. These include the clothes, pulp, porcelain, auto parts, fertilizer, and crumb rubber sectors (Indonesia L. C., 2009).

Furthermore, according to the Indonesian Central Bureau of Statistics, Indonesia has 32.193 medium and large-scale companies in manufacturing operations, while based on the Indonesia Stock Exchange Data, the public-listed companies are 169 companies of conventional and sharia index. According to the data of Statista in 2023, The initial data for 2022 indicates that the GDP generated by manufacturing operations in Indonesia amounted to approximately 3.6 quadrillion Indonesian rupiah. During the past ten years, the manufacturing sector has been the primary driver of Indonesia's GDP and has emerged as a substantial generator of investment and employment opportunities. In addition, the manufacturing industry in Indonesia employs around 19 million individuals.

Besides, according to Elkington's theory, the company must fulfill the three criteria to operate its business: profit, people, and the planet, which focus on economic, social, and environmental lines (Alhaddi, 2015). These criteria are well-known as triple bottom line. The concept of triple bottom line compromises the sustainability concept for the company. Timothy F. S., & Tanya J. H, (2011) revealed that the triple bottom line works for the way of measure of economic, environment, and social. The economic measure must cover the elements that pertain to profitability and turnover that should be considered appropriate for the economy. These variables may include revenue or spending, taxes, characteristics pertaining to the business climate, employment, and elements pertaining to the diversity of businesses. The environment measure must cover natural resources that reflects the possible impact that they may have on the sustainability of the existence. A few examples

of this would be the quality of the air and water, the amount of energy consumed, the natural resources, the solid and hazardous waste, and the land usage and land cover. The social measure must cover the health and well-being, quality of life, social capital, education, equity, and access to social resources. The concept of triple bottom line can be implemented by businesses, non-profits, and government. A sustainable business plan has as its overarching objective the delivery of returns to shareholders while simultaneously having a good impact on either society or the environment. It is becoming increasingly apparent to those in positions of authority in the business world that sustainable business strategies not only have the potential to address the most important concerns facing the globe today, but also to propel the success of their respective organisations.

Beside the presented concept of sustainability in triple bottom line to concern the environment, the Islamic faith instructs its adherents to prioritize preserving and safeguarding the environment. Preserving the environment's aesthetic, ergonomic, and hygienic aspects is tantamount to safeguarding the future generations of humanity on the planet. The transmission of environmental harm will inevitably lead to the demise of succeeding generations' ability to thrive. The comprehensive guide to the Muslim way of life is mentioned in the Qur'an of Al-Baqarah verses 205.

The environmental damage will lead to climate change, and it will have negative impacts not only on the risk of human health but also on hotter temperatures, more severe storms, increased drought, a rising ocean, loss of species, shortage of foods, and many more. Furthermore, World Bank Group (2021) emphasized that Indonesia is ranked in the top third of nations that are susceptible to the dangers associated with the climate change. It has a high exposure to all kinds of natural hazards, including flooding and intense heat, and it is among the most vulnerable countries. Thus, the environmental degradation must be considered for all the parties involved, especially for the company that the business operation activity lead to the emission, namely manufacturing sector. The management of company must take action through its decision of implementing the eco-efficiency in order to avoid the worst impact of climate change. Value added in firm value will be obtained by manufacturing companies that, in addition to profit, take into consideration the social and environmental aspects of their operations.

Relating to this topic, there have been a great number of empirical studies conducted in other countries that investigate the issues surrounding the connection between

environmental care and corporate value such as in China (Xie et al., 2022); Malaysia (Osazuwa & Che-Ahmad, 2016); Europe (Jové-Llopis & Segarra-Blasco, 2018); Japan (Yook et al., 2017); India (Sudha, 2020). These nations empirically show that they are willing to mitigate the climate change that is caused by the industry companies. Indonesian shows the same concern to mitigate the climate change by implementing the eco-efficiency for the company as its commitment to help the government of Indonesia in cutting the emission. However, Indonesia has still lack of evidence for the effect of implementating eco-efficiency on the firm value for manufacturing sector in the sharia stock index so that this research thesis will fill this gap.

The subject of the Study

An analysis of the effect that eco-efficiency has on the value of a company is shown here. Companies that are involved in manufacturing and are included in the Indonesia Sharia Stock Index (ISSI) are the subject of this research because statistics are readily available. In addition, there are few studies related to this topic with case of Indonesia. Considering that the manufacturing company is responsible for the emissions of greenhouse gases that are the root cause of climate change, it is imperative that the manufacturing company be concerned about environmental issues in addition to the profits that it generates.

Aim of the Study

In an effort to make suggestions for the stakeholders and the government in Indonesia to safeguard the environment, this research thesis will analyse and empirically assess the influence of eco-efficiency on firm value in the manufacturing company of Indonesia Sharia Stock Indexes. This will be done in order to provide recommendations. The purpose of this study is to specifically:

1. To observe the correlation between the effect of eco-efficiency on firm value in manufacturing companies of the Indonesia Sharia Stock Index.
2. To observe the leverage and profitability in strengthening the influence of eco-efficiency on firm value value in manufacturing companies of the Indonesia Sharia Stock Index.

Research Question

The research has been guided by the following stated research questions in order to attain the aims outlined:

1. Does eco-efficiency affect the firm value in the manufacturing companies of the Indonesia Sharia Stock Index?
2. Does leverage strengthen the effect of eco-efficiency against the firm value in the Indonesia Sharia Stock Index manufacturing companies?
3. Does profitability strengthen the effect of eco-efficiency against the firm value in the Indonesia Sharia Stock Index manufacturing companies?

Importance of the Study

Despite many efforts to mitigate climate change, it remains one of the most essential problems that need to be taken into account by all the stakeholders worldwide including Indonesia. many operational businesses run by the companies that lead to the contribution of greenhouse gas emissions. Since then, the eco-efficiency policy must be implemented to concern on economic and ecological environment. Several studies indicate that eco-efficiency has the effect of increasing the firm value (Jové-Llopis & Segarra-Blasco, 2018; Osazuwa & Che-Ahmad, 2016; Sudha, 2020; Xie et al., 2022; Yook et al., 2017). Meanwhile, in Indonesia, (Apri Dina Safitri et al., 2020; Rais & Usman, 2020; Savitri & Herda Nik Abdullah, 2023) focused on the Conventional Listed Companies in consumer, mining, and manufacturing companies. There is limited sharia consideration that reflects the maqashid shariah. Thus, this gap in the literature must be filled.

The objective of this study is to fill the gap in the existing body of literature by conducting an investigation into the influence of eco-efficiency on the value of a company using Indonesia Sharia Stock Indexes in the manufacturing sector. In addition, it will provide policymakers, stakeholders, practitioners, and academicians with insights regarding the implementation of eco-efficiency within the business operation towards the firm value. This will enable them to take additional steps and formulate policies in order to earn profits while also protecting the ecological environment from the effects of business operations.

Method of the Study

The quantitative approach, specifically balanced-panel data will be utilised in this thesis. The classical assumption test will be employed to avoid the bias within the data and obtain the valid estimation. After running hausman and chow test to observe which model will be suitable between fixed, common, and random effect, the fixed effect model within the regression analysis will be employed in this research thesis. The firm value is the dependent variable. The TOBINSQ ratio is the metric that is used to determine the firm value. Additionally, eco-efficiency is the independent variable in this scenario. This research study will make use of a dummy variable that involves assessing eco-efficiency, and the certification of ISO 140001 will serve as a proxy for measuring eco-efficiency. In addition, the age of the company is taken into consideration as a control factor in this research. Thus, the Linear Regression will be used to observe the relationship between independent variable to the dependent variable and afterwards the moderated regression analysis (MRA) will be used to see the moderate effect of moderation variables such as leverage and profitability in relationship between independent variable to dependent variable.

This information will be gathered from annual statements spanning the years 2013 through 2022. The 104 manufacturing enterprises that are included in the Indonesia Sharia Stock Index (ISSI) constitute the demographic that is being investigated in this study. During the course of the research period, the purposive sampling method will be utilised in order to ascertain the proportionate number of companies that are a part of ISSI. Therefore, the criteria that must be satisfied with are manufacturing businesses that were listed prior to 2013, companies that will be listed in the Indonesia Shariah Stock Index (ISSI) in 2022, and the company that will give the necessary data from 2013 to 2022.

Limitations of the Study

As the process of doing research progresses, researchers frequently encounter constraints or limitations that have an impact on the investigation as a whole. Therefore, it is necessary for every study project to recognise these limits. These limits are the result of the realisation that there were a great number of obstacles, challenges, and perhaps unreachable alternatives that were not feasible during the process of carrying out the

research. For the reasons that will be discussed further below, our study is not exempt from such restrictions.

For the purpose of this study, the sample size is restricted to forty out of the seventy-eight ISSI manufacturing companies because there is not enough data available. Therefore, the result found does not apply to all manufacturing enterprises that comply with Sharia law.

Study Structure

Following the disclosure of the theoretical framework of climate change that is observed through the environmental management that is carried out by the company, the next part will link to the Indonesia Sharia Stock Indexes where the manufacturing companies are listed, and the empirical analysis of the eco-efficiency towards the firm value will be presented. This research thesis is comprised of four chapters. The final section will provide a summary of the environmental concerns for the company policy and make recommendations for further steps to be taken.

In the first chapter, we will talk about the conceptual framework by identifying climate change, business operations, and variables that will be taken into consideration throughout this research. In particular, we will focus on eco-efficiency with the measurement, firm value, leverage, and profitability. The second chapter will provide information on the stock market by focusing on the Indonesia Sharia Stock Indexes in manufacturing businesses. These indexes will be connected to the relationship between the factors that were employed in this study.

The third chapter will conduct an empirical analysis of the research in comparison to the prior literature in order to achieve the goal of closing the gap. This section will place an emphasis on the research question, and it will also include the sources of study data collection, the specification of variables, the research strategy that was utilised, and the empirical approach that was utilised. Moreover, it provides findings based on empirical research. In the last chapter, a summary of the findings will be presented, along with policy recommendations for various stakeholders, including the government and business managers, in reference to the concerns of environmental issues that are caused by business activities.

CHAPTER 1: CONCEPTUAL FRAMEWORK

1.1. Climate Change

1.1.1. Definition of Climate Change

The concern about climate change has been discussed for a long time. International organizations, governments, and private institutions are involved in tackling the issue of reducing the global temperature. The United Nations has defined climate change as the alterations in the Earth's climate caused by human activities and resulting in changes to the composition of the global atmosphere. These changes are in addition to the natural variations in climate that occur over similar periods. The World Bank refers to climate change as the long-term regional or global average of temperature, humidity, and rainfall patterns over seasons, years, or decades. The pace of global climate change far exceeds the natural climate changes observed throughout Earth's history. Consistent evidence of a warming globe is observed through trends in globally averaged temperature, sea level rise, upper-ocean heat content, land-based ice melt, arctic sea ice, depth of seasonal permafrost thaw, and other climate indicators. The observed patterns are resilient and validated by numerous autonomous research groups globally. The average global temperature has been warming to approximately 1.2°C since the 1880s (World Bank, 2023).

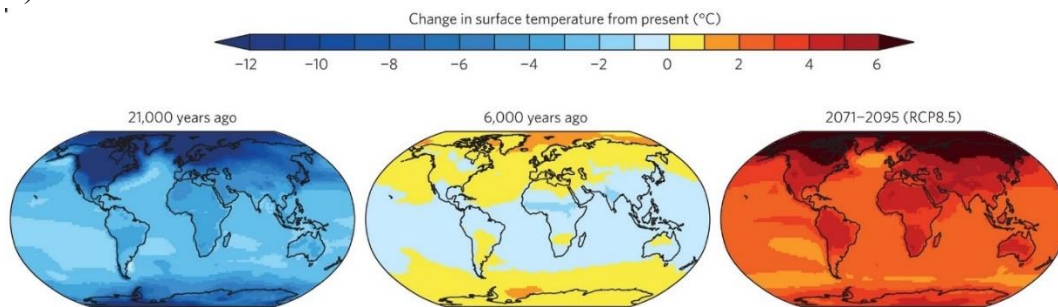


Figure 1: Model Simulated Global Temperature Anomalies for the Last Glacial Maximum

Source: World Bank.

Figure 1 demonstrates that the global average warming in the twenty-first century will greatly surpass the temperature during the Last Glacial Maximum period and even the warmest conditions in the Holocene epoch. This will result in a climate state that has not been encountered before. Meanwhile, Indonesia is projected to have a temperature

increase of 0.8°C – 1.4°C by the 2050s. Projections should be treated with care due to the possibility of seeing higher rates of warming in inland areas (World Bank Group, 2021). The following figure shows the annual mean temperature of Indonesia and is projected in 2070.

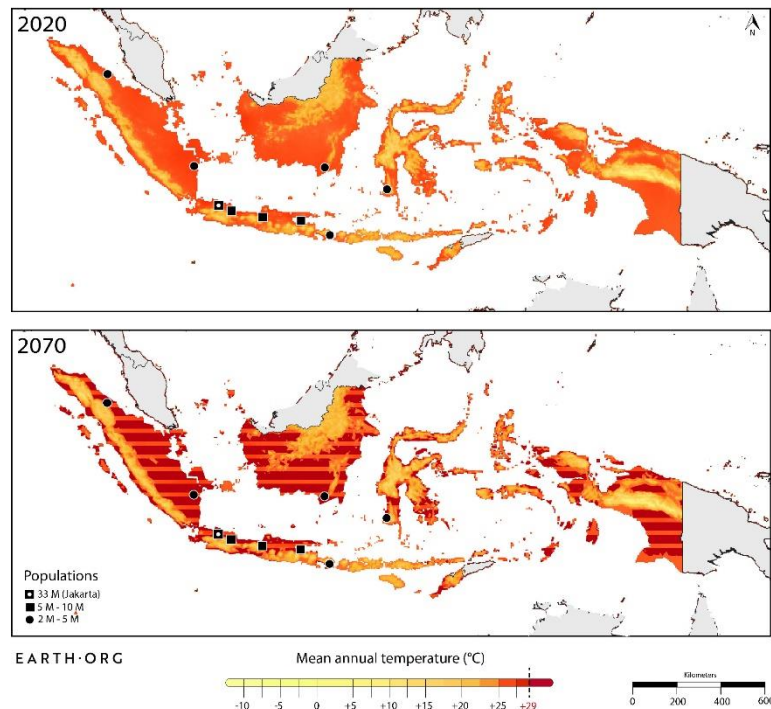


Figure 2: Indonesia Mean Annual Temperatures (MATs)

Source: Earth.org.

Figure 2 depicts that Indonesia is projected to see a gradual increase in temperature, with an average rise of 0.2 to 0.3°C every decade, regardless of whether it encounters sudden hot surges or prolonged higher temperatures. Xu et al., (2020) revealed that if there is no migration, it is estimated that one-third of the world's population will face a mean annual temperature (MAT) above 29°C , including in Indonesia.

1.1.2. The Cause of Climate Change

Climate change occurs due to three main reasons, particularly greenhouse gases, natural contributions, and human contributions (Kaddo, 2016).

Contributors	Causes
Greenhouse gases	1. Agriculture 2. Commercial and residential 3. Industry 4. Electric power 5. Transportation
Natural contributions	1. Volcanic eruptions
Human contributions	1. Consuming too much 2. Cutting down forest 3. Overfishing

Table 1: Cause of Climate Change

Source: UN, and Kaddo (2016).

Table 1 discloses that the biggest contributor to climate change is the greenhouse gas emissions that come from several sources. Kaddo (2016) stated that the CO₂ generated by volcanic eruption is smaller compared to the CO₂ generated by human activities that burn fossil fuels. Besides, the United Nations revealed that the industry including manufacturing emits emissions, usually from burning fossil fuels to produce energy for creating products like cement, iron, steel, electronics, plastics, textiles, and other goods. The mining and other industrial operations, along with the construction industry, also emit gases. The machines utilized in the manufacturing process frequently operate on coal, oil, or gas, while certain products, such as plastics, are derived from chemicals obtained from fossil fuels. The manufacturing industry is one of the greatest producers of greenhouse gas emissions worldwide.

Meanwhile, Indonesia committed to reducing GHG Emissions as part of its nationally determined contribution (NDC) to the United Nations Framework Convention on Climate Change (Government of Indonesia 2021). According to Statista (2019), Indonesia currently ranks eighth globally as a GHG emitter. The primary source of Indonesian GHG emissions is the energy industry, forestry, and other land use. The following table shows the source of GHG emitters in Indonesia.

Sector	GHG Emission Level 2010* (MTon CO2e)	GHG Emission Level 2030			GHG Emission Reduction				Annual Average Growth BAU (2010-2030)	Average Growth 2000-2012
		MTon CO2e			MTon CO2e		% of Total BaU			
		BaU	CM1	CM2	CM1	CM2	CM1	CM2		
1. Energy*	453.2	1,669	1,355	1,223	314	446	11%	15.5%	6.7%	4.50%
2. Waste	88	296	285	256	11	40	0.38%	1.4%	6.3%	4.00%
3. IPPU	36	70	67	66	3	3.25	0.10%	0.11%	3.4%	0.10%
4. Agriculture**	111	120	110	116	9	4	0.32%	0.13%	0.4%	1.30%
5. Forestry and Other Land Uses (FOLU)***	647	714	217	22	497	692	17.2%	24.1%	0.5%	2.70%
Total	1,334	2,869	2,034	1,683	834	1,185	29%	41%	3.9%	3.20%

Table 2: Indonesia's Business as Usual and Emission Reduction Scenarios in 2030

Source: Government of Indonesia.

Notes: CM1= Counter Measure 1 (*unconditional mitigation scenario*)

CM2= Counter Measure 2 (*conditional mitigation scenario*)

*) including fugitive.

**) Only include rice cultivation and livestock

***) Including emission from estate crops plantation

Based on the table above mentioned that the significant contributor to GHG emissions is energy. Meanwhile, manufacturing companies need two primary categories of energy sources—fuel and nonfuel. Fuel consumption refers to the utilization of flammable energy sources to generate heat and/or electricity while non-fuel refers to the raw materials that are utilized to make products. Thus, the manufacturing company activity can lead to the contributin of GHG emissions.

1.1.3. The Impact of Climate Change

Climate change can engender negative impacts to the environment, and living creatures. The United Nations confessed that climate change can damage the world, particularly through hotter temperatures, more severe storms, increased drought, warming of the rising ocean, loss of species, shortage of foods, more health risks, and poverty as well as

displacement. In addition, Indonesia is placed in the top third of countries that are vulnerable to climate change risks with high exposure to all types of natural hazards such as flooding, and extreme heat (World Bank Group, 2021). The United States Agency International Development (2022) revealed that approximately 180 million Indonesian people reside in coastal areas that are vulnerable to natural hazards. Besides, the World Bank Group (2021) stated that the Indonesian people can obtain the impact of climate change as well such as poverty and inequality, gender, and human health.

The impact of climate change will have a greater effect on the most economically disadvantaged segments of society. For example, physically demanding jobs that require a lot of manual effort are often associated with low wages and are also highly susceptible to decreased productivity caused by heat stress (Kjellstrom et al., 2016). Less affluent firms are the least financially capable of affording air conditioning, despite the potential rise in demand due to the expected increase in days requiring cooling. Impoverished farmers and communities face the greatest financial challenges in acquiring local water storage, irrigation infrastructure, and adaptive technology. However, they frequently cultivate regions that are very susceptible to drought and abnormal weather occurrences. Several areas in Indonesia are confronted with substantial adaptation difficulties, with Eastern Java being specifically recognized as a worldwide hotspot that requires urgent attention in terms of adapting to river flooding (Willner et al., 2018).

Mounting evidence indicates that climate-induced disasters have had significant repercussions on human populations in various domains, such as agricultural output, food stability, water administration, and public health. The extent of the effects and methods of dealing with them among populations is largely contingent upon their socio-economic status, socio-cultural norms, resource accessibility, poverty levels, and gender. Research has additionally yielded further evidence indicating that the impacts are not equally distributed among genders, with women and children being particularly vulnerable. Gender-based disparities in vulnerability to climate change risks can be attributed to several key factors. These include variations in time allocation, disparities in access to assets and credit, differential treatment by formal institutions that restrict women's opportunities, limited participation in policy discussions and decision-making processes, and a lack of sex-disaggregated data to inform policy changes (World Bank Group, 2016).

Climate change can affect human health such as nutrition, heat-related mortality, and disease. For Indonesia, the forecasts indicate that by mid-century under the most extreme projected scenario Representative Concentration Pathway (RCP 8.5), there might be around 35.1 climate-related deaths per million inhabitants due to insufficient food availability (Springmann et al., 2016). Climate change is anticipated to bring global temperatures closer to this critical threshold through gradual warming and more severe heat waves. Moreover, the connections between heightened droughts, fires, and heat linked to climate change will have consequences for regional air quality and public health in Indonesia (Marlier et al., 2015). Climate change projections indicate that the prevalence of infectious and vector-borne diseases is expected to increase. Specifically, in Indonesia, it is estimated that under both low and high RCP emissions scenarios, around 308 million individuals (out of a projected population of 340 million) could be susceptible to malaria by the 2070s. This is a significant increase compared to the baseline period of 1961-2000, where approximately 160 million people were at risk (WHO, 2015).

1.2. Business Operational Activity

1.2.1. Contingency Theory

The theory of contingency was founded by Fielder in the 1960s, which implied the theory of effectiveness. The core idea of this theory is the effectiveness of leadership in terms of group performance that depends on the interaction between two factors such as the leader's task or relations motivations and aspects of the situations (Fiedler, 1964). The leadership method is defined as the interplay between the relations motivations and the tasks undertaken by the leader. The leader's primary responsibility is to ensure the attainment of goals, but the motivation of individuals is closely linked to their relationships. The leadership's approach will be adapted according to the situation. Contingency theory posits that a situation can be classified based on three factors: the relationship between the leader and subordinate, the structure of performance, and the authority associated with the position. The leader-subordinate relationship pertains to the collective ambiance and the level of trust, allegiance, and engagement between the group members. The performance structure prioritizes the optimization of performance. The application of contingency theory enables the examination of the structure and

administration of accounting systems, which in turn furnish companies with valuable information for diverse objectives (Otley, 1980).

Fiedler, (1964) revealed that the situational elements are highly interrelated. A competent leader is often held in high regard, and a leader who is both highly regarded and well-liked can inspire and motivate their group members. There are three measurement specifications for the major situational components, in particular:

- a. Affective-leader group relations refers to the leader's personal interaction with key members of his group is likely the most crucial factor that influences group processes, which in turn impacts team performance. A well-regarded and esteemed leader does not rely on official authority and can achieve obedience from their group even in situations when an unpopular or untrusted leader might face rebellion.
- b. Task structure refers to the degree of task structure assigned by the leader to be carried out by members of the organization. The level of influence a leader has in an organization is directly proportional to the level of structure in the work at hand.
- c. Position power refers to the power associated with the leadership role that defines a significant third dimension. This encompasses the incentives and penalties that are formally or customarily available to the leader, his control over his subordinates, and the extent to which this control is backed by the organization in which the group functions. The leader's authority is typically inversely proportional to the authority of their members. An individual in a position of significant authority has the potential to secure obedience, even facing personal animosity from members of their organization.

Furthermore, the contingency theory discussed earlier is highly relevant to this research as it pertains to the leadership style used by the management of a corporation, which is contingent upon their comprehension of the specific circumstances in which they are leading.

There is a significant connection between the philosophical structure of contingency and the business operational activity, particularly the decision-making process. In the case that there are problems with pollution in the environment, the management of the organisation will modify the decision-making processes in a way that is both economically and environmentally efficient and effective. It is possible that this may require putting into practice the idea of eco-efficiency, which will have an effect on the

value of the company as well as avoidness of environmental degradation that is caused by the manufacturing operation. When the company succeed to reduce the negative impact caused by its business operation, the managerial indirectly shows the effectiveness of their leadership to tackle the climate issues and at the same time increased the firm value.

1.2.2. The Role of Maqashid Sharia in Preserving Environment

All the activities in the world are guided by the Qur'an and hadith, including the environmental preserve. Islam encompasses a comprehensive policy framework that establishes social relations and upholds moral values in ethical, political, and economic spheres for society. The Islamic moral standards serve as the foundation for human development and are derived from Shari'ah law (Oladapo & Rahman, 2016). The preservation of the environment to mitigate climate change constitutes the Islamic law that is prescribed by Maqashid Shariah. The Qur'an and Sunnah have demonstrated a significant level of concern for the environment. The Qur'an demonstrates this by its explicit reference to many botanical species, insects, and natural occurrences, as well as its promotion of kind and empathetic conduct towards the environment. In the same vein, the Sunnah promotes thoughtful interaction with one's surroundings (Gobaili Saged et al., 2017).

On the basis of man's responsibilities on earth, having an understanding of fiqh al-bi'ah is of its own importance. It does not solely involve material and physical relations; rather, it is founded on the belief in and the value of tawhid to Allah, the Most High. The obligation of the human being to fulfil their role as the *khalifah* on this planet is widely regarded as the primary principle that underpins the necessity of comprehending fiqh al-bi'ah itself, the necessity of having an understanding of fiqh al-bi'ah and its principles. There is a mandate that has been given to humans, and they are accountable to nature itself. Humans are a part of the environment. It is related to the management of the company must consider their role both as the leader within the organisation and as the *khalifah* in this world to protect the environment, especially when their activity can give the impact. The business operational activity run by the manufacturing sector which is led by the human must consider the right of the macrocosm and microcosm so that it avoids the environmental degradation.

According to Yang, A.B. (2015), the importance of managing and conserving natural resources is emphasized based on the concept of *daruriyyah al-khams*, which encompasses the preservation of faith, posterity, life, wealth, and intellect. These five fundamental ingredients are crucial, essential, and requisite for human existence. Conversely, Mohd Istajib Mokhtar (2018) proposed in (Md Ramli, 2020), that the administration and conservation of natural resources should be guided by the principles of *jalb al-masalih* (serving interests) and *daf' al-mafsadah* (protecting from harm and corruption), which are contained within *daruriyyah al-khams* as outlined in Table 3.

<i>Jalb al-Masalih</i> (serve interest)	<i>Daf' al-Mafsadah</i> (protect from harm and corruption)
Implement environmentally friendly agricultural practices (<i>tashjir</i> and <i>takhdhir</i>) and engage in reforestation efforts.	Minimize the process of deterioration and annihilation (<i>tafsid</i>)
Facilitate the process of growth and improvement (<i>ta'mir</i> and <i>taskhir</i>).	Minimize the occurrence of exploitation (<i>tasrif</i>)
Maintain cleanliness and promote good health (<i>tathir</i>).	Minimize environmental contamination (<i>talwith</i>)
Maintain equilibrium (<i>wasat</i> and <i>tawazun</i>)	Minimize the squandering of resources (<i>tabdhir</i>)
Preserve the biodiversity (<i>tanwwu' al-hayawi</i>)	Ensure the preservation of species to prevent their complete disappearance from the Earth (<i>inqirad</i>).
Promote and maintain the well-being of humanity (<i>rifq</i>)	Ensure the prevention of injustice (<i>zulm</i>) towards human beings.

Table 3: Maqashid Sharia in the Context of *Jalb Al-Masalih* and *Daf' Al-Mafsadat*

Source: Mohd Istajib Mokhtar (2018) proposed in (Md Ramli, 2020).

Table 3 shown above depicts the application and conservation of natural resources within the framework of *Jalb al-Masalih* and *Daf' al-Mafsadah*, as outlined in Maqasid al-Shari'ah. In addition, one of the names for the environment in Arabic is *al-Biah*. According to Islamic law, environmental jurisprudence is referred to as *fiqh al-biah*. This framework of Islamic law is a constructive approach for comprehending the environment in its entirety, which encompasses both the macrocosm and the microcosm (Hidayat & Priatna, 2018).

1.3. Eco-Efficiency

1.3.1. Definition of Eco-Efficiency

Eco-efficiency is the combination of eco in which the eco term means economic and ecologic, and efficiency which is the optimal and efficient utilization of resources (DeSimone, 2000). It constitutes the philosophy of encouraging the business to contribute to the environment while gaining economic benefits. The World Business Council for Sustainable Development (WBCSD) has defined it as the provision of goods and services that meet human needs and improve quality of life, while simultaneously reducing ecological impacts and resource usage throughout the entire life cycle, aiming to stay within the Earth's estimated carrying capacity. Essentially, its focus lies in generating greater value while minimizing the associated effects.

Minister for the Environment and Heritage Australia (1999) revealed that eco-efficiency seems to be doing more with less which means offering more value such as producing more goods and services while using fewer resources resulting in the reduction of pollution and less waste. For instance, if the company saves energy then it can cut costs while reducing undesirable output such as emissions. Eco-efficiency should catalyze fostering creativity and innovation in the pursuit of alternative approaches. Eco-efficiency extends beyond a company's internal operations, encompassing not only manufacturing and plant management but also other domains. It applies to actions both before and after a manufacturer's facility and encompasses the supply and product value chains.

1.3.2. Purpose of Eco-Efficiency

The implementation of eco-efficiency will lead to many positive impacts. Feldman et al., (1997) mentioned that when companies successfully communicate their commitment to eco-efficiency, they are perceived as having increased shareholder value by reducing their risk exposure. Ekins, (2005) revealed that by integrating the effective utilization of the environment into the company's strategic planning, management develops a direct correlation between the company's environmental objectives and its profitability.

WBCSD (1999) stated that eco-efficiency enhances both business and environmental performance, enabling organizations to proactively respond to market and regulatory developments, minimize expenses, acquire a competitive edge, and ensure long-term

profitability and sustainability. Maximizing efficiency is consistently a top priority for all companies. However, when it encompasses the simultaneous creation of economic value and the reduction of environmental impact and resource utilization, the resulting value added becomes even more substantial. The economic justification for eco-efficiency applies to all aspects of a company's operations, encompassing the elimination of hazards, the discovery of additional cost reductions, and the identification of novel market prospects. The following figure shows the business case for eco-efficiency.



Figure 3: The Business Case for Eco-Efficiency

Source: WBCSD.

Figure above depicts that eco-efficiency has been recognized as a crucial strategic component in business, with five distinct characteristics identified. Eco-efficiency enables emerging nations to sustain quantitative growth while optimizing resource utilization and minimizing environmental consequences. Considering that the concept revolves around achieving higher productivity while minimizing resource usage and reducing pollution levels.

1.3.3. Measurement of Eco-Efficiency

The WBCSD (1999) revealed that the implementation of eco-efficiency requires an assessment strategy in order to identify, investigate, and prioritize the opportunities. The following chart is the strategy for the eco-efficiency assessment.

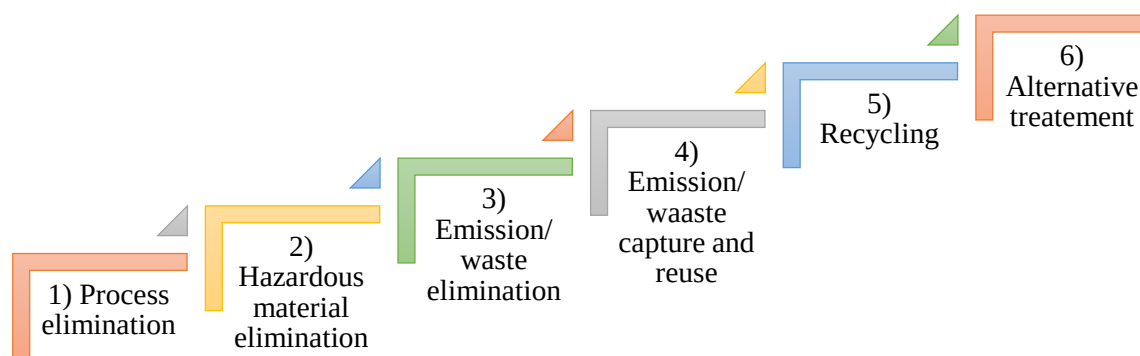


Figure 4: Eco-Efficiency Assessment Strategy

Source: WBCSD and processed by author.

The explanation of each strategy based on figure shown above is; 1) Is it possible to eliminate the process that generates pollutants without any adverse impact on the product, such as by removing redundant cleaning stages during processing? 2) Is it possible to eliminate or substitute the hazardous substances used in the procedure with non-toxic or less toxic substances? For instance, can organic solvent cleaning be replaced with water-based cleaning systems, or can spray lacquer paints be substituted with powder coatings? 3) Is it possible to eliminate non-product outputs such as waste or emissions from the process? An instance of this could involve using enhanced quality control measures to save expenses associated with the disposal of rejected products, 4) Examine the possibilities for capturing and reusing waste or emissions in the process, such as implementing a coolant recycling system for metalworking fluids, 5) Explore recycling options, such as transporting used solvents to an external facility for distillation and subsequent reuse, and 6) Explore alternative treatment modalities, such as those aimed at diminishing the magnitude or harmfulness of the waste or emissions.

According to the explanation above, eco-efficiency is determined by measuring it through ISO 14001 certification, which serves as an indicator that the organization has incorporated the notion of eco-efficiency into its policy. ISO 14001 is the initial measure identified for organizations to enhance efficiency in their operational activities. ISO 14001 is a comprehensive framework that outlines the procedures and laws that corporations need to follow in order to establish environmentally responsible and well-managed organizations. According to the Citation ISO Certification Limited (2023) that many advantages for the company that implements the ISO 14001 certification. The

following figure shows the benefits for the organization that has the certification of ISO 14001.

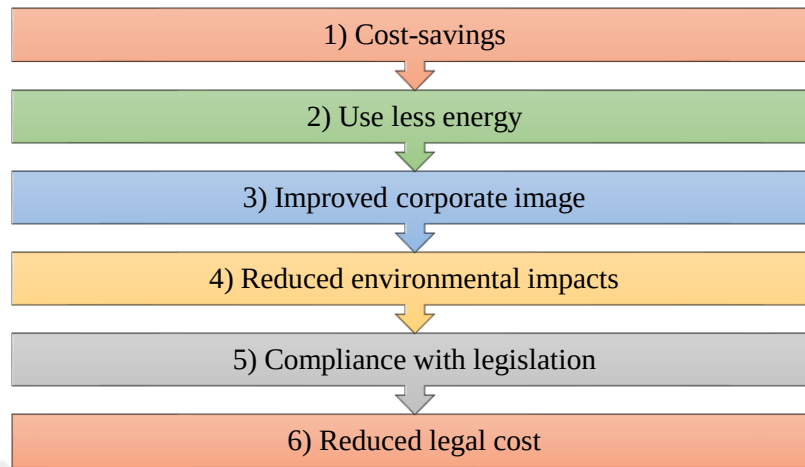


Figure 5: ISO Benefits for Organisation

Source: Citation ISO Certification Limited (2003).

Provided the company adopts ISO 14001 certification, many positive impacts will contribute to the organization itself. Manufacturer companies must be able to be concerned about the environment. In addition, the ISO 14001 Standard facilitates the quantification, monitoring, and management of the continuous environmental effects resulting from an organization's operations. By effectively controlling the utilization of natural resources, energy, and waste, it may enhance the company's reputation and trustworthiness. This, in turn, can attract new clients and enable uncovering potential avenues for reducing expenses.

ISO 14001 certification is a widely acknowledged standard created by the International Organisation for Standardisation (ISO) that offers a structure for improving an organization's environmental performance. The ISO 14001 standard is applicable to organisations of all sizes, types, and locations. It is a widely recognised standard that can be implemented by any organisation. The price of ISO 14001 Certification can vary depending on factors such as the organization's size, number of employees, number of branches, and the chosen certification body. When implementing the certification of ISO 14001, there are six key elements that need to be considered. The following is the figure 3 the glimpse of keys elements.

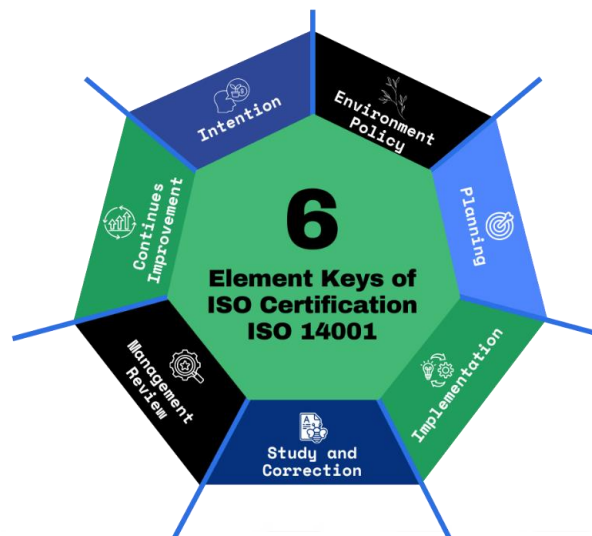


Figure 6: Elements of ISO 14001

Source: (Pareek, 2022).

According to the shown figure, there are six element that require to execute when the company considers to obtain the certification of ISO 14001. The further explanationi will be elaborated as follows:

- 1) Environmental policy refers to the an organisation must establish its environmental policy. An organisation must establish business objectives and targets in accordance with its Environment policy. The ISO 14001:2015 standard includes the concept of sustainable development and performance indicators related to Environmental Management Systems (EMS). The organisation must develop efficient communication, both internally and externally, in order to ensure compliance with ISO 14001 certification.
- 2) Planning refers to developing blueprints and tactics for the implementation of the Environment Management System (EMS). An organisation can evaluate the environmental effects of its commercial operations through efficient planning and execution. Planning enables organisations to identify compliance requirements and establish clear targets and objectives through documentation.
- 3) Implementation refers to the efficient and effective execution of a plan holds greater value than its formulation. It integrates modifications and constructs novel methods and protocols to accommodate evolving demands. An organisation must establish, record, and disseminate the implementation process in order to provide essential

training to staff. In addition, it encompasses the development of strategies and measures to effectively respond to emergencies and ensure readiness.

- 4) Study and Correction refers to upon the implementation of the EMS, the organisation evaluates its effectiveness and directs its efforts towards optimising it. The task entails assessing and appraising current and novel protocols to guarantee the attainment of Key Performance Indicators (KPIs) and the efficiency of EMS.
- 5) Management Review refers to a structured assessment of how well the organization's Environment Management System is functioning. It is a crucial component that guarantees the proper operation of everything within the defined parameters. It considers any emerging environmental concern, legal regulations, and evolving conditions.
- 6) Continues Improvement refers to an organisation to maximise efficiency in all areas of the system and guarantees that the EMS incorporates the concepts of ongoing enhancement. The notion of continuous improvement adheres to the Plan-Do-Check-Act cycle in order to enhance corporate processes and procedures.

Any organisation that desires to build, enhance, or uphold an environmental management system in accordance with its stated environmental policy and standards should utilise ISO 14001:2015. The standard's requirements can be integrated into any EMS, with the level of integration defined by several factors such as the organization's industry, environmental policy, products and services, and location. ISO 14001:2015 is applicable to all organisations, irrespective of their size, geographical location, sector, or industry. ISO 14001:2015 addresses the following areas in relation to environmental management systems at the most elevated level such as context of the organization, leadership, planning, support, operation, performance evaluation, and improvement. Thus, the measurement of eco-efficiency within this research study will employ dummy variable in which manufacturer company in the Indonesian Sharia Stock Index that has ISO 14001 certification will be given 1 grade, and those that do not have ISO 14001 certification will be given 0 grade. The information regarding the implementation of ISO 14001 certification can be seen through the annual report for each company on the company's website.

1.4. Firm Value

1.4.1. Definition of Firm Value

The firm value is defined as the activity of the firm that can enhance the value of the shareholders and the stakeholders (Lonkani, 2018) The firm value is essential because it can contribute to the prosperity of the parties involved. The firm is expected to maximize its value. The higher the value the better for the investor. Since it becomes one of the measurement indicators for the investor to decide whether to invest or not in the company. From the investor side, the firm value is sometimes related to the stock price which means that the higher the stock price, the more prosperous the investor will be. Therefore, the high value of the firm is the goal of the management company.

Karaçayır, E., & Afşar, A. (2020) have revealed that although firm value has no legal definition, firm value is related to liquidity, capital structure, operating rates, and profitability. Hence, the high value of the firm indicates the company shows good performance and has ongoing concerns in the future consequently it can convince the investor (Pambudi et al., 2022).

1.4.2. Measurement of Firm Value

Sukesti et al., (2020) revealed that the indicator of whether the performance of the company is good or bad as well as the sustainable prospects can be seen through its firm value. Many financial approaches can be used to measure the firm value, particularly profitability matrix, revenue growth, market value to book value ratio, Tobin's Q, and earnings per share (Venkatraman & Ramanujam, 1986). This research employs Tobin's Q as a proxy to measure the firm value (Bui et al., 2023; Thoma, 2021). Bui et al., (2023) have defined that Tobin's Q metric depends on the present and anticipated future earnings derived from market capitalization. A higher Tobin's Q value signifies a stronger possibility and advancement of opportunities for the firm. The following is the measurement of Tobin's Q.

$$\text{Tobin's Q: } \frac{\text{Equity Market Value} + \text{Market Value of Debt}}{\text{Book Value of Total Asset}} \quad \text{Equation 1}$$

1.5. Leverage

1.5.1. Definition and Measurement of Leverage

The company has two kinds of sources to facilitate the assets particularly equity from the shareholders and leverage whereby the management can utilize to produce products and services resulting the revenues. Leverage constitutes the source to purchase assets through short and long-term debts. Hussain, (2011) has defined debt as a means to emphasize the confidence that investors have in the firm. By issuing debt, a firm conveys to the market its anticipation of favorable future cash flows. Consequently, the increased level of debt indicates the management's trust in future cash flows.

However, another consequence of this signaling element is the issue of undervaluing equity. Should a company choose to utilize stock rather than debt to fund its new initiatives, investors would perceive this signal in an unfavorable light. Al-Momani & Obeidat (2017) mentioned that leverage has a relationship with the success of the company. Gill & Mathur (2011) explained that financial leverage is the measure for a company to utilize borrowed funds. Decisions for the management company to consider how much money to borrow and how much the shareholders require to offer as the capital structure is not simple since the management must be concerned with the effect of profitability and its survival in the long run.

The higher of financial leverage, the riskier it will be. However, most of the company will utilize the leverage to finance the business operation known as going-concern, investment, and assets. The following is the formula to calculate the leverage of the company.

$$\text{Leverage: } \frac{\text{Total Liability}}{\text{Total Asset}} \quad \text{Equation 2}$$

1.6. Profitability

1.6.1. Definition and Measurement of Profitability

Profitability becomes the main goal of all companies since profitability will decide whether the company can survive in the long run or not. The historical profitability, current, as the projection will be essential for the going concern of the company. (Ahmad & Alghusini, 2015) have defined profitability as the economic indicator to measure the

company's success in utilizing the capital invested. The economic indicator can be determined by the accounting of net profit (Pimentel et al, 2005 p.86).

Profitability can be defined as the revenue of a company that is generated from sales after deducting the expenses during a certain period (Al-Momani & Obeidat, 2017b) The measurement of profitability can be used as Return on Assets (Abeyrathna & Priyadarshana, 2019; Fidanoski et al., 2018). ROA represents the ratio of net earnings to the total assets of the company. The ROA ratio quantifies the amount of after-tax profit a company earns per dollar of assets it possesses. The following is the formula of return on asset.

$$\text{ROA: } \frac{\text{Net Income}}{\text{Total Asset}}$$

Equation 3

CHAPTER 2: INDONESIA SHARIA STOCK INDEX

2.1. Stock Market

Rjumohan, (2019) has defined stock markets as venues for conducting economic transactions including the purchase and sale of stocks or shares, which represent ownership stakes in businesses. A stock exchange is a virtual marketplace where buyers and sellers of stock come together, without the requirement for a physical location or a distinct business. Stock markets are alternatively referred to as share markets and equity markets. A stock exchange, known as a securities exchange or bourse, is a venue where the trading of shares of stock, bonds, and other financial products takes place. For a security to be traded on a stock exchange, it must be listed on a prominent stock exchange. Essentially, the system of stock markets is comprised of many stock exchanges and their interconnectedness.

A company that requires more capital to run and expand its business operation can issue its share to the public. Typically, entities initially secure equity financing from a limited group of investors, without the presence of a readily available market for these investors to trade their shares. When a company thrives and requires more equity money, it typically becomes advantageous for it to "go public" by offering its stock to a wide range of varied investors. Once a firm's stock becomes publicly traded, the increased liquidity enables the company to raise capital on more advantageous conditions compared to a privately owned company, which would have to offer compensation to investors due to the limited liquidity (Ibbotson & Ritter, 1995).

The company listed on the stock exchange will receive funds from its investors thus the management must consider the welfare of its investors. The number of shareholders will affect the ownership structure. The structure of ownership particularly block holders, institutional, foreign as well as family ownership will relate to the performance of firm value(Kao et al., 2019).

Shares (stock) are widely used in the financial market. Issuing shares is a viable option for the company to raise funds. On the flip side, stocks are a popular investment choice due to their potential for generating attractive returns. There are advantages and disadvantages of investing in stock market. The advantage will be the dividend, capital

gain, and join the company's annual board meeting. Dividends represent a distribution of profits provided by the company, stemming from its generated profits.

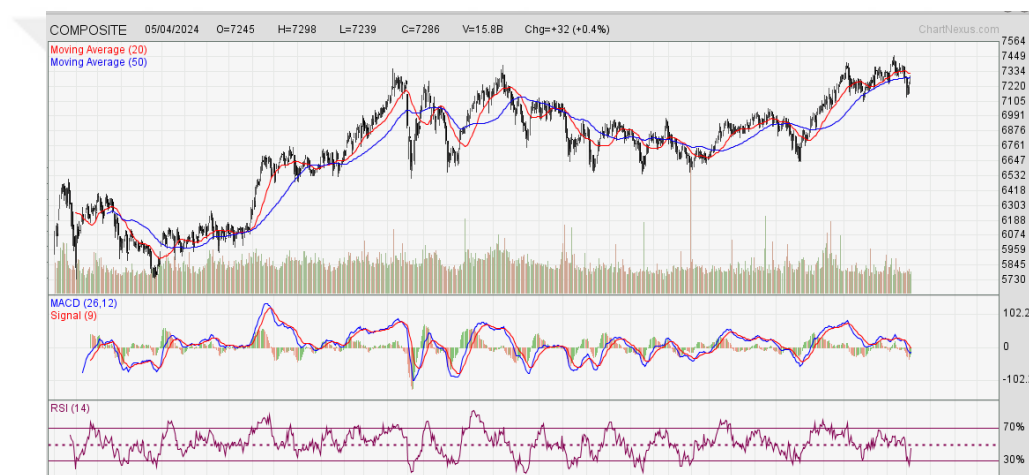
Dividends are distributed once they receive approval from shareholders during the General Meeting of Shareholders (GMS). To receive dividends, investors need to hold onto their shares for a considerable duration, until they are officially recognised as shareholders eligible for dividend payouts. The company distributes dividends in two forms: cash dividends and stock dividends. Cash dividends are given to each shareholder in the form of cash, while stock dividends increase the number of shares owned by an investor. Furthermore, capital gain is calculated by subtracting the purchase price from the selling price. Stock trading activities in the secondary market contribute to the formation of capital gains. Investor can buy ABC shares at IDR 3,000 per share and sell them later at IDR 3,500 per share, resulting in a capital gain of IDR 500 for each share sold.

Meanwhile, the disadvantage of investing in stock market will always exist, particularly capital loss, and liquidation risk. Capital loss is the opposite of capital gain, representing a situation in which investors sell shares at a price lower than the acquisition price. As an illustration, the PT XYZ shares were acquired at a rate of Rp 2,000 per share, and thereafter, the share price steadily decreased until it reached Rp 1,400 per share. Due to concerns about further decline in the share price, the investor decides to sell at Rp 1,400, incurring a loss of Rp 600 per share. In addition, the liquidation risk can occur when the corporation, whose shares are owned, is declared bankrupt by the Court or dissolved. In this scenario, the shareholders' right to claim is given the lowest priority, only after all the company's debts have been fully reimbursed using the proceeds from the sale of the company's assets. If there is any remaining amount from the sale of the company's assets, it will be distributed proportionally among all shareholders. Nevertheless, in the absence of any surviving assets of the corporation, the shareholders will not get the proceeds resulting from the liquidation. This condition poses the most significant risk to stockholders. Therefore, it is necessary for a shareholder to consistently monitor the progress of the organisation.

Stock prices in the secondary market or during everyday stock trading exhibit volatility, characterised by both upward and downward movements. Stock prices are determined by the interaction between the demand and supply for shares. Put simply, stock prices are

determined by the interplay between supply and demand for these shares. The interplay between supply and demand in the stock market is influenced by various factors. These include company-specific factors like the performance of the company and the industry it operates in, as well as macro factors such as interest rates, inflation, exchange rates, and non-economic factors like social and political conditions.

Furthermore, the IDX performance has been remarkable increasing over years. It has growth from 2.48 million in 2019 to 12.16 million in 2023(Katadata, 2023). Since then, the Indonesian stocks had been traded both domestic and international investor in retail or hedge fund. The following is the graphic of Indonesian composite performance from 2021-2024.



Graphic 1: Indonesian Composite Stock Price

Source: Indonesia Stock Exchange.

The Composite Stock Price Index (CSPI) is a stock market index utilised by the Indonesia Stock Exchange (IDX). The JCI was initially created on 1 April 1983 as a gauge of fluctuations in share prices in the JSX. The index encompasses the price fluctuations of both ordinary and preferred shares that are listed on the JSX. The JCI computation is based on the date of 10 August 1982. On that particular date, the index was established with a fundamental value of 100, and there were a total of 13 equities that were officially listed at that specific moment in time. The JCI achieved its highest intraday position on 15 September 2022, reaching a record of 7,377.49 points. The record-breaking closing position of 7,318.20 points was achieved on September 13, 2022. According to the graphic shown above, the CSPI tends to increase years. It indicates that the investors recognise significant prospects and potential in the Indonesian market.

2.2. Indonesia Sharia Stock Index

According to the Indonesia Stock Exchange, the Islamic Capital Market refers to financial activity inside the capital market that adheres to Islamic standards. The Islamic capital market in Indonesia is a component of the Islamic financial sector overseen by the Financial Services Authority (OJK), specifically the directorate responsible for Islamic capital markets. The emergence of Indonesia's Islamic capital market commenced with the introduction of the Indonesia Sharia Equities Index (ISSI) in 2011. The ISSI is a composite index that includes all Islamic equities registered on the Indonesia Stock Exchange (IDX).

Indonesia has the largest Muslim population worldwide as well as its share of the Islamic Capital market. Conversely, Indonesia's ratio of market capitalization to Gross Domestic Product remains low such as below 50%. It indicates that the opportunity for the Islamic capital market can be developed further for its growth. The update for the ISSI lists in September 2023 reached 554 companies.

The National Islamic Board of the Indonesian Ulama Council (DSN-MUI) is the regulatory body responsible for enforcing Islamic standards in the Indonesian Capital Market. It does so by issuing fatwas that pertain to investing operations in the Indonesian Islamic Capital Market. The inaugural fatwa concerning the Islamic capital market, published by DSN-MUI in 2001, was Fatwa No. 20 which pertained to the issuance of Islamic Mutual Funds. In 2003, the DSN-MUI released fatwa No. 40, which pertains to the capital market and provides general instructions on how to apply Islamic principles in the capital market. In 2011, DSN-MUI released fatwa No. 80 which pertains to the use of Islamic principles in the equity trading mechanism at the regular market of the Stock Exchange.

To ensure the enforceability and legal certainty of applying Islamic principles in the Indonesian capital market, the Indonesia Financial Authority (OJK) has transformed these principles into OJK regulation No. 15/POJK.04/2015, which specifically addresses the implementation of Islamic principles in the capital market. OJK has implemented regulations under No. 53/POJK.04/2015 to facilitate the use of Akads (contracts) in all issuances of Islamic securities in the Indonesian capital market. Essentially, any Akad that adheres to Islamic principles can be utilized for issuing Islamic securities, as long as they do not conflict with the applicable restrictions set by the OJK. The permissible Akads for

issuing Islamic securities in the Indonesian capital market, as stipulated by regulations, include the contracts of *ijarah*, *istishna*, *kafalah*, *mudharabah*, *musyarakah*, and *wakalah*. Furthermore, according to the report of World Population Review as of 2021, Indonesia has become the largest populous Muslim country. Society often considers halal or haram of certain products and services. The governments, therefore, regulate the products and services based on Sharia compliance. Indonesia has become a potential Islamic finance product and service market (Statista, 2023). The existence of ISSI will be essential for the muslim investor who tends to have sharia lifestyle that can fulfill its desire in investing and gaining blessing from Allah SWT for their deeds to obey islamic principles. Meanwhile, the muslim investors has been increasing over years in the IDX reaching 211 percent over the past five years, surging from 44,536 investors in 2016 to 136,418 investors by December 2023 (Ibrahim, 2024).

The Jakarta Islamic Index, also known as the JII, is a stock index in Indonesia that computes the average share price index for stocks that adhere to sharia requirements. The establishment of the JII is closely linked to the collaboration between the Indonesian Capital Market and PT Danareksa Investment Management. The JII has been in development since July 3, 2000. The purpose of creating this sharia instrument was to facilitate the formation of the Sharia Capital Market, which was subsequently inaugurated in Jakarta on 14 March 2003. The Islamic Capital Market operates in a manner that closely resembles the pattern observed in Malaysia, where it is integrated with conventional exchanges like the Jakarta Stock Exchange and Surabaya Stock Exchange. The JII includes the 30 most liquid stocks listed on the Indonesia Stock Exchange that meet sharia criteria for each period. The JII utilises a reference date of 1 January 1995, with a corresponding benchmark value of 100. The establishment of the JII aims to enhance investor confidence in investing in sharia-compliant companies and offer advantages to investors who wish to apply Islamic sharia principles in their stock market investments. The following is the performance of ISSI and JII (Jakarta Islamic Index) from mid of 2019 to 2024, which comprises a total of 60 stocks were chosen based on their average market capitalization over the past year, with the highest values given priority. From this selection, 30 stocks were further selected based on their average daily transaction value in the normal market, with the highest values given priority.



Graphic 2: ISSI and JII Stock Performances 2019-2024

Source: Indonesia Stock Exchange.

The yellow line represents the performance of the ISSI, whereas the blue line represents the performance of the JII. Based on the provided graph, it is evident that from 2019 to 2024, the Islamic Stock Price Index (ISSI), which includes all sharia-compliant firms, has shown a strong performance with a growth of 13.50%. In contrast, the Jakarta Islamic Index (JII) has experienced a decline of 22.89%. However, it should be noted that the value of ISSI is still significantly lower than that of JII.

In regards the equity market, the Indonesia Stock Exchange, Indonesia Financial Authority jointly with National Sharia Council to screen the stock so that it can be classified as the sharia stock. When determining whether or not a stock fulfils the requirements to be classified as an Islamic stock, there are two screening techniques that are utilised. Initially, there is a test for business (qualitative), and then there is a screening for financial matters (quantitative). Once every two years that occurs in late May and November. Commencing on June 1 and December 1 annually, the stocks that are on the list of sharia securities will be subjected to a review that will be conducted frequently.

Qualitative criteria are guidelines set by the sharia council to determine whether or not an issuer may be classified into the sharia index. The qualitative criteria encompass essential factors, such as the issuer's company type and the items manufactured by the issuer. Business screening evaluates the company's business activities to determine if they are in alignment with Sharia principles or if there are any conflicts. For instance, the stocks of cigarette firms, traditional commercial banks, and conventional insurance companies will certainly fail to meet the criteria of this screening stage. Stocks of companies involved in

consumer goods production, mining, hospitality, transportation, basic industries, diverse industries, and other business sectors will successfully pass the business screening step. Whereas, quantitative criteria refer to accounting or calculating criteria that involve the use of financial ratios. This ratio is calculated by comparing the ratio of debt to non-halal income. Financial Screening examines the financial ratios of the company. The two rules are as follows: the entire amount of interest-based debt should not exceed 45% of the total assets, and the amount of non-halal income should not exceed 10% of the whole firm revenue. These regulations are the outcome of a collaborative effort between researchers and regulators in Indonesia, and as a result, the percentage provisions may be subject to revision in the future. If the financial accounts of the company satisfy these criteria, the company's shares will successfully undergo the screening process and be added to the Sharia Securities List (DES). The following is the overview of the screening process conducted by the SAC, and IDX.

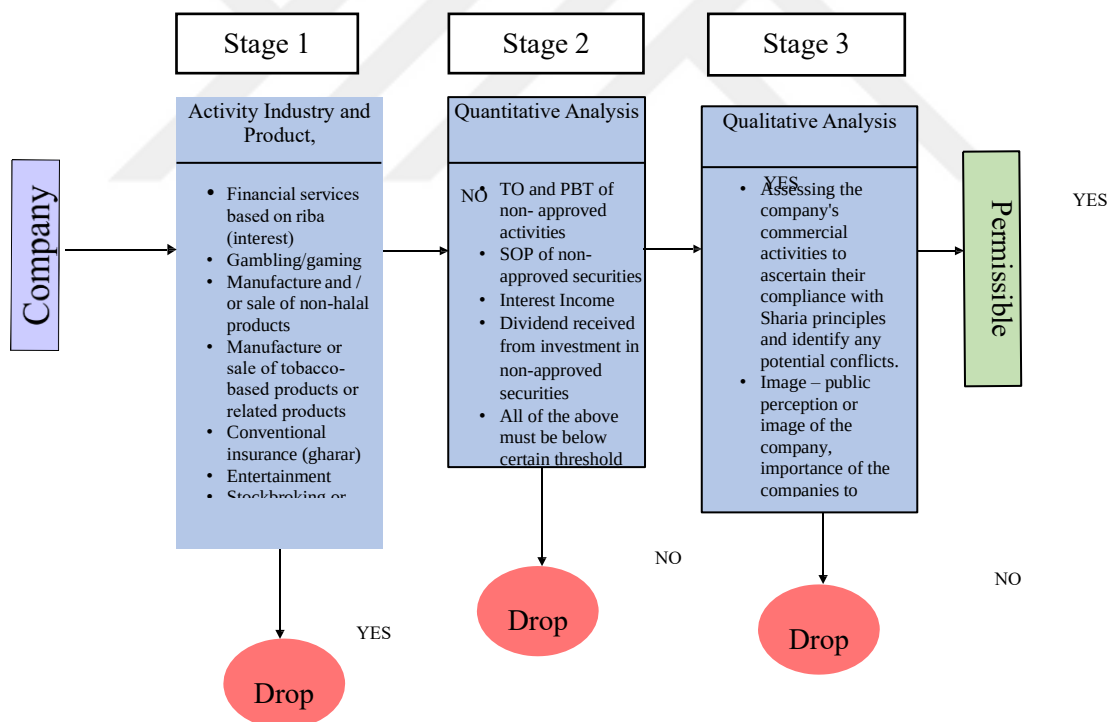


Figure 7: SAC, Securities Commission, and IDX Screening Process

Source: Author.

Based on the chart above, the company that can meet the criteria, can be classified as the sharia stock index. The investors who are concerned the Islamic lifestyle may select the

choice and the company that becomes the part of Islamic stock can gain more advantages because both Islamic and conventional investor can invest.

The investor nowadays concern on the environmental issue as well. According to the survey conducted by Katadata Insight Center, 595 investment respondents in Indonesia, 66.1% of them possess shares in companies that prioritise environmental, social, and governance (ESG) factors. Based on this study, the majority of participants regard investing in companies that prioritise environmental, social, and governance (ESG) factors as significant (Katadata, 2022). Many sub-index within the ISSI, particularly the ESG SRI KEHATI can be seen as one of the ways of the Indonesian government to classify the companies which consider the environmental and social issues. On December 20, 2021, the KEHATI Foundation and the Indonesia Stock Exchange jointly introduced two stock indices that are based on environmental, social, and governance (ESG) criteria. An example of such an index is the IDX KEHATI ESG Sector Leaders index. The purpose of this index is to enhance the existing SRI-KEHATI Index, which was introduced in 2009 and has since established a benchmark for ESG (Environmental, Social, and Governance) investment in the Indonesian stock market. The IDX KEHATI ESG Sector Leaders Index comprises equities that have ESG performance evaluation results beyond the sector average.

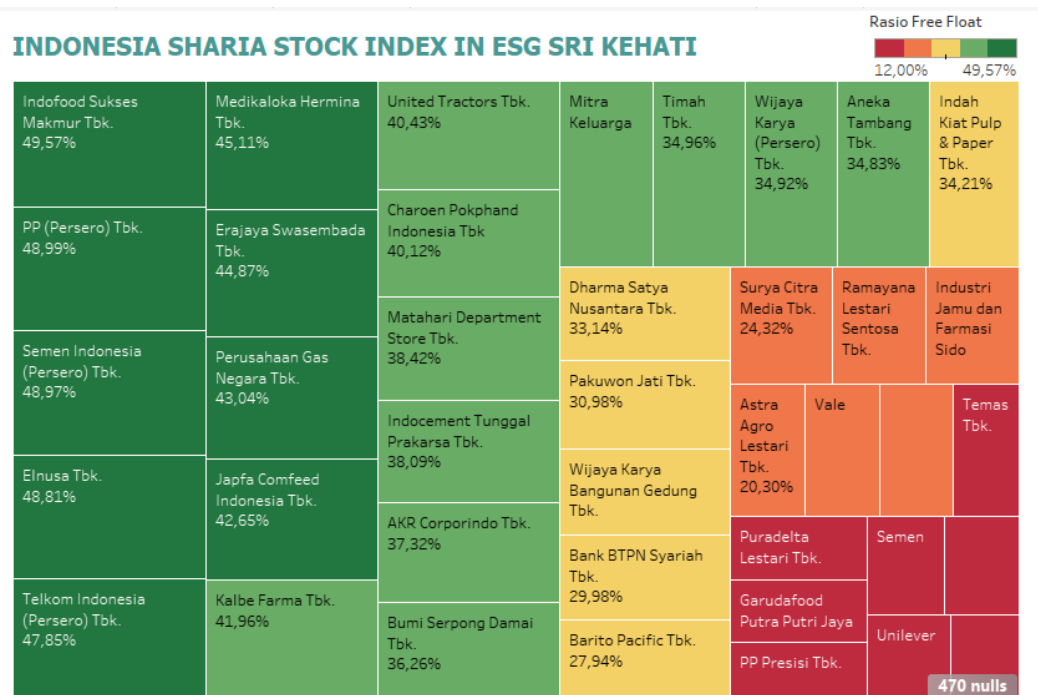


Figure 8: ISSI in ESG Sector Leader Sri Kehati

Source: Author.

The industry in issue refers to the segmentation of the sector based on the categorization on the Indonesia Stock Exchange. The code for the Indonesia Stock Exchange index is ESG SL IDX KEHATI. The constituents of the IDX KEHATI ESG Sector Leaders Index will undergo periodic reviews and updates in the months of May and November. During the examination, the weight of each stock in the index is capped at a maximum of 15%. The following is the glimpse of company that constitutes part of Indonesia Sharia Stock Index and lead the ESG sector leader in Kehati that is visualized by Tableau.

Based on the data shown above, the total of ISSI 2022 comprises of 510 companies listed from all of the sectors and it is only 40 companies which is classified as the ESG sector leader kehati, 470 does not include. According to the data presented above, the total number of companies in ISSI 2022 is 510, encompassing all sectors. Out of these, only 40 companies are categorised as leaders in the ESG sector (kehati), while the remaining 470 companies are not included in this classification. However, the aforementioned corporations are diversified and not specifically focused on the manufacturing sector due to their limited presence in this industry. The largest free float is in the green colour and wider shape. The free float demonstrates the amount of share owned by the public exclude controlling share.

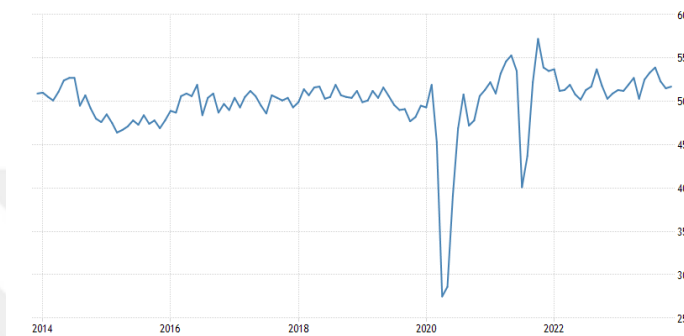
2.3. Manufacturing Sector

Manufacturing is a process that enhances the value of raw materials, components, or parts by transforming them into predetermined goods, products, or commerce that meet the precise expectations or requirements of a consumer. Manufactured goods can be either sold to other manufacturers for additional processing or sold directly to clients in marketplaces, such as wholesalers or retailers, and ultimately to end users. To do this, manufacturing activities have the crucial aim of enhancing value and generating profits, by ensuring that the prices of the products exceed those of the raw materials (Huang et al., 2019).

The stakeholders within the manufacturing company have strong leadership in running the business, particularly the business expansion of its production. The S&P Global Indonesia Manufacturing Purchasing Managers' Index assesses the efficiency of the manufacturing industry and is based on a survey of 400 manufacturing firms. The Manufacturing Purchasing Managers Index (PMI) is calculated using five separate

indexes, each with its weightage: New Orders (30%), Output (25%), Employment (20%), Suppliers' Delivery Times (15%), and Stock of Items Purchased (10%).

The Delivery Times index is inverted to ensure that it moves in the same direction as the other indexes for comparability. A value beyond 50 signifies a growth in the manufacturing sector in comparison to the prior month, whereas a reading below 50 signifies a decline. A reading of 50 shows that there has been no change. The following graphic shows the purchasing manager's index (PMI) manufacturing in Indonesia.



Graphic 3: Indonesian Manufacturer Purchasing Managers' Index (PMI)

Source: S&P Global.

The chart above explains that a Manufacturing PMI above 50 means that the Manufacturing sector has started to expand business expansion. Meanwhile, a reading below 50 indicates contraction. The PMI figure reflects an improvement in business conditions in Indonesia, along with increasing new demand both domestically and exports. It indicates that the leaders in this organization succeed in reaching its goals along with the group performance.

Besides, the essential for survival manufacturing is not only to generate profit but also the sustainable manufacturing process (Jayal et al., 2010). The U.S. Department of Commerce has defined sustainable manufacturing as the development of manufactured goods that apply methods aimed at reducing adverse environmental effects, preserving energy and natural resources, ensuring the safety of employees, communities, and consumers, and maintaining economic viability.

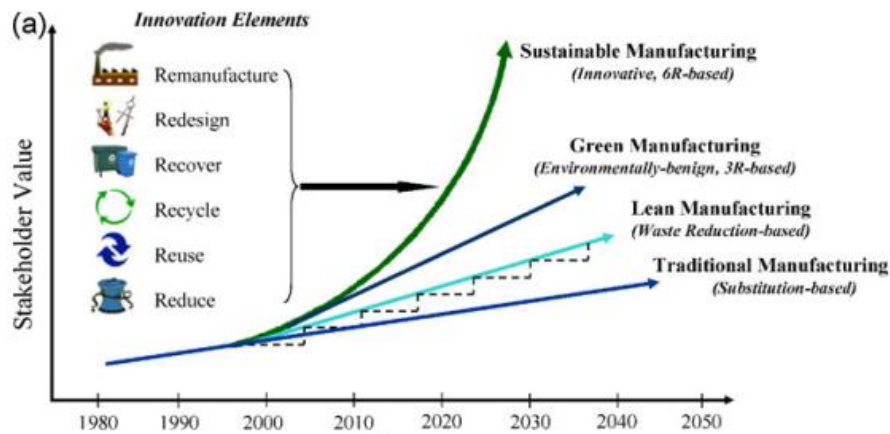


Figure 9: Evolution of Sustainable Manufacture

Source: Jayal et al., (2010).

The manufacturing can be classified as sustainable as long as it fulfills 6 innovation elements, particularly reduce, reuse, recycle, recover, redesign, and remanufacture. Meanwhile, green manufacturing addresses the 3 elements such as reduce, reuse and recycle. These elements must be implemented to maximize the increased product's value. When climate change issues arise, the management must be able to consider sustainably running the manufacturing company to avoid the worst of climate change.

Manufacture business may produce finished goods for consumers, or create components or intermediate products that are shipped to other businesses and may be incorporated into final products for sale or utilised to deliver services. Regardless of what business produce, a company relies on resources and services derived from the natural environment, such as metals, materials, fossil fuels, soil, water, and biodiversity. Additionally, the business generates "by-products" in the form of trash and emissions, which are released into the environment. Therefore, business actions have a direct influence on the ecosystem. The followings is foundational connections between manufacturing and the environment.

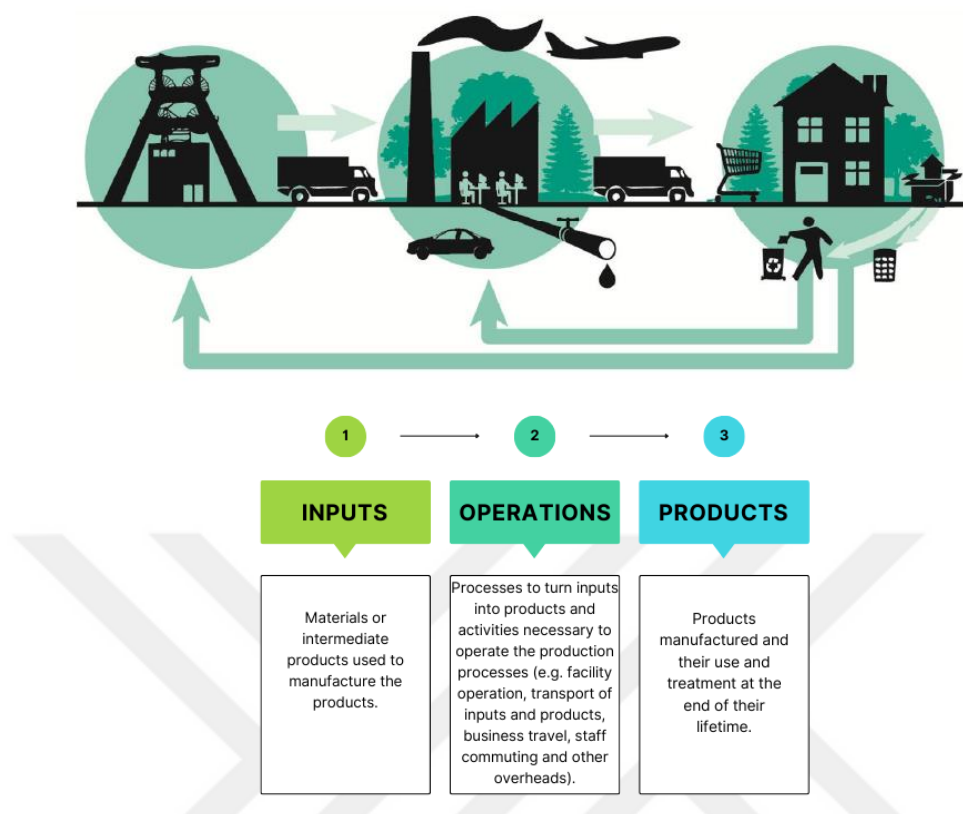


Figure 10: Manufacturing and Environmental Relation

Source: (OECD, 2011).

In accordance with the figure shown above, the manufacturing company is in constant and direct interaction with the surrounding environment. Since this is the case, the operations need to cover not only the 3R but also the 6R. For the purpose of evaluating environmental performance, the Sustainable Manufacturing framework includes 18 quantitative indicators that are both essential and broadly applicable. Indicators like this are particularly useful for internal management and decision-making, and they are applicable to all manufacturing sectors. An illustration of how the indicator of sustainable manufacturing ought to be constructed is shown in the following figure.

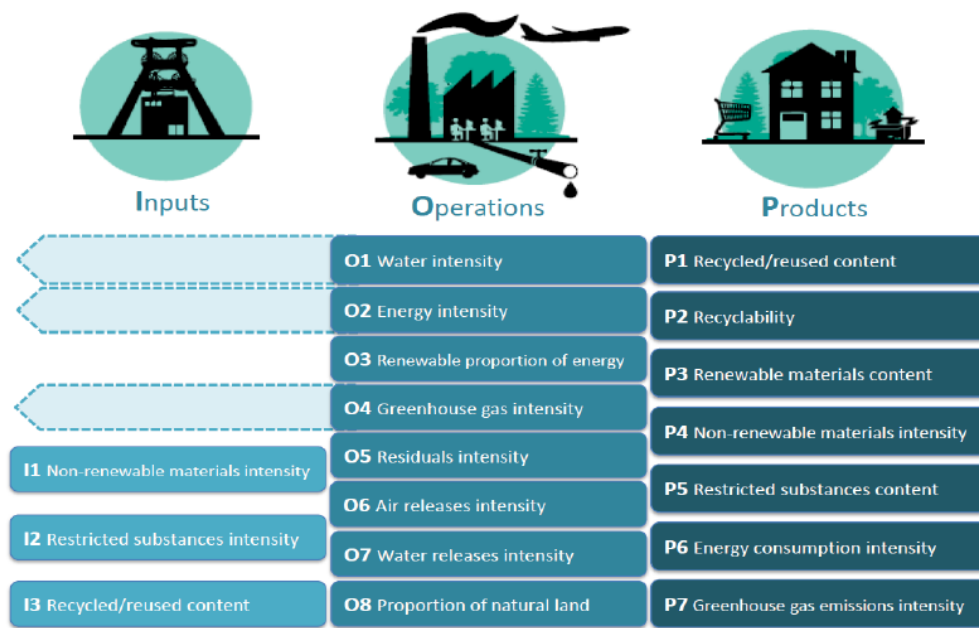


Figure 11: Glimpse of Indicator of Sustainable Manufacturing OECD

Source: (OECD, 2011).

Based on the figure 8 illustrates that indicators O1, O2 and O4 can also be expanded to assess the environmental impact of the supply chain and facility. Specifically, they can measure the amount of water and energy used, as well as the greenhouse gas emissions generated throughout the manufacturing process of inputs.

2.4. Hypothesis Development

2.4.1. Relationship between Eco-Efficiency and Firm Value

The environmental issue becomes a big deal for the company in the present world since the management must align the external issues such as climate change to the policy made by the organization. The contingency theory adopted within the internal organization may lead to identifying the characteristics of the environment and resources. Mahmud et al., (2021) revealed in their findings that the firm can adapt to external pressure while implementing the management of the environment by utilizing contingency theory in particularly decentralized structures in 106 small and medium-sized enterprises in the United Kingdom.

The external conditions are related to the internal organization to shape the organization fit and thus that will determine the company's performance (Burns & Stalker, 1994; Tangpong et al., 2019). Therefore, the management company must commit to the external

issue by implementing eco-efficiency in the operational business because the management must establish policies and procedures that are related to how the company will deal with environmental issues (Boxer, 2013).

Sinkin et al., (2008) explained that the business is linked to sustainable development since the implementation of eco-efficiency constitutes the creation of more value with less input. Evidence in their findings stated that when eco-efficiency is implemented as part of the business strategy, then it will increase higher firm value. Since it reduces costs and increases profits resulting in high value by the market. The positive correlation between eco-efficiency and firm value is rooted in the notion that prioritizing manufacturing costs will lead to a subsequent boost in corporate earnings, thus elevating the overall worth of the company (Osazuwa & Che-Ahmad, 2016). Based on the explanation above, the hypothesis can be:

H1: eco-efficiency is influenced to the firm value

2.4.2. The Effect of Leverage as Moderating Variables

The concept of eco-efficiency that is implemented by the contingency theory of the firm will require much cost due to depend on the size of the firm, industry, and the complexity of the process. Although it requires much money for the certification, eco-efficiency can maximize the output with the input that is more ecologically. Economic technology innovation has significant improvements in eco-efficiency in developed and developing countries (Y. Zhang et al., 2021a). However, when it comes to investment in technology innovation, the company will need more funding to realize it. Thus, the company has two kinds of solutions, particularly issuing its shares and borrowing money as the capital structure of the company.

Lang et al., (1996) believed leverage and growth are negatively correlated for enterprises with low Tobin's q ratio. Thus, debt does not impede growth for enterprises with attractive investment opportunities. It is in line with the finding from (Bae, 2009), who found that Chinese enterprises with greater investment prospects exhibit a notable negative correlation between their market total debt-equity (MTDE) ratios and their borrowing tendencies, implying that they are inclined to borrow less. The outcomes, however, indicate that the relationship between financing and investment is influenced by the method employed to assess financial leverage. The findings additionally indicate that

there is no significant correlation between the long-term debt-equity ratios of Chinese companies and their investment prospects. This suggests that long-term corporate debt plays a negligible role in the relationship between leverage and investment for Chinese firms.

However, as a firm's debt/equity ratio increases, there is a greater incentive for the firm's management to adopt accounting practices that accelerate earnings from the future to the present. This is believed to enhance the firm's value (Watts & Zimmerman, 1990). Osazuwa & Che-Ahmad, (2016) and Roberts, (1992) argued that the corporation should enhance its environmental efforts and provide more environmental information to meet the creditors' expectations on environmental issues, given the growing reliance on debt. Based on the explanation above, the hypothesis can be:

H2: leverage moderates the relationship between eco-efficiency and firm value.

2.4.3. The Effect of Profitability as Moderating Variables

When the company implements eco-efficiency, it must contribute to the profitability of the company since the waste is reduced and more economic benefits as well as environmental protection. Profitability becomes the main concern of Malaysian-listed companies since it is related to another party (Alarussi & Alhaderi, 2018). (Van Lear, 1999) revealed that the profitability index can be utilized to evaluate the current position of the economy within the business cycle. Increasing profitability indicates that the economy is following a long-term growth trajectory, but a peak or decline in profitability indicates a slowdown in growth and the economy is likely to enter a recession. The research conducted by (D. Zhang & Xie, 2022), found the result derived from a sample of 5390 manufacturing enterprises across 25 Central and Eastern European and Central Asian nations, demonstrating that customer environmental concerns have a favorable effect on profit margins for firms with low energy-intensity, whereas they have an adverse effect on profit margins for firms with high energy-intensity. Furthermore, enterprises that have high energy intensity and implement energy efficiency measures are more adversely impacted by customer environmental concerns compared to firms that also have energy efficiency measures.

It is in line with the result found by (Lankoski & Helsinki University of Technology, 2000) in his dissertation accomplishment, he analyzed the determinants of environmental

profits by using six factors such as technology, regime, visibility, willingness to pay, benchmarks, and discount rate. The result demonstrates that the correlation between environmental and economic success at the firm level follows an inverted U-shaped pattern, which differs between firms based on the six primary factors influencing environmental profitability. A profit-maximizing firm's advantage from a proactive environmental policy is uncertain. Managers should analyze the specific conditions in which they are working, and develop a suitable environmental strategy that aligns with the opportunities available in their position. However, managers do not have to remain passive and helpless in the face of their circumstances; they can also proactively strive to influence the conditions surrounding their company. Firms should not only review their circumstances but also analyze how the model is relevant to their rivals and other actors in their value chain, such as suppliers and customers. This will enable them to comprehend their situation better and evaluate potential responses. Based on the explanation above, the hypothesis can be:

H3: profitability moderates the relationship between eco-efficiency and firm value.

According to the above explanation, it can be illustrated in the following table that describes the independent, dependent, moderate, and control variables.

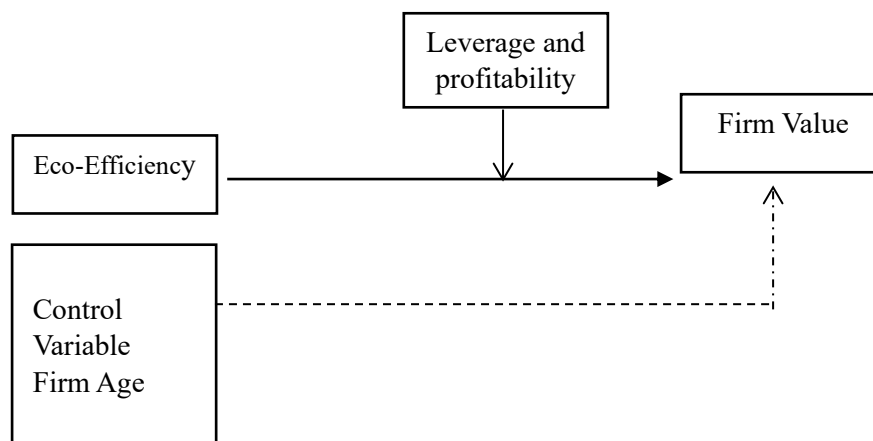


Figure 12: Conceptual Framework

Source: Author.

CHAPTER 3: EMPIRICAL ANALYSIS

3.1. Empirical Literature Review

The term of eco-efficiency has attracted a lot of attention (DeSimone, 2000 & Feldman et al., 1997), as the tool to reduce the environmental damage caused by the business operation. Since the government of Indonesia has committed to reduce the emission, they issue the policy of green innovation that must be followed by the private sector, especially when the company's activity produce a lot of emissions. The research from Solikhah et al., (2020) shows that Indonesian industrial enterprises disclosed carbon emissions at 18.79%. It demonstrated that firm management awareness of carbon reduction was ineffective. It requires government, stakeholders, and connected parties to adopt legislation to help companies be environmentally conscious, notably about carbon emissions. The ineffective of carbon reduction by the firm management can be caused by low of eco-technology innovation. It is in line with the result found by Y. Zhang et al., (2021) which examined 102 nations' EE (eco-efficiency), ETI (eco-technology innovation), and EWP (eco-well being performance) The result showed that Economically developed countries have higher EE, ETI, and EWP than low-income countries. Comparing 3E numbers in different countries to the worldwide average shows that global 3E performance is low.

However, regarding the emission reduction, sustainable businesses must be economic, social, and environmental friendly in order to avoid the environmental degradation. According to Ekins (2005), when management incorporates the efficient utilisation of the environment into the strategic planning of the company, they are able to establish a direct link between the environmental goals of the firm and the profitability of the company. There are several empirical previous research that show the relationship between the environmental innovation to the firm value. The following is the table for the previous empirical evidences that become the reference within this research thesis.

No.	Author	Title	Country	Methodology	Result
1.	Khalid et al., (2023)	Does corporate green investment enhance profitability? An institutional perspective.	China	Least squares dummy variable fixed effect panel regression for the Chinese A listed companies for 2010 to 2019.	CGI increases profitability, and Environmental Protection Law 2015 strengthens this relationship. Regional growth boosts CGI's profitability benefits.
2.	Asni & Agustia, (2022)	The mediating role of financial performance in the relationship between green innovation and firm value: evidence from ASEAN countries.	ASEAN (Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam)	Panel data from 374 publicly listed companies 2015 to 2019.	The financial performance in this case as ROA, and ROE has a significant role in mediating the relationship between green innovation and firm value. It indicated that the ASEAN investors region prefers the motivation of economic in the company that implements green innovation. Besides, ROE and ROA have an association significantly towards firm value
3.	Xie et al., (2022)	Impact of green innovation on firm value: evidence from listed companies in China's heavy pollution industries.	China	Unbalance panel data, from 2008 to 2017 using fixed effect model with moderate variables such as financial flexibility and analyst coverage while control variable is firm-level characteristics.	1) The more green patent applications a company has, the lower its value becomes, but this decrease in value is only temporary; 2) Both the company's financial flexibility and the attention it receives from analysts partially lessen the impact of green innovation on its value; 3) Analyzing differences among companies shows that they can reduce the negative impact of green innovation on their value by increasing executive equity incentives and the pay gap between management and employees. Furthermore, when the level of economic policy uncertainty rises, the magnitude of the adverse effects diminishes.
4.	Sudha, (2020)	Corporate environmental performance-financial performance relationship in India using eco-efficiency metrics.	India	Panel data regression model in 224 Indian and S7P 500 companies from 2002 to 2011.	A statistically significant positive relationship between eco-efficiency based CEP and CFP metrics, which supporting supporting Porter's win-win theory. In addition, the results demonstrated a positive two-way causal association between Corporate Environmental Performance (CEP) and Corporate Financial Performance (CFP) with a one-period time lag, indicating the potential for mutual reinforcement in the CEP-CFP relationship

5.	Sutrisno & Wendy, (2020)	The effect of eco-efficiency and quality management system on firm's performance: moderating role of profitability and leverage.	Indonesia	Panel data regression with moderating variables of profitability and leverage in Indonesia Stock Exchange from 2012 to 2017.	Diminishing the impact of eco-efficiency on firm performance. Meanwhile, profitability can strengthen the value between quality management to the firm performance and leverage does not reveal any interaction effect.
6.	Wang & Zhao, (2020)	Economic impacts of ISO 14001 certification in China and the moderating role of firm size and age.	China	Difference-in-difference method with 63 listed companies in Shenzhen and Shanghai stock exchange from 2003 to 2018.	ISO 14001 certification hurts enterprises' financial performance, but the negative effects lessen with certification time. Firm size and age significantly affect ISO 14001 certification and financial success. ISO 14001 accreditation also boosts a company's global competitiveness.
7.	Jové-Llopis & Segarra-Blasco, (2018)	Eco-efficiency actions and firm growth in European SMEs	European Union	Ordered logistic model using dummy variable in 11.366 small medium enterprises from 28 European nations.	Some eco-strategies may not lead to improved performance, especially in the near future. European enterprises who utilize renewable energies and focus on recycling or creating products that are easier to maintain, repair, or reuse demonstrate superior performance. Efforts to decrease water or energy pollution appeared to have a negative relationship with company expansion. In addition the output suggest that a substantial investment in eco-friendly initiatives enhances the success of companies, especially those that become EU members after 2004. They found a U-shaped correlation between eco-strategies and business growth, suggesting that a wider range of eco-strategies leads to improved firm performance. Yet, only a small number of European small and medium-sized enterprises have the capacity to make significant investments or implement various eco-friendly practices, creating an opportunity for governmental interventions.
8.	Yook et al., (2017)	The disclosure of environmental conservation costs and its	Japan	Regression analysis model employed on the Japanese firms during 2002 and 2012.	A negative correlation between stated environmental control costs and eco-efficiency performance indicators. This correlation is

		relation to eco-efficiency: Evidence from Japan.			particularly significant during the Kyoto protocol period for two out of three eco-efficiency metrics.
9.	Osazuwa & Che-Ahmad, (2016)	The moderating effect of profitability and leverage on the relationship between eco-efficiency and firm value in publicly traded Malaysian firms.	Malaysia	Hierarchical regression including Moderated regression analysis with the sample of 667 non-financial firm in Bursa Malaysian of 2013.	A direct correlation between eco-efficiency and the value of the firm. It also found evidence supporting the idea that profitability has a positive influence on the relationship between eco-efficiency and firm value. However, there was no significant effect observed for leverage in this relationship.
10.	Gurvits & Habakuk, (2016)	Environmental management in European Union: survey of ISO 14001 certified Estonian companies.	Estonia	Survey to the certified Estonian companies in September to October 2015.	Estonian enterprises are actively engaged in the environmental management process. Consequently, they have launched the ISO 14001 certification procedure and are eager to renew the certificate following its expiration. Nevertheless, it is important to note that the organisations questioned do not establish a clear connection between the green certification certification and the reduction of specific costs and expenses.

Table 4: Previous Empirical Evidence

Source: Author.

3.2. Research Gap

The depth understanding of implementation eco-efficiency for the management of the company will contribute to the firm value. Consequently, it should be deeper dug for the research and the study of this issue will offer advantages for the stakeholders and shareholders of the company as well as the positive impact of the environment. The previous research regarding this study conducted by (Asni & Agustia, 2022; Jové-Llopis & Segarra-Blasco, 2018; Osazuwa & Che-Ahmad, 2016; Sudha, 2020; Xie et al., 2022; Yook et al., 2017), that examined the relation of eco-efficiency towards firm value.

Based on the empirical previous research in the eco-efficiency and firm value from ASEAN, India, China, European, Japan, and Malaysia, the case of Indonesia particularly Islamic manufacturing listed companies is still lack of studies. Thus, this research will fill the gap with novelty of leverage and profitability in sharia index as moderated variable by employing factor of ages as the control variable. This result of this research study will provide policymakers in the government, academicians, stakeholders of the company and investor insights in the process of decision making.

3.3. Research Problem

Numerous countries both developed and developing take action to tackle climate change. Based on the Paris Agreement conducted on December 2015, 195 countries signed up the agreements to combat climate change. In Indonesia, the government commits to decrease the GHG emissions as part of the contribution to UNFCCC (Government of Indonesia 2021). Many factors contribute to the gas emission of Indonesia, but the highest comes from the energy (refers to the table 2) which the Manufacturing companies uses fuel and non-fuel to run its operational activity. Manufacturers primarily employ this electricity for their operations. Additionally, electricity is used to power equipment and related production facilities (U.S. Administration, 2023). In the US of 2018, the usage of fuel sources reached 68% while non-fuel was 32% of energy consumption by the U.S. manufacturers. Meanwhile, in Indonesia in 2016, the manufacturing industry consumed roughly 40% of energy as the second largest after transportation although the manufacturing sector is one of the largest contributors to the Indonesian economy

(Setyawan, 2020). The following table shows the Indonesian manufacturing sector with energy consumption.

Sector	Share of Total Percentage of Energy Consumption (2010-2015)
Food, Beverages, and Tobacco	17,7%
Textile, Wearing Apparel and Leather	11,6%
Wood and Wood Products	2,3%
Paper and Paper Products	8,5%
Chemical, Petroleum, Coal, Rubber and Plastic Products	20,8%
Non-Metallic Mineral Products	20,6%
Basic Metal Industries	9,5%
Fabricated Metal Products, Machinery and Equipment	8,8%
Other Manufacturing Industries	0,3%

Table 5: Energy Consumption of Indonesia Manufacturing Company

Source: (Setyawan, 2020).

The table shown above illustrates that the most significant use of energy was Chemical, Petroleum, Coal, Rubber, and Plastic Products which was similar to the US manufacturing energy consumption. Many policies has been issued by the government of Indonesia to reduce the GHG emission. However, it is still less efficient. The stakeholders and shareholders of the private sector must involve to tackle the issue as well. Since the manufacturing company consumes a lot of energy in its electricity, and contributes to the damage of environments due to the process of the product operational activity, the management must implement the eco-efficiency through the ISO 14001 as the legal framework. The utilization of eco-efficiency is related to the firm value based on the empirical evidence from China as the same case with Indonesia as one of the largest contributor of GHG emission in the world (Xie et al., 2022). the implementation of this policy will absolutely assist the government of Indonesia to achieve the target. Despites

a lot of efforts has been done by the parties to tackle climate change, the environmental damage still becomes worst. Thus, this research study will aim to demonstrate the relation of eco-efficiency towards firm value in the manufacturing company so that the output will offer advantages to the stakeholders of the company and shareholders, as well as the government to maximize its policy in this field.

3.4. Methodology

This research study employs quantitative method. Williams, (2007) revealed that the quantitative can be employed to response the related variable questions within the research, where the researcher attempts exploration and prediction. Creswell, J. (2003) stated that the quantitative method can uphold the empirical paradigm assumption. The quantitative technique aims to build, confirm, or validate links and develop generalisations that contribute to theory (Leedy, P. & Ormrod, J, 2001).

This study uses regression test analysis with balanced panel data from 2013 to 2022. The regression test determines if the independent variable has a positive or negative effect on the dependent variable and predicts the dependent variable's value. Before running the regression analysis test, the classical assumption must be undergone in order to avoid the bias within the regression data and obtain the valid estimation, particularly normality, heteroscedasticity, multicollinearity, and autocorrelation test. Afterwards, the hausman and chow test will be used to determine which panel data model is best amongst fixed, common, and random effect. After the model has been decided from hausman and chow test, the regression analysis will be estimated to examine the impact of eco-efficiency on business value. According to Ohlson (1995), there is other relevant information that might contribute to the anticipated growth of a company's firm earnings. If there is a positive correlation between the information and future earnings, there will also be a positive correlation with the firm's market value. Therefore, this study thesis will use eco-efficiency in the model as it may aid in supplying information that might elucidate the enhanced efficiency and prospective augmented earnings that would ensue from using an eco-efficiency strategy in the business operations.

In addition, the research thesis also examines the moderating effect such as leverage and profitability on relationship between eco-efficiency and firm value. Thus, it will be continued to analyze using moderated regression analysis (MRA) to assess whether the

moderating variables increases or weakens the independent-dependent relationship. Moderated Regression Analysis (MRA) is a specialised kind of Linear Regression analysis that includes a 'interaction term' in the regression equation (Champoux & Peters, 1987; Southwood, 1978). MRA is defined as a moderator that become a third variable that modifies the nature of the association between a focal predictor and a dependent variable. Therefore, it quantifies the impact of moderation by using the regression coefficient to represent the interaction effect. Thus, the moderated regression analysis is the most suitable regression to be used in order to investigate how leverage and profitability may enhance this relationship as the moderating variables.

3.4.1. Data and Variables

3.4.1.1. Variables

The variables analysed in this study are based on the major problem formulated and the stated hypothesis. Andrade, (2021) defined independent variable as the value that affects to other variable. The independent variable within this research study is eco-efficiency with using ISO 14001 certification as the proxy measurement, the variable will employ dummy variable in which if the company has ISO 14001 then it will be indicate as 1, and if the company does not have ISO 14001 then it will be indicated as 0. Andrade (2021) defined dependent variable as the value that is affected by other variables. The dependent variable within this research study is firm value with using TobinsQ as the measurement. Khanfer et al., (2013) defined moderating variable as the variable that can affect the strength of the relationship between an independent variable and a dependent variable. In the research, to infer the variable is moderating, it must have a significant statistical interaction between the predictor and moderator $p < 0.05$. The moderated variables within this research study are leverage and profitability with return on assets as the measurement value.

This research thesis employs control variable that can be controlled or made constant so that the effect of the independent variable on the dependent is not influenced by external factors that exclude from the research study. The control variable within this research study is age. Company age refers to the amount of time a company has been in operation or carrying out commercial activities since its inception or legalisation letter. Yularto and Chariri, (2003) revealed that company's age indicates that it will continue to exist,

compete, and capitalise on economic prospects. In this study, the firm age variable is calculated as the sample year minus the year the company was created. The measurement of age is the year of research is minus with the year of company establishment.

3.4.1.2. Types and Sources of Data

The data used within this research study is quantitative data which is formed in number, and will be analyzed using the statistical method. The data obtained from the secondary data refers to the each company's information through annual report and financial statement that can be downloaded through its website. The data must fit the criteria of the sample within this research study in particularly list of Indonesia Sharia Stock Index in Manufacturing sector obtained from Indonesia Stock Exchange (www.idx.co.id) spanning from 2013-2022.

3.4.1.3. Population and Sample

Population is defined group of subjects selected by academics to investigate and make conclusion meanwhile sample represents the number and characteristics of the population (Anshori and Iswati, 2009:92). This analysis includes every manufacturing entity registered on the Indonesia Sharia Stock Index from 2013 to 2022.

Purposeful sampling is a method used to identify and choose certain criteria that contain valuable information, allowing for efficient use of limited resources (Patton, 2002). Morse and Niehaus (2009) stated that sampling methods aim to optimise efficiency and validity. In order to be the sample, the followings are the criteria that must be fulfilled:

1. The manufacturing companies Sharia Index listed and published in the Indonesia Stock Exchange period 2013-2022.
2. The manufacturing companies Sharia Index provide the data period 2013-2022.

Description	Company	Total (Company x year)
1. The manufacturing companies Sharia Index listed and maintain its position in the Indonesia Stock Exchange period 2013-2022.	78	780
2. The manufacturing companies Sharia Index did not provide the data period 2013-2022.	(38)	(380)
Total	40	400

Table 6: Population and Sample Criteria

Source: Author.

The table shown above that the number sample will be used within this research study is 40. The overall of the companies and the derived data can be seen as follows:

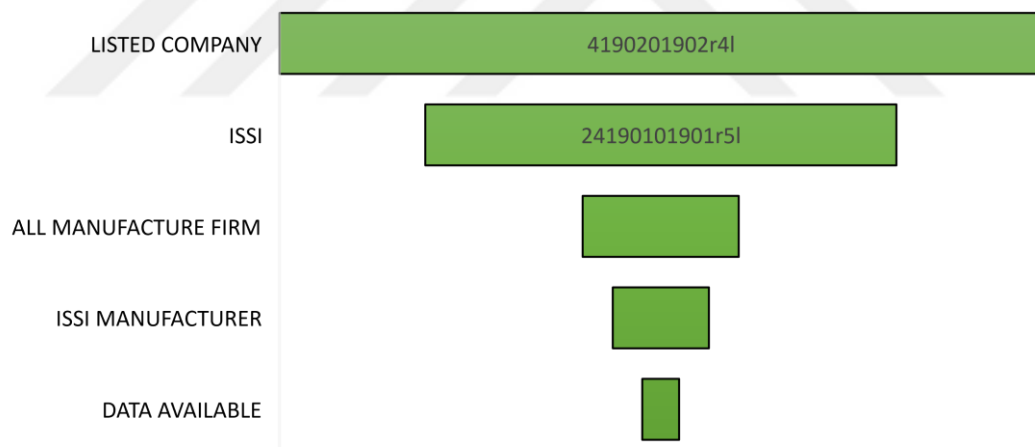


Chart 1: Derivative Data during 2022

Source: Author.

3.4.2. Classical Assumption

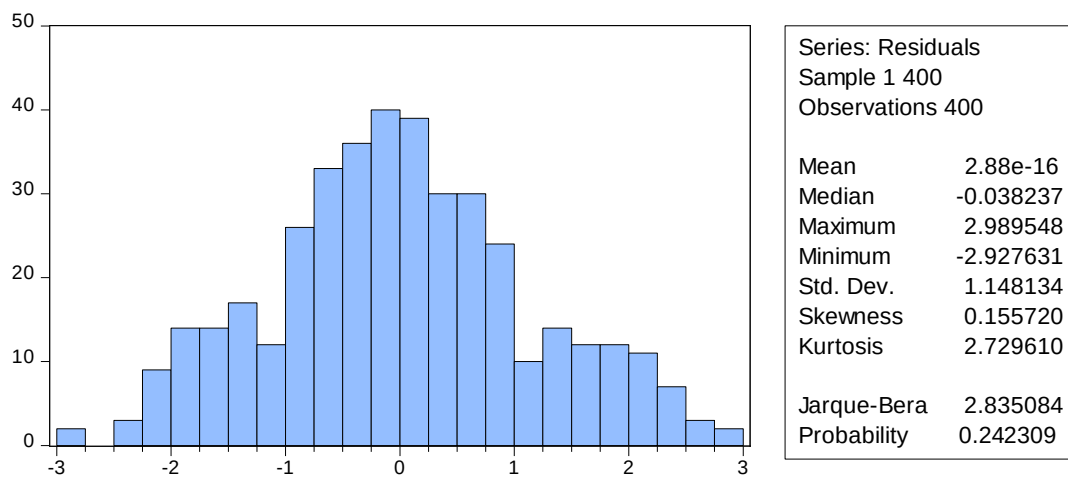
The classical assumption test is a necessary statistical condition for doing linear regression analysis. Conducting the standard assumption test is necessary to minimise bias in Linear Regression analyses as the empirical model. An ideal regression model is one that is devoid of biases that could lead to errors in interpretation. The study employs

classic assumption tests like normality test, heteroscedasticity test, multicollinearity test, and autocorrelation test.

3.4.2.1. Normality Test

Normality test is used to examine if the residual data in the regression model has been distributed normally (Ghozali, 2006:110). Many ways to test the normality, such as Jarque and Bera (1980), the tests of Kuiper (1960), Shapiro and Wilk (1965) and tests of Kolmogorov-Smirnov and Cram'ervon Mises type (Thadewald & Büning, 2004). However, this research study will employ Jarque and Bera since the recommended tests have excellent asymptotic power characteristics and perform well in finite sample scenarios. Because of their simplicity, they are expected to be valuable tools in statistical analysis (Jarque & Bera, 1987). Gujarati (2004) discovered that every residual or error component follows a normal distribution with a mean of zero and a variance of 2. If the significance probability is more than 0.05, the null hypothesis (H_0) is accepted, implying that the residual data follows a normal distribution. Conversely, if the probability is less than 0.05, the null hypothesis is rejected, suggesting that the residual data does not follow a normal distribution.

The normality test aims to observe the output of the data whether or not is distributed normal. This research study will utilize the approach of Jarque-Bera to examine the normality test. The following is the output of the data.



Graphic 4: Normality Test

Source: Author

Based on the data shown above, the data implies that the Jarque-Bera is 2.835084 and probability value is distributed normal as the value 0.242309 is higher than 0,05. Thus, the data pass the normality test and it can move forward.

3.4.2.2. Heteroscedasticity Test

The purpose of the heteroskedasticity test is to determine whether there is variation in the level of inequality between observations within a regression model. The optimal regression model is characterized by the absence of heteroskedasticity. Statistical tests, such as the Glejser test, can be used to identify heteroscedasticity issues. This research study employs the Glejser test to assess This research study employs the Glejser test to assess the similarity of residuals by regressing the absolute residual value of the current regression model with the independent variables utilised (Ghozali, 2006: 108). When the probability value of the test is greater than 0.05, it suggests that the data is not affected by heteroskedasticity.

The heteroscedasticity test is employed to assess whether there is a disparity in the variance of residuals across different observations in the regression model. This research study will employ the approach of Glejser test to see whether or the data does not possess the heteroskedasticity problem. The following is the output of the data.

Heteroskedasticity Test: Glejser				
F-statistic	2.037897	Prob. F(4,395)		0.0884
Obs*R-squared	8.087863	Prob. Chi-Square(4)		0.0884
Scaled explained SS	8.253941	Prob. Chi-Square(4)		0.0827
Test Equation:				
Dependent Variable: ARESID				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.569807	0.156449	3.642118	0.0003
Eco-efficiency	-0.031442	0.076624	-0.410339	0.6818
Age	0.004855	0.002884	1.683367	0.0931
Leverage	0.209360	0.142771	1.466398	0.1433
Profitability	0.382853	0.233196	1.641766	0.1014
R-squared	0.020220	Mean dependent var		0.906156
Adjusted R-squared	0.010298	S.D. dependent var		0.703588
S.E. of regression	0.699956	Akaike info criterion		2.136823
Sum squared resid	193.5258	Schwarz criterion		2.186716
Log likelihood	-422.3646	Hannan-Quinn criter.		2.156582
F-statistic	2.037897	Durbin-Watson stat		1.026937
Prob(F-statistic)	0.088373			

Table 7: Heterocedasticity Test

Source: Author.

Based on the data above, the value of *Obs*R-squared* with the probability is 0.0884. Moreover, the probability value for each variable is more than 0.05. Thus, it can be interpreted that there is no heteroskedasticity problem within the data.

3.4.2.3. Multicollinearity Test

The relationship between one independent variable and other independent variables in the regression model is tested using the multicollinearity test (Ghozali, 2006: 91). Multicollinearity problems can be detected using the tolerance value and the variance inflation factor (VIF) value. If the tolerance value > 0.10, there is no correlation between the independent variables (independent), while if using the VIF value, if the VIF value is < 10, then there are no symptoms of multicollinearity in the independent variables in the regression model built.

The multicollinearity test aims to test whether there is a correlation or linear relationship between the independent variables or not in the regression model and aims to avoid bias in the decision-making process. A good regression model should not have a correlation between the independent variables. The multicollinearity test is carried out by looking at the Variance Inflation Factor (VIF) value. The following is the output of the data.

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.066522	19.98325	NA
X	0.015957	3.295479	1.029837
Control	2.26E-05	18.15420	1.084780
M1	0.055399	4.175642	1.218079
M2	0.147795	1.485689	1.276164

Table 8: Multicollinearity Test

Source: Author

Based on the data above, the VIF value of each variable within this research study is less than 10. Therefore, it does not contain multicollinearity problem.

3.4.2.4. Autocorrelation Test

Abduh & Zein Isma, (2017) argued that an ordinary least squares regression model might assume that each residual or error component is autonomous and unrelated. Durbin-Watson can identify autocorrelation. An ordinary least squares regression model could assume that the individual error or residual term is independent such as uncorrelated with each other. To detect the autocorrelation problem can use the Durbin-Watson statistic. The following is the output of the data.

S.E. of regression	46.48956	Sum squared resid	1026608.
F-statistic	18.03717	Durbin-Watson stat	2.111231
Prob(F-statistic)	0.000000		

Table 9: Autocorrelation Test

Source: Author.

The data can pass the autocorrelation test as long as the value of DU is less than DW less than 4-DU. The DU value can be obtained from the table of Durbin Watson. According to the data above, $DU < DW < 4-DU$ ($1,86272 < 2,111231 < 2,13728$) thus it can be interpreted that the data does contain autocorrelation test so that it can be continued to the regression model.

3.4.3. Panel Data Model Test

In order to determine which kind of the model that is most suitable for the panel data used within this research study, the several test will be run. The following is the Chow test to compare between common and fixed model.

Redundant Fixed Effects Tests			
Test cross-section fixed effect			
Effect Test	Statistic	d.f	Prob.
Cross-section F	17.121239	(39,353)	0.0000
Cross-section Chi-square	421.536049	39	0.0000

Table 10: Chow Test

Source: Author

Based on the shown table above, the value of probability is 0.0000 which indicate that is lesser than 0.05. Thus, the fixed effect model is selected. After running the chow test, the hausman test will be employed to compare between fixed effect and random model. The following is the Hausman test result.

Correlated Random Effects-Hausman Test			
Test cross-secrion random effects			
Test Summary	Chi-Sq Statistic	Chi-Sq.d.f	Prob.
Cross-section random	65.153207	4	0.0000

Table 11: Hausman Test

Source: Author

According to table above, the value of probability is 0.0000 which indicate that is lesser than 0.05. The fixed effect model wins over the random model. Hence, within this research study, the fixed effect model will be utilized as the regression analysis test to observe whether or not the relationship between independent variable to dependendent variable, as well as the effect of moderating variables.

3.4.4. Empirical Model

This research study will utilize the Linear Regression with the prediction model for the dependent variable in this case as eco-efficiency. In addition, it will be further analyzed with using MRA as the leverage and profitability as the moderated variables. This regression model is used to test the hypothesis which will be formulated as follows:

Linear Regression

$$\text{TOBINSQ}_{it} = \alpha + \beta_1 \text{ECO}_{it} + \beta_2 \text{LEV}_{it} + \beta_3 \text{ROA}_{it} + \beta_4 \text{AGE}_{it} + \varepsilon_{it}$$

Equation 4

Moderated Regression Analysis is a special application of linear regression where the regression equation contains an element of interaction (multiplication of two or more independent variables). The equation is formulated with the following formula:

Moderated Regression

$$\text{TOBINSQ}_{it} = \alpha + \beta_1 \text{ECO}_{it} + \beta_2 \text{LEV}_{it} + \beta_3 \text{ROA}_{it} + \beta_4 \text{ECO}_{it} * \text{LEV}_{it} + \beta_5 \text{ECO}_{it} * \text{ROA}_{it} + \beta_6 \text{AGE}_{it} + \varepsilon_{it}$$

Equation 5

Notes:

α : constanta

TOBINSQ_{it} : firm value, company *i* year *t*

ECO_{it} : eco-efficiency, company *i* year *t*

LEV_{it} : leverage, company *i* year *t*

ROA_{it} : return on assets, company *i* year *t*

AGE_{it} : company's age, company *i* year *t*

ε_{it} : error, company *i* year *t*

3.4.5. Analysis Test

3.4.5.1. Descriptive Test

Ghozali, (2011) revealed that an overview of the factors connected to the research was provided in this study through the use of descriptive analysis. Data collection, summary, and presentation in tabular, visual, or numerical form are all related to descriptive statistics. The average value (mean), maximum and minimum values, and the degree of data deviation (standard deviation) are among the details that descriptive analysis provides as an overview of the size of the data formulation.

3.4.5.2. Determination Coefficient Test

The adjusted R² value measures the extent to which the model can predict the impact of independent factors on the dependent variable. The adjusted R² value varies between 0 and 1. As the modified R² value approaches 1, the impact of the independent variables on the dependent variable increases.

3.4.5.3. T Statistical Test

The statistical t test is utilized to quantify the extent to which each independent variable affects the dependent variable. The impact of each independent variable can be assessed by comparing the computed significance value obtained from the regression model with the threshold value (α) in the t test. If the estimated significance value is greater than the error level (α), then it can be concluded that the independent variable does not have a significant effect on the dependent variable. If the estimated significance level value is less than the error level (α), then it indicates that the independent variables have a statistically significant effect on the dependent variable when considered separately.

3.5. Results

3.5.1. Overview of Research Subjects and Objects

This research study aims to investigate the impact of eco-efficiency on firm value with leverage and profitability act as the moderating variables. The subject of this research are undertaken on Indonesia Sharia Stock Indexed manufacturing companies in period 2013-2022. By employing purposive sampling in table 5, there are two conditions that must be fulfilled, namely the manufacturing company must be in the ISSI during 2013-2022, and it must provide the data spanning from 2013-2022. The entire population of manufacturing businesses listed on the IDX, which are indexed to the sharia stock, was 78 in the years 2013-2022. Out of the total population, there are 40 samples from different companies that have been selected based on specific criteria and will be observed in the study. The following figure demonstrates the glimpse of overall data within this research study that is visualized by the Tableau software.

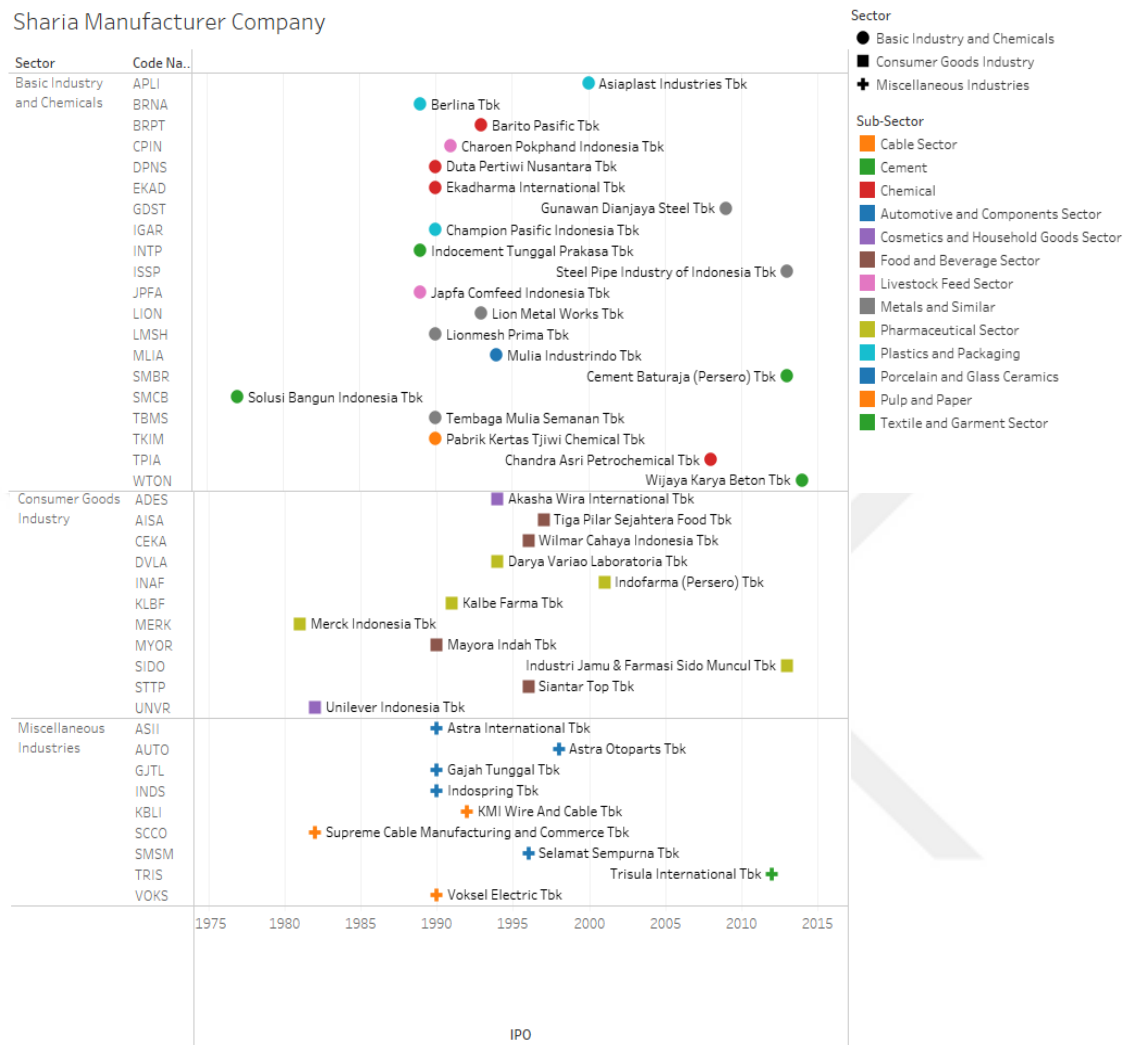


Figure 13: Sharia Manufacturer Company 2013-2022

Source: Author.

Based on the figure above, it can be seen that there are three cluster sectors in the manufacturing companies within this research study, namely basic industries and chemical, consumer goods, and miscellaneous industries. Many manufacturer company offers its share to the public prior 2000. The majority firms run their business in the sector of basic industry and chemicals. It is consistent with the result found by Setyawan, (2020) as shown in table 4 that imply the largest use of energy following by the consumer and miscellaneous sectors.

3.5.2. Descriptive Analysis

Descriptive statistical analysis is used to provide an overview of the variables employed in the study without comparing or linking to other variables. The measures employed are the mean, standard deviation, minimum value, and maximum value of each variable used in the study. The following is the output of the descriptive analysis.

	Age (Control)	Leverage (M1)	Profitability (M2)	Eco- Efficiency (X)	Firm Value (Y)
Mean	50.13500	0.421567	0.068697	0.687500	2.923313
Median	51.00000	0.412002	0.060598	1.000000	1.453379
Maximum	105.0000	2.899874	0.920997	1.000000	27.86409
Minimum	26.00000	0.029141	-2.640992	0.000000	0.061282
Std. Dev.	12.65453	0.270882	0.169753	0.464093	3.933179
Skewness	1.349778	3.759833	-9.580642	-0.809040	3.201358
Kurtosis	6.402213	32.70298	165.6445	1.654545	14.80956
Jarque-Bera	314.3775	15646.87	447006.3	73.80716	3007.674
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	20054.00	168.6268	27.47884	275.0000	1169.325
Sum Sq. Dev.	63894.71	29.27754	11.49759	85.93750	6172.490
Observations	400	400	400	400	400

Table 12: Descriptive Result

Source: Author.

According to the table above, the mean of age as the control variable is 50 years with minimum of 26 years and maximum of 105 years. In addition, the value of standar deviation reaching 12.65453 is high among other variables following the firm value. It can be interpraetad that the age variable is homogeneous data due to smaller than the mean value. It shows that the manufacturing companies sharia indexed observed within this research study are similar where they have been operating for the long run and they have passed the crisis era in pandemic covid-19. It means that they can maintain its business and can still exist.

The mean of leverage is 0.421567 with minimum of 0.029141 and maximum of 2.899874. The value of standar deviation is 0.270882. It indicates that the data is homogeneous which indicates the company's strategy tend to resemble in utilizing the leverage to run its business operation. Meanwhile, the mean of profitability is 0.068697

with minimum of -2.640992 and maximum of 0.920997. The value of standar deviation is 0.169753. It indicates that the data is heterogeneous which refers to the policy of each company taken to earn profit is different.

The mean of eco-efficiency is 0.687500 with minimum of 0 and maximum of 1. The standar deviation reaches 0.464093. It indicates that the data is homogeneous which refers to the implementation of eco-efficiency for each company is same. Meanwhile, the mean value of firm value is 2.923313 with minimum of 0.061282 and maximum of 27.86409, and the standar deviation is 3.933179. It indicates that the data is heterogeneous which implies to the ability of each company to improve the firm value has different approaches.

3.5.3. Estimation of Regression Analysis Results

The purpose of regression analysis is to create a regression equation by methodically introducing changes one at a time in order to ascertain the relative strength of each influence. This is accomplished through the use of regression analysis.

3.5.4. Linear Regresion Analysis

The first fixed effect model will provide the effect of eco-efficiency and leverage as well as profitability as moderating variable on the firm value. The following is the output of the estimatiion that can be seen in the table 14.

Dependent Variable: Log(Firm Value)				
Method: Panel Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.411205	0.399159	6.040717	0.0000
Eco-Efficiency (X)	-0.166558	0.100832	-1.651839	0.0994*
Leverage (M1)	0.144429	0.178877	0.807421	0.4200
Profitability (M2)	0.332098	0.205077	1.619383	0.1063
Age (Co)	-0.036709	0.007557	-4.857615	0.0000***
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.722387	Mean dependent var		0.540012
Adjusted R-squared	0.688855	S.D. dependent var		0.974807
S.E. of regression	0.543751	Akaike info criterion		1.722817
Sum squared resid	105.2570	Schwarz criterion		2.161878
Log likelihood	-300.5635	Hannan-Quinn criter.		1.896691
F-statistic	21.54323	Durbin-Watson stat		0.970401
Prob(F-statistic)	0.000000			
The significance level of p-value * p 0.10; ** p 0.05; *** p 0.01				

Table 13: Linear Regression Analysis Model 1

Source: Author.

If the regression coefficient is negative, it means that the independent variable and the dependent variable changed in the opposite direction. If it is positive, it means that the variables changed in only one direction. Based on the data above, the equation can be written and described as follow:

$$\text{TOBINSQit} = 2.411205 - 0.166558X + 0.144429M1 + 0.332098M2 - 0.036709C + \varepsilon_{it}$$

The data interpretation can be shown from the constant coefficient (α) of 2.411205 signifies that in the absence of any changes in the independent and moderating variables, the firm value will increase by a factor of 2.411205 due to the influence of other variables that were not included in the study. The regression coefficient β_1 X is - 0.166558 for the regression coefficient the eco-efficiency variable. This shows that if eco-efficiency goes up by one, the firm value will go down by 0.16 times, assuming that all other factors remain constant. Regression coefficient β_2 M1 for the leverage variable is 0.144429. This finding demonstrates that a one-unit increase in leverage is associated with a 0.14-fold increase in firm value, under the assumption that all other variables remain constant. Regression coefficient β_3 M2 for the profitability variable is 0.332098. This finding demonstrates that a one-unit increase in profitability is associated with a 0.33-fold increase in firm value, under the assumption that all other variables remain constant. Regression coefficient β_4 Co is - 0.036709 for the regression coefficient the age variable.

This shows that if age goes up by one point, the firm value will go down 0.03 with the assumption of other variables remain contrant.

The determination test result can be shown from the Adjusted R Squared value in shown table is 0.688855, which is equivalent to 68,88%. The findings indicate that approximately 68,88% of the firm's value can be attributed to the variables in this resarch study model, while the remaining 31,12% is attributed to other variables examined in this research study.

Meanwhile, the T test as the evaluation for the hypothesis within this research study can be shown from the probability value of the shown table. If the t test's significance level is <0.01 , <0.05 , and <0.1 (p-value $<1\%$, $<5\%$, and $<10\%$), H1 is accepted, indicating a meaningful relationship between the independent and dependent variable. The data shows that the t-test probability results within the table is 0.0994. It is smaller than 0.1. Thus, the H1 is accepted, and it implies that the eco-efficiency influence the firm value of the Sharia manufacturing companies listed indexed from 2013 to 2022.

3.5.5. Moderated Regression Analysis

The second fixed effect model in this case as MRA will provide the analysis to observe whether the leverage and profitability can moderate the impact of eco-efficiency to the firm value. The following is the model estimation.

Dependent Variable: Firm Value				
Method: Panel Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.47402	1.656459	8.134229	0.0000
Eco-Efficiency (X)	-2.112081	0.752566	-2.806508	0.0053**
Leverage (M1)	-3.504368	1.442452	-2.429453	0.0156**
Profitability (M2)	14.40325	3.328519	4.327224	0.0000***
Eco*Leverage (XXM1)	3.524080	1.465863	2.404100	0.0167**
Eco*Profitability (XXM2)	-13.75881	3.350629	-4.106338	0.0000***
Age (Co)	-0.173465	0.028546	-6.076777	0.0000***
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.760808	Mean dependent var		2.923313
Adjusted R-squared	0.731917	S.D. dependent var		3.933179
S.E. of regression	2.036471	Akaike info criterion		4.363780
Sum squared resid	1476.408	Schwarz criterion		4.802841
Log likelihood	-828.7559	Hannan-Quinn criter.		4.537654
F-statistic	26.33364	Durbin-Watson stat		0.904372
Prob(F-statistic)	0.000000			
The significance level of p-value * p 0.10; ** p 0.05; *** p 0.01				

Table 14: Moderated Regression Analysis Model 2

Source: Author.

According to the data shown in Table 14, the equation for Linear Regression with moderating variables can be derived in this way:

$$TOBINSQ_{it} = 13.47402 - 2.112081X - 3.504368M1 + 14.40325M2 + 3.524080XxM1 - 13.75881XxM2 - 173465Co + \epsilon_{it}$$

The data interpretation can be shown from the constant coefficient (α) of 13.47402 signifies that in the absence of any changes in the independent and moderating variables, the firm value will increase by a factor of 13.47402 due to the influence of other variables that were not included in the study. Regression coefficient β_1 for eco-efficiency is -2.112081. This shows that if eco-efficiency goes up by one, the firm value will go down by 2.11, assuming that all other factors remain constant. Regression coefficient β_2 for leverage is -3.504368. This finding demonstrates that a one-unit increase in leverage is associated with a 3.50-fold decrease in firm value, under the assumption that all other variables remain constant. Regression coefficient β_3 for profitability is 14.40325. This finding demonstrates that a one-unit increase in profitability is associated with a 14.40-

fold increase in firm value, under the assumption that all other variables remain constant. Regression coefficient β_4 for the eco-efficiency with leverage as the moderating variable (eco*leverage) is 3.524080. It means when eco*leverage is increasing one unit, the firm value will increase 3.52 with the assumption that all other variables remain constant. Regression coefficient β_5 for the eco-efficiency with profitability as the moderating variable (eco*profitability) is 13.75881. It means when eco*profitability is increasing one unit, the firm value will increase the 13.75 with the assumption that all other variables remain constant. Regression coefficient β_6 for the age as control variable is -0.173465. It means when age is increasing one, the firm value will decrease the 0.17 with the assumption that all other variables remain constant.

The determination coefficient can be seen from the Adjusted R Squared value in table 13 is 0.731917, which is equivalent to 73,19%. The findings indicate that approximately 73,19% of the firm's value can be attributed to the variables within this research study model, while the remaining 26,81% is attributed to other variables examined in this research study. To evaluate the hypothesis in this model, the t test was used. If the t test's significance level is <0.05, <0.01, and <0.1 (p-value <5%, 1%, and 10%), H2 and H3 are accepted, indicating a meaningful relationship between the independent and dependent variable. The followings is the T test elaborated from the table 14.

Variables	Probability Value	Hypothesis
Eco*Leverage (XxM1)	0.0167**	H2 is accepted
Eco*Profitability (XxM2)	0.0000***	H3 is accepted
The significance level of p-value * p 0.10; ** p 0.05; *** p 0.01		

Table 15: T-Test Moderate Variables

Source: Author.

The data shows that the t-test results within the table is smaller than 0.05 thus the H2 and H3 are accepted, and it implies that the leverage and profitability can moderate the relationship of eco-efficiency to the firm value of the Sharia manufacturing companies listed indexed from 2013 to 2022.

3.6. Discussion

The implementation of eco-efficiency in manufacturing companies may lead to the positive and negative impacts. The positive will be the preservation of environment and

the negative side will reduce the firm value as the evidenced found within this research study. The explanation of the findings will be elaborated further as follows:

3.6.1. The Effect of Eco-Efficiency towards Firm Value (H1)

According to the result found in the first model and second model, the eco-efficiency is associated with the firm value of manufacturing companies sharia index in negative way. It demonstrated that when the stakeholders of company implement eco-efficiency, the firm value will decrease in the certain point. The decreasing of firm value displayed that the theory of contingency by Fielder in 1964 within this case as the management of organization must have the motivations and aspects of the situations in order to reach the goals particularly protect the environment seemingly failed. The managerial will only consider the maximalization of sales and profit but reluctant to maximize the preserving environment. The managerial apparently does not have strong motivation to protect the worst of environment, they only implement the certification of ISO 14001 as the formality to fulfill the green innovation. The result is similar by the finding from (Solikhah et al., 2020), who found that the level of carbon emission's disclosure produced by the manufacturing companies in Indonesia within the low range reaching 18.79% which indicates that the managerial awareness and its effort to decrease the carbon emission is ineffective.

Beside the lack of strong motivation by the managerial, the implementation of eco-efficiency may require upfront cost in technology investment, equipment and employee training for the ISO 14001 that takes time. It is consistent with the findings from (Mosgaard & Kristensen, 2020), who found from the interview by the environmental coordinator in 19 Danish companies that the cost of ISO 14001 certification is expensive. The argument supports that these cost can strain the firm finance thus the investor will reluctant to invest their money to the company that affect the profitability reduction of the company so that it lead to the decrease of firm value. The output of this research is similar by the (Safitri et al., 2019), who found that although spending money into the research and development can influence the firm value, but when it comes to the investment in environment is not related to the eco-efficiency or enhanced the firm value. Wang & Zhao, (2020) discovered that ISO 14001 is negatively influenced the firm financial performance in 63 companies listed in Shenzhen and Shanghai Stock Exchanges

during 2003 and 2018. Although ISO 14001 certification has a favorable impact on China's economy, the impact must be properly examined in regard to its effects on small and medium-sized firms.

However, the finding within this research study contradicts from (Sudha, 2020), which discovered the significant positive relation between eco-efficiency based on the corporate environmental performance (CEP) which comprises of energy, water, and material efficiencies towards the firm value in the metric of corporate financial performance (CFP) in the Indian companies from 2002 to 2011.

Xie et al., (2022) investigated the effect of green innovation towards firm value in the industry of heavy pollution in China. They found that the green innovation leads to the decreasing of the firm value yet it only happens in the short-run. The devaluation of firm value can occur because the increasing of green innovation will decrease the financial flexibility of the company as well as the coverage analysis. The result is supported by the finding by (Zhu et al., 2021), they investigated the eco-efficiency of industrial investment and its influencing factors from 2015 to 2017 in 30 provinces China. They found that the industrial investment of eco-efficiency is low and the significant regional disparity exists. In addition, the investment treatment of industrial pollution sources had a negative effect.

In addition, the clarity of the result within this research study has been emphasized by (Y. Zhang et al., 2021b), who examined the factors that contribute to the enhancement of the economy, technological innovation, and human well-being within the constraints of environmental and resource limitations, as outlined in the global sustainable development goals. A study revealed that developed nations like Singapore, the United States, and Iceland have a substantial impact and achieve the highest levels of eco-efficiency (EE), eco-technology innovation (ETI), and eco-wellbeing performance (EWP). These countries excel in converting ecological consumption into economic benefits, technological advancements, and improvements in human welfare. Therefore, if the findings of this study are linked to the work of Y. Zhang et al. (2021b), it becomes evident that emerging countries like Indonesia have not yet formulated effective methods to enhance their national performance in the three E's. The outcome of the descriptive analysis shows that the standard deviation of eco-efficiency is consistent, indicating that managers tend to adopt the same eco-efficiency strategy. This leads to a decrease in the

value of the organization. It illustrates that the technique remains ineffective. Therefore, the managers of the manufacturing company, particularly in the Sharia index, must carefully analyze the most effective way to apply eco-efficiency in order to avoid diminishing the value of the organization. The focus on the environment is closely tied to the maqashid sharia, which dictates that every human, as the head of the planet, must adhere to the principles of religion and ethical living.

3.6.2. The Effect of Leverage as the Moderate Variable in the Relation of Eco-Efficiency on Firm Value (H2)

According to the output within this research study in the table 14 and 15, the probability value of leverage is positively associated in moderating the eco-efficiency to the firm value. Thus, the hypopthesis 2 is accepted. The leverage can strengthen the relationship between eco-efficiency and the firm value in which whenever the eco-efficiency increases one unit, the leverage will strengthen its relation in increasing the firm value by 3.5 unit. Since the company will need to pay ahead for technology in order to achieve ISO 14001, the outcome shows that the corporation will use leverage as its source of funding to implement eco-efficiency. Appropriate technological investment will enhance better performance on company growth in the interim. This is consistent with the findings of (Jové-Llopis & Segarra-Blasco, 2018), who concluded that a strategy of increased investment in eco-efficiency will lead to greater company performance, particularly for the European Union, which became a member in 2004. Nevertheless, only a tiny number of small and medium-sized European businesses are able to make significant investments or implement various eco-efficiency strategies, necessitating government assistance.

Utilizing debt to invest in eco-efficiency might serve as a strong indication to the market and other stakeholders that the company is genuinely dedicated to environmental responsibility. Implementing this strategy can enhance the company's reputation and bolster its perceived long-term value. The management team is strongly urged by the public to implement the environmental policy, particularly in cases where the business activities of the manufacturing industry have the potential to harm the environment. The Ministry of Industry in Indonesia, as a key participant in the sector, has previously established regulations about the environmental policy according to green industry

standards (SIH). The policy is stipulated in Minister of Industry Regulation (Permenperin) number 51/M-IND/PER/6/2015 (Indonesia R. , 2022).

The Ministry of Industry continues to encourage manufacturing companies in Indonesia to apply green industry principles in their production processes. The purpose of implementing green industry is to prioritize efficiency and effectiveness efforts that are able to harmonize industrial development with the preservation of environmental functions. Head of the Industrial Services Standardization and Policy Agency (BSKJI) Andi Rizaldi had been interviewed by (Pressrelease.id, 2024) :

“Green industry provides many benefits, including reducing operating costs including energy and water savings, saving limited natural resources, reducing negative impacts on the environment, maintaining ecosystem balance, and encouraging the development of environmentally friendly technology”

Based on the regulation by the government and the encouragement from the public, the manufacture managerial utilizes the leverage in raising capital so that it can implement environmentally friendly policies through eco-efficiency. In addition, the leverage is easily borrowed by the bank since the bank sector is encouraged by the government to disburse the credit to the industry sector in the term of green and ESG field in order to fulfill bank's green portfolio. It is in line with the result found by (Roberts, 1992) and (Osazuwa & Che-Ahmad, 2016), they revealed that higher reliance on debt would necessitate that the corporation boost its environmental efforts and provide more environmental information in order to adhere to creditors' expectations regarding environmental issues.

Nevertheless, it is vital for the management to consider that employing leverage has a distinct range of risks. Excessive debt can significantly increase a company's financial risk, especially if efforts to improve eco-efficiency do not provide the expected outcomes due to sudden shifts in market conditions or ineffective decision-making. Therefore, it is essential to thoroughly evaluate the potential advantages and risks before deciding to utilize leverage as a means to enhance eco-efficiency. Since based on the results of the descriptive test in table 6, it can be concluded that the leverage data is homogeneous. This indicates that the manufacturing enterprises in this study tend to adopt a similar strategy in utilizing leverage to fund their eco-efficiency operations.

The finding within this research study is contrary from (Osazuwa & Che-Ahmad, 2016), who found that the leverage has no significant effect to moderate the eco-efficiency

towards firm value in 667 non-financial company in public traded listed of Malaysia. (Sutrisno & Wendy, 2020) delved no significant influenced in leverage as the moderating variable between eco-efficiency and quality management system on the firm performance in the 75 listed companies in Indonesia Stock Exchange during 2017. In addition, Zahid et al., (2023) discovered that the company who has lower debt finance tends to have high ESG performance and ease to obtain the equity funding access through stock market in the 6295 firm-year of Chinese A listed companies from 2010 to 2019.

3.6.3. The Effect of Profitability as the Moderate Variable in the Relation of Eco-Efficiency on Firm Value (H3)

The results of this research study show that the probability value has a negative relationship with moderating the eco-efficiency to a company's value (see tables 14 and 15). As a result, hypothesis 3 is accepted. The relationship between eco-efficiency and company value can be weakened by profitability, such that for every unit gain in eco-efficiency, the firm value will decrease by 13.75 units due to the profitability's weakened relationship.

Since this research study employs return on assets as the measurement of profitability, it can imply the result that the profitability weaken the relationship between eco-efficiency towards the firm values because the managerial is not able to manage the assets effectively and efficiently in gaining the profit from maximizing the implementation of eco-efficiency strategy so that it affects to the firm value.

Implementing environmental efficiency measures frequently necessitates initial expenditures in technology, infrastructure, or procedures. Although these expenditures can ultimately lead to long-term cost reductions and sustainability advantages, they may immediately affect profitability due to greater initial expenses. Shareholders with a narrow emphasis on immediate financial benefits may view these initiatives as harmful to profitability, despite their potential to enhance the company's long-term value, particularly when compared to competitors who have yet to take significant proactive measures to mitigate environmental harm by implementing ISO 14001. This aligns with the initial expenses that the company must bear, which will reduce its profitability. In this case study, the majority of organizations obtained ISO 14001 certification in 2017 or after. Prior to that, they were still undergoing internal or employee training. As a result,

their long-term profitability cannot be accurately assessed at this time. The result within this research study aligns with the result found by (Sutrisno & Wendy, 2020), who found that the profitability weakend the relationship between eco-efficiency towards firm performance in 561 companies of Indonesia Stock Exchange 2017. Besides, other empirical studies found by (Hatakeda et al., 2012; Wagner, 2010), which suggested an inverse correlation between environmental sustainability and financial performance, specifically in reference to TobinsQ. Gurvits & Habakuk, (2016) discovered that the companies polled in this case as Estonian companies in 2015 did not find a clear connection between ISO 14001 certification and reductions in certain expenditures and expenses. Hence, it is imperative to arrange additional workshops and training sessions to elucidate the correlation between sustainability and enhanced firm performance, achieved through cost reduction and profit maximization. Furthermore, Khalid et al., (2023) found that there is no relation between profitability and the green investment in the company that run in industries that are mindful of and prioritise the protection of the environmen in the the Chinese A sharelisted coompanies between 2010 and 2019. However, the result contradicts from (Sudha, 2020), who found that there is correlation between eco-efficiency against the corporate financial performance in 224 Indian S&P 500 companies spanning 2002 and 2011. Yook et al., (2017) found that a negative association between claimed environmental control expenses and eco-efficiency performance metrics in Japan from 200 to 2012. Besides, Osazuwa & Che-Ahmad, (2016) delved that the profitabilty positively affects the relationship between eco-efficiency and firm value in Malaysia 2013. In addition, the result from (Asni & Agustia, 2022), who investigated the the relationship between the green innovation towards firm value in ASEAN countries such as Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam in the conventional manufacturing companies, have found that return on assets which is the measurement of this reseearch study in profitability approach has positive significant effect to the firm value.

CONCLUSION

Conclusion

Presently, nations, including Indonesia, are confronted with the most severe impacts of climate change. According to the 2022 report from World Air Quality, Indonesia has been placed as the country with the poorest air quality in Southeast Asia and 26th out of 131 countries globally. There are other variables that contribute to this explanation, but the primary cause is the operation of manufacturing companies. According to CNBC News (2023), the emission has a significant impact, and the main contributor to this emission in Indonesia is the manufacturing sector. As the leader in this world, known as the *khalifah*, it is necessary to adhere to the Islamic law prescribed by Maqashid Shariah and effectively oversee the management and preservation of natural resources.

Meanwhile, the global temperature has increased by 1.2 degrees Celsius. If not addressed sensibly, there will be several adverse consequences for all living organisms. Therefore, the country must actively participate in addressing this issue. The Indonesian government has pledged to decrease its greenhouse gas (GHG) emissions by 41% by the year 2030, since it currently holds the eighth position among the world's largest GHG emitters. Several regulations have been implemented to promote emissions reduction, including the green industry standard policy released by the Minister of Industry Regulation.

The manufacturing companies that becomes the part of Indonesia stock sharia index at least must follow the rule of Islamic principles and forbid harming the environment. The party that must take responsible is the management of the company to consider in running the business operation in environmentally friendly. Inasmuch as Indonesia manufacturer becomes the largest energy consumer that use fuel and non-fuel, and significant use of energy such as Chemical, Petroleum, Coal, Rubber, and Plastic Products, Non-Metallic Mineral Products, and food, beverage and tobacco that lead to the emission. The management company will implement the eco-efficiency in tackling the climate change as well as in earning economical benefit.

Several industrial businesses in nations such Japan, India, UK, China, European Union, Estonia, and ASEAN have demonstrated that adopting eco-efficiency, as measured by ISO 14001, improves the value of the firm. However, it simply presents information from a conventional viewpoint. The manufacturing Islamic index remains more limited. It is

crucial for a company that become part of the Sharia stock index as it requires them to adhere to specific standards, such as avoiding causing harm to the environment. Therefore, this research study will address and resolve this gap in the case of Indonesia manufacturer sharia stock index.

This research study aims to investigate the influence of eco-efficiency on company value from 2013 to 2022. It will examine the role of leverage and profitability as moderating variables to determine whether they may either weaken or strengthen the relationship between eco-efficiency and firm value. The study utilises age as a control variable to mitigate the influence of external factors that are not considered in the investigation. The research study will utilise purposive sampling to choose participants from a balanced panel dataset. The analysis will be conducted using the moderated regression model.

The result found that the eco-efficiency is negatively influenced the firm value. it occurs because the manegerial tends to implement the same strategy of eco-efficiency so that it leads to the ineefficient and ineffective strategy. Due to the necessity for upfront investment in technology, equipment, and personnel training for ISO 14001, the organisation need a certain amount of time. The expenses can burden the financial resources of the firm, causing investors to be hesitant in allocating their funds to the company. This, in turn, results in a fall in the company's profitability and ultimately leads to a decline in the firm's worth. In addition, Indonesia has not yet developed successful strategies to improve their national performance in the three areas of eco-efficiency (EE), eco-technology innovation (ETI), and eco-wellbeing performance.

Furthermore, the leverage can strengthen the relationship between eco-efficiency towards firm value because the company will have to make upfront payments for technology in order to attain ISO 14001, it is evident that the corporation will utilise leverage as its financial source to implement eco-efficiency. Strategic use of resources towards technology will improve firm performance and contribute to its growth in the short term. In addition, using debt to invest in eco-efficiency can demonstrate to the market and other stakeholders that the company is truly committed to environmental responsibility. Adopting this approach can improve the company's standing and strengthen its perceived long-term worth.

Nevertheless, the profitability can weaken the relationship between eco-efficiency towards firm value because the management is unable to properly and efficiently handle

the assets in order to maximise profits through the execution of an eco-efficiency strategy, which in turn affects the value of the organisation. Implementing environmental efficiency solutions often requires initial technology, infrastructure, or procedure investments. These investments can reduce long-term costs and improve sustainability, but they may lower profitability temporarily. Despite their potential to increase the company's long-term value, shareholders who focus solely on short-term financial gains may view these initiatives as harmful to profitability, especially compared to competitors who have yet to implement ISO 14001. The company's initial expenses will lower its profitability.

Despite the result found from this research thesis, there is limitation within this research thesis. Because there is not enough information available, the sample size for this study has been limited to forty out of the seventy-eight Indonesia sharia stock index manufacturing companies. This is due to the fact that insufficient data is currently available. As a result, it is possible that the result does not apply to all manufacturing businesses that are in accordance with Sharia index.

Policy Recommendation

Based on the findings within this research study depicts that the company management in the term of implementing the eco-efficiency is still insufficient and ineffective because the more eco strategy is improved, the lesser firm value will be. Although the management company in the manufacturer of Sharia index tends to expand the business operation in Indonesia massively (chart 1), the company is still in the level of green manufacturer or 3R (reduce, reuse, recycle) in the figure 5.

If the stakeholders and shareholders are not concerned carefully the climate change issue, the temperature in Indonesia will gradually increase from 0.2 to 0.3°C every decade as shown in figure 2. It will result multiplier effect from the human health to the economic side in which Indonesia is the agraria center and archipelago so that it can damage the living creature below the sea and ruining the farm. Thus, the stakeholders, policymakers, investors, as well as the other parties must involve in combating the climate change.

For the Policymakers: the government should establish a policy to regulate the sustainable business operation for the the manufacturer and take action to give sanction for those who have not implemented the sustainable business for the sake of climate change issues that become worst nowadays.

For the Company's Stakeholders: they must take into account the effective and efficient strategy so it can not devalue the firm value, particularly the upfront cost in utilizing the eco-efficiency, and the maximizing the use of assets to earn more profit in ecological way. Since the ISO 14001 has several upgrade level from 2009, 2010, 2015, and the newest is 2019. Thus, the company must adjust the level upgrade of ISO 14001 and the management must execute the element of ISO 14001. Inasmuch as there is the inefficient and ineffective strategy in implementing the eco-efficiency, the managerial must do studying and correction in the fourth key elements, and review the results. Afterwards, it becomes successfully, the managerial may continue the improvement. In addition, the manufacturing company which uses energy the most from the industrial operation, and produces the raw materials that the process can damage environment and produce larger GHG emissions, must shift the business operation from green manufacture to the sustainable manufacture.

For the Investors: Investors should prioritise investing in environmentally-friendly companies due to the worsening effects of climate change, which are directly impacting human beings. In addition to prioritising profit, investors should also consider the well-being of both people and the earth. While the initial implementation of eco-efficiency may lead to a decrease in the value of firms in the shariah stock index of the manufacturing industry, it has the potential to improve in the long-term and generate greater profits as long as an effective and efficient strategy is employed. Therefore, during the shareholders' general meeting, the investor has the opportunity to suggest an alternative strategy to the stakeholders that, if implemented, might enhance the firm's value and profitability within eco-efficiency measures.

For the Researcher: due to the scarcity of data on the company's involvement in the Indonesian sharia stock index, future researchers can analyse the financial performance of both conventional and sharia sectors by focusing on green innovation. Therefore, a more comprehensive understanding could be gained in order to progress further in addressing climate change.

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