# The Graphical Information in Sustainability Reports and Corporate Performance: A Southeast Asian Case Study

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**Abstract**

The primary objective of this study is to evaluate the graphical information quality within sustainability reports produced by companies in Southeast Asia that voluntarily disclose such reports. Additionally, the research delves into examining the correlation between graphical sustainability reporting and corporate performance, encompassing both financial and market-based indicators. The study focuses on companies in Southeast Asia that submit sustainability reports through the global reporting portal (www.globalreporting.org). A total of 132 sustainability reports from 33 companies in the Philippines, Malaysia, Singapore, Thailand, and Indonesia were analyzed consistently over the period from 2016 to 2019. The quality of sustainability reports was assessed using the Graphical Information Disclosure Index (GIDI). The findings reveal that, despite a negative impact on accounting-based performance measured by Return on Equity (ROE), the GIDI score exhibits a positive influence on market-based performance. This underscores the significance of graphical information disclosure in sustainability reports, emphasizing its potential impact on enhancing market perceptions and overall corporate performance in the Southeast Asian context.

**Keywords**: corporate performance; graphical information; sustainability report; return on equity; market performance.

## INTRODUCTION

Corporate social responsibility (CSR) and sustainability reporting were created to help companies manage sustainability (Baumgartner & Rauter, 2017). Sharing data and information regarding an organization's commitment to sustainability and sustainable development is routine in business

reports (Hussey et al., 2001; Perrini, 2005). Based on survey results from KPMG in 2020, only 80% of the world's top 100 companies publish sustainability reports voluntarily. However, this report is considered to be limited to impression management (IM) only (Diouf & Boiral, 2017). Of course, this means that information expressed to varying degrees can influence the allocation of attention (Kanbaty M. et al., 2020) or what is usually called the salience effect (Ding et al., 2017).

Companies will, of course, exploit salience in selectively disclosing information in ways that can distort information users' perceptions. Of course, this can be done using a presentation format, especially by adding graphics as an IM tool for the context of CSR and sustainability reporting. The use of graphics in reports can, of course, be used to influence readers' perceptions.

Previous research generally discusses information with graphics for the purpose of providing additional information to stakeholders, for example graphical visualization (Dilla, Janvrin and Jeffrey, 2013; Mohd Isa, 2006), narrative and graphics order (Daigle, 2015), clarity and understandability (Wu et al., 2016; Tan, Wang and Zhou, 2015), and tone (Aly, El-Halaby and Hussainey, 2018).

It is critical to highlight that at the moment, there are no standards or regulations controlling the inclusion of narrative, graphic, or photographic content in corporate reports. Apart from that, they are not audited by external auditors unless a narrative footnote to the financial statements is added, which is uncommon (El-Sayed et al., 2021).

Graphs, charts, and similar types of visualization are excellent instances of functional visualization (Chen, 2004), emphasizing the simplicity with which information can be used rather than influencing the interpreter's mind. These visualizations are widely used in statistics, and considerable knowledge exists regarding their application to a variety of data types and combinations. Regarding reporting, research has found that 80% of large companies have included at least one chart of financial variables in their annual reports (Dilla & Janvrin, 2010). The use of graphics as an additional medium in a company's annual report is carried out by companies whose performance is good and getting better in a certain period (social psychology theory of impression management). If management's goal of using graphics is to communicate good performance to stakeholders, it is interesting to

review stakeholders' perceptions of graphical presentation in annual reports or assess the quality of graphics in reports. Research on information related to the phenomenon of graphical media to find out the direction of development of the use of graphical media in the company's annual report is also interesting.

For example, a line chart visualizes data as a collection of data points connected by straight line segments (Jääskeläinen & Roitto, 2016). A stacked or stream graph visualizes the values of a time series and frequently enables drill-down into a subset of the series (Heer et al., 2010). Rather than highlighting broad patterns, bar charts (and column charts) are typically used to emphasize single values. They are beneficial for comparing items that are classified into a small number of groups (Abela, 2008).

Previous studies related to graphical reporting focused on various aspects, such as different graphical reporting practices from financial and non-financial firms (Beattie & Jones, 1997) performance and achievement (Dilla, Janvrin and Jeffrey, 2013), information bias (El-Sayed et al., 2021), the nature and extent of graphics in the annual report (Uyar, 2009), and graphical reporting

focused on the Global Reporting Initiatives (GRI) diffusion (Marimon et al., 2012; del Mar Alonso-Almeida, Llach and Marimon, 2014) and GRI reporting contents In contrast, there has been little investigation of the behavior and influence of GRI. As a result, we must increase our understanding of the Global Reporting Initiative (GRI) and its role in the quest of sustainability.

The southeast Asia country has different cultural, political and business environment characteristics. Another interesting thing to study is whether this difference affects the commitment to sustainable development visible in the sustainable report. This study extends the previous research on the relationship between economics-social-environmental performance and financial performance (Danso et al., 2020; Hategan et al., 2018). Based on the importance of the development of sustainable reports as a form of adaptation to the process of global warming in the ASEAN regional market and the increasing phenomenon of the use of additional media in graphical form in the company's annual financial statements, as well as the importance of assessing the graphic quality in the report, researchers are interested in

reviewing the quality of sustainable reports between ASEAN countries.

Earlier research has established a link between sustainability and corporate performance. These benefits include increased competitiveness (Orens, Aerts and Cormier, 2010), and improved market performance (Orlitzky, Schmidt and Rynes, 2003; Isanzu, 2016; Hussain, Rigoni and Cavezzali, 2018; Cherian et al., 2019). On the other hand, several studies suggest that engagement in sustainability is detrimental to financial performance (Alcaide González, De La Poza Plaza and Guadalajara Olmeda, 2020). On the other hand, King and Lenox (2001), and Link and Naveh (2006) state that there are no associations between sustainability and financial performance. While the body of knowledge continues to grow, the outcomes remain inconclusive. Considering the conflicting findings, our study seeks to address this gap by employing graphical reporting as a proxy for sustainability.

There are numerous benefits that companies can get for preparing sustainability reports. Some of these benefits include increasing company competitiveness and competitive advantage or reputation and legitimacy, including company performance (Ching et al., 2017);

however, a number of studies still show different results. Pan et al. (2014), Inoue and Lee (2011), and Kapoor and Sandhu (2010) revealed a considerable impact on profitability (2011). However, Ho and Taylor (2007) found disappointing results. Thus, this work adds to the conversation by investigating this link from a graphical perspective. Disclosure influences the way information-related market prices are determined (Ng & Rezaee, 2020). Haw et al. (2012) demonstrate that increased corporate disclosure is associated with an increase in stock price. Grewal, Hauptmann and Serafeim (2021) found the association is stronger for enterprises that are more vulnerable to sustainability considerations, to performance and analyst coverage.

Thus, study highlight graphical reporting is important for investors and other stakeholders (Jones et al., 2018), as an attractive presentation format, graphics are typically employed in annual reports as part of a company's broader disclosure strategy. In addition, graphics let readers make comparisons, synthesize key performance indicators, and contextualize results. Graphics can influence investors' perceptions of current and future profitability. Thus, this study assesses the usage of graphics, the information

they carry, and the types most typically employed in reports. This study also examines the sustainability reporting and financial performance. This research is expected to contribute at least in two ways; firstly, this study provides an overview of the comparability of sustainability reports of companies in the ASEAN region; secondly, this research is also expected to provide an overview of the relationship between sustainability reports and companies' financial performance. Based on the background, the problems addressed in this study are formulated as follows:

1) What information is often presented in the graphical form, and what type of graph is often used in reporting?

2) Is there any relationship between graphics disclosure and accounting-based performance?

3) Is there any relationship between graphics disclosure and market-based performance?

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT
### Theoretical Framework

According to Beyer et al. (2010), the demand for information stems primarily from 1) the knowledge asymmetry between managers and other stakeholders, and 2) the agency

challenges associated with ownership and control separation. Jensen and Meckling (1976) describe the principal-agent relationship between firm owners and the management team that runs the company if there is a separation between ownership and the management. If managers tend to be opportunistic, there will be a conflict of interest between the principal and the agent. Agents who daily manage the company have their own advantages, one of which is having superior information of owners of the company's activities, giving rise to information asymmetry. This leads to agency costs that must be borne by the principal to monitor the behavior of the agent (Umoren & Asogwa, 2013). Thus, appropriate reporting can be used to align the interests of the agent with the principal (Shapiro, 2005). In this study, a sustainability report is seen as an appropriate reporting that decreases the level of information asymmetry and, therefore, aligns the agent's interests with the principal.

### Sustainability Reporting to Mitigate Information Asymmetry

Sustainability reporting is a practice that involves disclosing an organization's economic, environmental, social, and organizational governance (ESG)

performance. Of course, this reporting is a company strategy that aims to increase transparency, reduce negative impacts, and support better decision making.

Sustainability reporting can help reduce the problem of information asymmetry and foster trust among stakeholders through transparent and comprehensive reporting. Sustainability reporting can reduce information asymmetry by providing accurate and reliable information, increasing stakeholder confidence in the Company's sustainability performance (Cuadrado-Ballesteros, B. et al. 2017).

A report is categorized as a quality report if it meets certain quality standards. The general rule of quality reporting states that the more data informed, the more informative, the higher the quality is. Quality is related to the contents of the report and is also easily understood by report readers. In order for reports to be easily understood even by laypeople (considering that most report readers are not accounting people), certain media such as pictures or graphics are needed. Many SDG-supporting organizations around the world have worked to develop reporting standards for CSR performance. Achieving national or worldwide standard agreement is

challenging since some countries legally require it while others do not. The "triple bottom line reports" are produced by many companies every year, but their format, style, and assessment process vary widely, even within the same industry.

## Corporate Performance

Sustainability is a critical component of the operations approach used to boost corporate performance (Danso et al., 2020). Corporate performance is measured by two different types of measurement: accounting/financial based performance and market-based performance (Cohen et al., 1997). Accounting-based performance is generally measured based on many accounting ratios. Accounting-based performance is a valid measure because accounting reports are official information obtained from an audit process that is widely trusted. However, Agarwal and Taffler (2008) stated that accounting reports presenting past performance must be evaluated for their usefulness in forecasting the future, and that management can manipulate accounting numbers. The ability of the firm's management to react to future changes in the environment is a key factor in market-based performance. The primary goal of any

investment is growth and profit (Taiwo et al., 2021).

**Graphics in Sustainable Report**

Recent research shows that over 80% of large corporations utilize at least one graph of financial indicators in their annual reports (Ware, 2005; Dilla and Javrin 2010). It is easy to interpret information in the form of graphs based on the fact that visual understanding is the most dominant understanding that humans have; thus, information in graphical form is easily understood by stakeholders. Graphical information is known to increase information accuracy (Jones et al., 2018), suppress ambiguity that confuses information users (Linsley & Lawrence, 2007) and is useful as a structured formats information (Ryan, 2012).

The use of this media by management is based on the social psychology theory of management's impression and political cost theory (Dilla and Jafrin 2010). According to the management impression hypothesis, a company's management chooses to use textual financial statements to showcase its performance. Graphs are a type of textual report used by managers to impress stakeholders. The political cost theory indicates that managers have incentives to make big advances

in financial performance less visible to regulators (Watts, Zimmerman and Watts, 1978). In certain situations, company management with good performance dislikes disclosure in graphical form, especially when it comes to the government. Different forms of data can be used to analyze company sustainability. These data can be classified according to their relationship to the reference object (Schöggl et al., 2016), for example, corporate data, production site data, or product level, component, and design data (Maas et al., 2016). Many elements must be addressed, such as the assessment's goal, unit of analysis, and organizational level (Morioka & Carvalho, 2016; Mouchamps, 2014).

The following three factors influence a person's understanding of a graph: knowledge of standard graphical standards, recognition of all visual features and conventions in the data visualization they are viewing, and comprehension of the context or content surrounding the data in the visualization (Shah & Hoeffner, 2002). This requires prior knowledge of several visuals and their conventions (Shah et al., 1999). To sum up, a viewer must mentally grasp the number referents (Shreiner, 2020).

**The Relationship between Sustainability Reporting and Corporate Performance**

Companies that meet moral and social objectives will put more effort into running the mechanism and achieving the company's actual social and economic benefits (Fathony et al., 2020). Therefore, corporate social and environmental activities can add value to the firm under certain conditions (Utami & Wahyuni, 2018). The argument that companies that have good environmental and social performance will be responded positively by investors (Waluyo, 2017) means that a company with a higher quality of sustainability disclosure would benefit in the long run, instead of the short run. Incomplete information can cause an inaccurate forecast of company prospects (Utami et al., 2020) and is important for investors' decision-making (Dilla et al., 2013; El-Sayed et al., 2021; Jones et al., 2018; Mohd Isa, 2006), leading to lower financial performance. However, the disclosure may have unintended consequences. According to Flammer, Toffel and Viswanathan (2021), the risk of disclosure may be exposed private information to competitor, and create vulnerabilities for business. Disclosure entails direct costs as well as possible risks. Firms must dedicate resources to gathering and reporting data on their business, asses' risks, and mitigation measures.

According to Margolis, Elfenbein and Walsh (2009), a company's sustainability transparency has no influence on its performance. However, Orlitzky, Schmidt and Rynes (2003) suggested a positive relationship between sustainability and financial performance, with the most significant relationship being with the ROE, which is consistent with several studies (Isanzu, 2016; Cherian et al., 2019) which found a positive relationship with the ROE. Meanwhile, other studies indicate a negative correlation between sustainability and return on equity (González-Rodriguez et al., 2019; Sheikh, 2019).

Disclosure is the process of changing confidential information into publicly available information (Scott & O'Brien, 2019), and it enables investors to gain a better knowledge of the management of a firm. Disclosure as a strategy of gaining transparency results in an information vacuum (Healy & Palepu, 2001). Disclosure assists investors by lowering their estimated degree of risk, among other factors (Ashbaugh et al., 2004). Reduced risk increases investors' willingness to invest (Setiany & Suhardjanto, 2021). As a result, it reveals that companies with a high

rate of transparency have higher stock prices, implying a better prospective rate of return for investors (Gelb & Zarowin, 2002). Based on these arguments, this study formulates the following hypothesis:

H[1]: Graphics disclosure in sustainability reporting significantly affects accounting-based performance

H[2]: Graphics disclosure in sustainability reporting significantly affects market-based performance

## METHOD

The population includes companies in Southeast Asia which submit a sustainability report through the global reporting portal (www.globalreporting.org). This research uses 132 sustainability reports of 33 companies from the Philippines, Malaysia, Singapore, Thailand, and Indonesia which consistently published their sustainability reports within the period of 2016 - 2019. The quality of sustainability reports was measured using the Graphical Information Disclosure Index (GIDI). Corporate performance was measured using return on equity (ROE), and market indicator, which is stock return. Multiple regression was employed to examine the causal relationship between graphical information in sustainability reporting and corporate performance.

## Variable Measurement

*Sustainability Report*

Sustainability reporting measured covers three main areas:

1) Time Series for each topic disclosed are calculated according to the GIDI formula assumption (equation 1), a maximum of five years for each graph type and a maximum of two graph types. Then, the number is multiplied by the number of topics disclosed (equation 2). After that, the calculation results (with a maximum value of 50) are multiplied by 0.4 (equation 3). For this equation 3, the maximum value is 20.

2) After getting the results of the values from equations 1 to 3, then the sum is done.

3) GIDI values range from 0 to 100, from very bad to very good.

*Accounting-based Performance*

Previously, accounting- and market-based measures were used to assess corporate financial success (Danso et al., 2020; Hategan et al., 2018; Wasara & Ganda, 2019). Accounting measurements include ROI, ROE, revenue growth, ROS, EPS,

**Table 1. GIDI Scoring Level**

| GIDI Score Range | Disclosure Level |
|---|---|
| 80–100 | Excellent |
| 60–79 | Good |
| 40–59 | Average |
| 20–39 | Poor |
| 0–19 | Very poor |

Source: Rahman & Ibrahim (2004)

and cash flow (Wasara and Ganda, 2019). Thus, return on equity (ROE) was used to assess internal financial performance. The reason for using ROE is that this metric is versatile and can provide valuable insight into various aspects of a company's internal financial performance. ROE can be used to assess profitability, efficiency, value creation, and long-term sustainability, making it a key metric in financial analysis and research.

### Market-based Performance

Stock prices reflect a company's performance and response to the company's ability performance to the company's published report. To measure the performance of shares in the company, the researcher uses stock returns obtained from the closing price from IDX. (Nawawi et al., 2020) stated that stock price is a consequence of investors getting the latest information, in this case, sustainability reports. Therefore, this research used lagged annual stock

returns to measure market performance.

### Time span

The time span is the control variable used in this study. Time span is used to measure how long the graph time span is displayed in the sustainability report on average. Time span control is important because the time span provides the size of the window of information that investors get. Informative disclosures help investors interpret companies' economic prospects (Setiany and Suhardjanto 2021).

### World bank regulatory index

The World Bank publishes this index in their Govdata360 platform. They explain that this index measures how well governments draft and enforce sound policies and regulations that foster private sector growth. The use of this variable assumes that a country's regulatory regime impacts the level of company disclosure (Setiany and Suhardjanto 2021). According to the OECD (2004),

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market-based monitoring requires a strong disclosure framework that promotes actual transparency.

*Industries*

This study uses control of industry variables to provide a differentiator between the types of industry companies. This is based on the argument that companies with certain types of industry have more disclosure items than companies from other types of industries. In this study, a dummy variable is used by assigning number 1 to the manufacturing sector company and 0 to a non-manufacturing company.

**RESULTS AND DISCUSSION**

**Type of Information and Type of Graph Used**

In this study, the graphical information is analyzed based on the type of graph used, the time span and the number of topics presented in graphical form. Based on Table 2 below, asal perusaha yang paling banyak menyajikan informasi menggunakan grafik dalam setiap laporan keberlanjutan adalah: Singapore (17.19 charts), Thailand (17 charts), Philippines (14.46 charts), Indonesia (13.35 charts) and finally Malaysia (13.17 charts). The topic of sustainability presented in the graph shows a different

emphasis on the information presented. Companies from Singapore give almost equal weight to information on economic and social and provide less graphic-based information about the environment. This can be seen from Singapore companies' average economic graph information, which amounted to 6.38, almost the same as the average social graph information of 6.77. The two numbers are still higher than the average environmental information equivalent to 4.05 charts per annual report for Singapore companies.

Meanwhile, companies from Thailand give a different emphasis on information. Companies from Thailand prioritize environmental information, followed by social information and less economic information presented in graphic in the sustainability report. This can be seen from the average, namely, 8.42 for the environment chart, 4.75 for the social and economic charts; the average is 3.83 for each sustainability report from Thai companies.

Companies from the Philippines provide more graphical information on social topics with an average of 7.75 charts in the sustainability report. The information is in the form of environment-themed charts, an average of 4.50 charts followed by 2.21 economic-themed charts.

**Table 2. Information by Country (Average per Report)**

| Information type | Chart Type | Graphic by Countries | | | | | Average per Report |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | Singapore | Thailand | Philippines | Malaysia | Indonesia | |
| Economic | Bar | 4.02 | 1.42 | 0.71 | 2.33 | 4.80 | 5.08 |
| | Line | 0.52 | 0.08 | 0.33 | 1.08 | 0.15 | |
| | Pie | 1.64 | 2.33 | 1.04 | 0.67 | 0.40 | |
| | Others | 0.20 | - | 0.13 | - | 0.40 | |
| | Sub Total | 6.38 | 3.83 | 2.21 | 4.08 | 5.75 | |
| Environment | Bar | 3.02 | 5.17 | 3.29 | 1.50 | 2.35 | 4.32 |
| | Line | 0.58 | 1.83 | 0.75 | 1.42 | 0.70 | |
| | Pie | 0.42 | 1.25 | 0.29 | 0.08 | 0.20 | |
| | Others | 0.03 | 0.17 | 0.17 | - | 0.05 | |
| | Sub Total | 4.05 | 8.42 | 4.50 | 3.00 | 3.30 | |
| Social | Bar | 3.13 | 2.08 | 2.71 | 3.33 | 2.35 | 6.33 |
| | Line | 0.36 | 1.17 | 2.29 | 0.92 | 0.20 | |
| | Pie | 3.06 | 1.42 | 2.54 | 1.25 | 1.10 | |
| | Others | 0.22 | 0.08 | 0.21 | 0.58 | 0.65 | |
| | Sub Total | 6.77 | 4.75 | 7.75 | 6.08 | 4.30 | |
| Total | | 17.19 | 17.00 | 14.46 | 13.17 | 13.35 | 15.73 |

Meanwhile, companies from Malaysia prioritize social graph information, which on average is 6.08 graphs per sustainability report, while economic information is only 4.08 graphs and environment is presented in 3 graphs only. Companies from Indonesia mostly use economic-themed charts with an average of 5.75, followed by social-themed charts with an average of 4.30 charts, and finally environmental themes with 3.3 charts per sustainability report.

Overall, the use of graphs in sustainability reports by companies in Southeast Asian countries places more emphasis on social topics with an average of 6.33 charts, followed by economic topics with an average of 5.08 and finally environmental topics with an average of 4.32 charts. However, each company shows different emphases, indicating that there are different regulatory patterns in each country.

Table 3 represents the type of chart. The type of chart that the companies mostly use is bar chart, and this can be seen from the average of 9.02 bar chart displayed by the companies in their sustainability report. The second most widely used chart type is the pie chart type. On average, the sample companies display 4.08 pie charts in their published sustainability reports. This is followed by line charts with an average of 2.07 charts per sustainability report and other types of charts with an average of 0.55 per

**Table 3. Information by Chart Type (Average per Report)**

| Information type | Type of Chart | | | | Time series Graph (Bar & Line) | Single Year Graph (Pie & Others) |
|---|---|---|---|---|---|---|
| | Bar | Line | Pie | Others | | |
| Economic | 3.14 | 0.44 | 1.32 | 0.18 | 3.58 | 1.50 |
| Environment | 3.02 | 0.82 | 0.41 | 0.07 | 3.84 | 0.48 |
| Social | 2.86 | 0.81 | 2.36 | 0.30 | 3.67 | 2.66 |
| Total | 9.02 | 2.07 | 4.08 | 0.55 | 11.09 | 4.64 |

sustainability report. Bar charts and line charts are often used to inform time series and multiyear performance or progress, while pie charts and other chart types such as maps, human figures etc., are used to describe current performance. Based on those assumptions, we divide the data into two groups: a time series graph that counts only bar and line chart, and a single year graph that counts only pie and other charts. The result shows that the time series graphs (bar and line) appear more often in sustainability reports.

Bar and line chart have had both similarities and differences. A line chart or line graph visualizes data as a collection of data points connected by straight line segments (Jääskeläinen & Roitto, 2016), while bar charts (and column charts) are typically used to emphasize single values and beneficial for comparing items that are classified into a small number of groups (Abela, 2008). When examined further, both types

(bar and line chart) show a company's progress or, in other words, describe the company's achievements and performance from year to year.

In contrast, pie charts and other types provide information about the current year's achievements. Based on Table 3, on average, 11.09 charts per sustainability report display information that is progressing time series information; on the other hand, 4.64 charts represent current year information on average per sustainability report. Thus, it can be concluded that in the sustainability report presented, the companies use more graphics to explain the achievement of its performance from year to year rather than presenting information about the current year's performance. This is interesting because it can be interpreted that companies use charts or graphics to present information about performance in the long or medium-term in a simpler but more informative way.

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**Table 4a. Result of GIDI Score**

| Range | Disclosure Level | GIDI Score | | | | | | Modified GIDI Score for Bar and Line Graph | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | All samples | | Manufacture | | Non-Manufacture | | All samples | | Manufacture | | Non-Manufacture | |
| | | N=132 | | N=60 | | N=72 | | N=132 | | N=60 | | N=72 | |
| | | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % |
| 80–100 | Excellent | 88 | 67 | 41 | 68 | 47 | 65 | 96 | 73 | 42 | 70 | 54 | 75 |
| 60–79 | Good | 17 | 13 | 5 | 8 | 12 | 17 | 8 | 6 | 3 | 5 | 5 | 7 |
| 40–59 | Average | 16 | 12 | 9 | 15 | 7 | 10 | 16 | 12 | 9 | 15 | 7 | 10 |
| 20–39 | Poor | 8 | 6 | 5 | 8 | 3 | 4 | 9 | 7 | 6 | 10 | 3 | 4 |
| 0–19 | Very poor | 3 | 2 | - | - | 3 | 4 | 3 | 2 | - | - | 3 | 4 |

Table 4a above indicates the quality of graphical disclosure measured by the GIDI score. The results show that 67% or equivalent to 88 sustainability reports is at "excellent" disclosure level, 13% equal to 17 annual reports is at "good" disclosure level, and 12% equal to 16 sustainability reports is at "average" disclosure level. These numbers show quite good numbers considering that only 11 out of 132 annual reports are categorized as poor and very poor, equal to 6%, and 2%, respectively. The results showed that a total of 80% of the sample companies were categorized as "excellent", "good", and 12% "average" companies in the sustainability disclosure they presented, while only 8% of the companies were included in the "poor" and "very poor" category.

Next, this study divides the sample into groups of manufacturing and non-manufacturing companies. The pattern of the disclosure using graphs in the sustainability report of the two types of companies is relatively similar. The manufacture consists of 60 sustainability reports. This can be seen from a total of 76% of the sample companies that were categorized as "excellent", equal to 68%, "good" equal to 8%.

While the sample companies were categorized as "average" equal to 15%, only 8% of the companies were included in the "poor" and zero "very poor" in the sustainability disclosure they presented. On the other hand, for non-manufacture, the data consist of 72 sustainability reports. The result is quite similar. A total of 82% of the non-manufacture companies were categorized as "excellent", equal to 65%, "good" equal to 17%. GIDI score is categorized as "average" equal to 10%, while only 3% of the companies were included in the "poor" and 3% "very poor" in the sustainability disclosure they presented. These results show that

**Table 4b. Result of Modified GIDI Score (continue)**

| Range | Disclosure Level | GIDI Score | | | | Modified GIDI Score for Bar and Line Graph | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Go Public | | Non-Go Public | | Go Public | | Non-Go Public | |
| | | N=92 | | N= 40 | | N=92 | | N= 40 | |
| | | Total | % | Total | % | Total | % | Total | % |
| 80–100 | Excellent | 52 | 57 | 36 | 90 | 59 | 64 | 37 | 93 |
| 60–79 | Good | 16 | 17 | 1 | 3 | 8 | 9 | 0 | - |
| 40–59 | Average | 15 | 16 | 1 | 3 | 15 | 16 | 1 | 3 |
| 20–39 | Poor | 6 | 7 | 2 | 5 | 7 | 8 | 2 | 5 |
| 0–19 | Very poor | 3 | 3 | - | - | 3 | 3 | - | - |

the pattern of information in the sustainability report using graphs between manufacturing companies and non-manufacturing companies is similar. Both groups share information that is relatively of the same quality in accordance with the integrated sustainability guidelines. Since the bar and line chart are so popular, this research modified the GIDI score to focus on counting only the bar and line chart, as seen in Table 4a. The result shows almost a similar percentage as the unmodified GIDI score.

Furthermore, Table 4b shows two groups, go public and non-go public companies. In total, there are 92 sustainability reports in the go public group, and 40 sustainability reports in the non-go public group. This division into two groups is carried out because the disclosure pattern can be influenced by the fact that social and environmental disclosures that are part of the sustainability report become

mandatory information for publicly listed companies, and on the other hand, are voluntary for non-go public companies. However, the data in Table 4b show that in the publicly listed companies, a total of 74% or equivalent to 68 of the 92 sustainability reports of publicly listed companies are categorized as "excellent" and "good".

The percentage of sustainability reports categorized as "excellent" is equal to 57%, and "good" is equals to 17%. While the percentage of sustainability reports categorized as "average" is equal to 16%; 7% of the companies were included in the "poor" and 3% "very poor" in the sustainability disclosure they presented. Meanwhile, for non-go public companies, only 40 sustainability reports, it shows that 90% are categorized as excellent, 3% good, and 3% average, the remaining 5% are poor, and none are classified as very poor. This means that the level of sustainability reporting in the

**Table 5. Result of Multiple Regression Analysis**

| Independent Variable | Prediceted Sign | Dependent Variable: | | | |
|---|---|---|---|---|---|
| | | ROE (All samples) | ROE (manufacturing) | ROE (non-manufacturing) | Market Return annually |
| (Constant) | | 28.490 (.000) | 18.898 (.039) | 12.998 (.007) | -.285 (.095) |
| GIDI Score | + | -.180 (.041)** | .072 (.315) | -.008 (.888) | .004 (.022)** |
| Chart Time span | + | .665 (.517) | .303 (.646) | 2.219 (.006) *** | .078 (.003) *** |
| WB_regulatory index | + | -4.483 (.022)** | -2.025 (.163) | -6.116 (.000)** | -.087 (.055)* |
| Industry | + | 4.505 (.260) | - | - | -.065 (.481) |
| ROE | | - | - | - | .001 (.526) |
| R Square | | 0.114 | 0.208 | 0.334 | 0.163 |
| Adjusted R Square | | 0.083 | 0.150 | 0.304 | 0.114 |
| F | | 4.091 | 4.606 | 11.356 | 3.340 |
| Sig | | 0,004 | 0,011 | 0,000 | 0,008 |
| N | | 132 | 60 | 72 | 92 |

*, **, *** significant in 10%, b5% and 1% respectively

excellent category for non-go public companies reaches 90%, with 3% categories as "good" and 3% as average. While only 5% are categorized as "poor" and none as "very poor". Like Table 4a, Table 4b also shows the modified GIDI score that focuses on counting only bar and line charts. The result shows almost a similar percentage as that of the unmodified GIDI score. Finally, when we compared the percentage between the go public company group and the non-go public group. It seems that non-go public prepare their reports well and realize the added value that sustainability reports provide for the company's image. This is because the disclosure of items in the sustainability report for non-go public companies is voluntary.

**Relationship between Graphical Disclosure and Accounting-based Performance**

The regression results presented in Table 5 show that for the first model of 132 data of all sample, the model is fit because the F value is 4.091 with 0.004 significance qualified to be a good overall model of the regression model. So, the model can be used to predict the effect of the GIDI index and control variables on the dependent variable. The adjusted r square value is 8.3%, while the other 91.70% is explained by other variables outside this research model.

The results in Table 5 show that the GIDI score affects ROE as accounting-based performance with a coefficient value of -0.180 and a

significance level of 0.041 below 0.5. Thus, the GIDI score has a negative effect on ROE. This negative direction is different from the assumption. However, different results were seen in the groups of manufacturing and non-manufacturing companies. In a separate sample group of manufacturing and non-manufacturing companies, the GIDI score is not proven to affect ROE. This finding demonstrates that disclosure has direct costs in addition to exposing potential concerns. This finding supports a previous study by Gonzales et al. (2019) and Alcaide González, De La Poza Plaza and Guadalajara Olmeda (2020) showing the negative effect of sustainability on accounting-based performance.

This finding, however, contradict Orlitzky, Schmidt and Rynes (2003), Cherian et al. (2019), and Isanzu (2016), as well as a study by Margolis and Walsh (2003) showing that a company's sustainability transparency has no effect on its performance. The unfavorable relationship between graphical disclosure and accounting-based performance supports Flammer et al.'s (2021) assertion that disclosure may indicate vulnerabilities such as risks associated with property damage, personal injury, liability, loss, or any other type of climate-

related harm to the business, which would be costly to accounting-based performance.

**Relationship between Graphical Disclosure and Market-based Performance**

Table 5 also shows that the effect of the GIDI score influences returns annually as a measure of market-based performance. This fourth model shows an adjusted r square value of 11.4%, with an F value of 3.340 and a significance of 0.008. The result shows the positive effect of the GIDI score on return with a coefficient of 0.004 and a significance of 0.022 below 0.05. These results are in accordance with the research hypothesis that the GIDI score affects market-based performance. Thus, information in the form of graphs in the sustainability reports is proven to be appreciated by investors.

This result confirms the argument that investor associates the graphical representation with its context, which includes a mental grasp of the quantitative referents (Shreiner, 2020). This capacity to discern "between the data" is heavily reliant on the investors' prior exposure to various graphics and their conventions (Friel et al., 2001; Shah et al., 1999). These results

show that investors understand the graph, recognise the visual features and conventions in the data visualization they are viewing, and comprehend the context or content surrounding the data in the visualization (Shah and Hoeffner, 2002).

The control variables used in this study are chart time span, world bank regulatory index and industry. Firstly, the control variable time span shows a positive effect on the third model with ROE as a dependent variable among non-manufacturing companies as well as the fourth model with market return as the dependent variable. This result indicates that chart time span is useful for investors. A longer chart time span provides more information on a company's historical performance.

The second control variable is World Bank regulatory index. World Bank regulatory index has a negative effect on the first test of the entire sample on ROE, the third test on ROE of non-manufacturing companies and the last test on annual returns, while the second test on manufacturing companies does not show any WB regulatory effect index to ROE. The three tests show a negative direction, meaning that the higher the WB regulatory index, the lower the GIDI score is. This indicates that companies from countries with a high level of WB regulatory index tend to report lower ROE levels, and at the same time, tend to record lower market returns. Referring to the World Bank's statement regarding the definition of WB regulatory perceptions as the government's ability to formulate and implement sound policies and regulations that promote private sector development have a negative effect on ROE and market returns, it can be interpreted as a sign of prudence.

Companies originating from countries with higher WB regulatory index levels tend to be more conservative in recognizing profits, and investors respond more conservatively as well. This is in line with the statements of Lara et al. (2009) that regulation induces not only unconditional conservatism but also conditional conservatism. The third control variable industry in this research shows no effect on both ROE and market return. Meanwhile, ROE as a control variable also shows no significant effect on the fourth model with market return as the dependent variable.

**CONCLUSION, IMPLICATION AND LIMITATION**

This study has examined graphical reporting in Southeast Asian public slisted companies during 2017–2019. There are several findings in our research, as follows. The average number of graphs contained in sustainability reports is 15.73, which can be considered high when compared to previous research by Uyar and Kilic (2012) with an average of 8.6 charts in the annual reports in Turkey. Regarding the type of information, the graphic type mostly used is social information (on average 6.3 charts) which is higher than economic and environmental information. In terms of the types of charts used, the results of this study show that bar chart is the most popular chart type used in sustainability reports; this also shows that companies tend to present graphs for information that is multiyear and reflects progress or achievements rather than information that reflects current one-time information. In terms of quality, based on the GIDI score, this study shows a good quality of graphical information, as shown by 67% percent or equivalent to 88 sustainability reports classified as excellent. The good quantity and quality of graphical information in this study support the notion that graphical information increases information accuracy (Jones et al., 2018), suppresses ambiguity that confuses information users (Linsley and Lawrence, 2007) and is useful as a structured information (Ryan, 2012).

The result of multiple regression analysis shows that although the present negative influence on accounting-based performance is measured by ROE, the GIDI score shows a positive effect on market-based performance. The different direction of the influence of the GIDI score on the return shows that the sustainability report information is beneficial for investors, even though it is detrimental to the companies' accounting-based performance. This indicates that the issuance of sustainability report is a cost borne by the companies but provides added value for stakeholders, especially for shareholders.

The results of this study do not support previous research by Uyar (2012) which shows that there is no relationship between profitability and total graphic. However, the results show that graphical information positively affects the market return. This is consistent with the argument that corporate social and environmental activities can add value to the firm under certain conditions

(Utami, 2018). The argument that companies that have good environmental and social performance will be responded positively by investors (Waluyo, 2017) means that a company with a higher quality of sustainability disclosure would benefit in the long run, instead of the short run. The results of this study are also in line with Aljifri and Hussainey (2007), who claimed that the disclosure helps investors make investment decisions. Less or incomplete information can cause an inaccurate forecast of company prospects (Utami et al., 2020). Overall, this result supports the argument that graphs play an important role in investors' decision-making (Jones 2018; Dilla et al., 2013; Isa 2006; El-Sayed et al., 2020).

These results are interesting and extend previous studies that have linked disclosure to financial performance and companies' characteristics. Sustainability disclosure is universal and applies internationally, influenced by the type of business because certain types of businesses demand a broader explanation and have more information to disclose. Disclosure evidently influences the way information-related market prices are determined (Ng & Rezaee, 2020). This study also shows that increased

corporate disclosure is associated with a rise in stock price (Haw et al., 2012). This means that investors appreciate companies that have a high level of graphic disclosure. Investors appear to be more receptive to companies that show more information graphs, as this is a type of transparency. Disclosure has been shown to be beneficial in minimizing information asymmetry between companies and investors (Healy and Palepu, 2001). Transparency is achieved by the transformation of confidential information into public information (Scott, 2016), which aids investors in better understanding the company's management. This incentivizes investors to reduce their expected degree of risk (Ashbaugh, Collins, & Lafond, 2004). Given that organizations with a higher level of transparency have less investment risks, the level of disclosure, as a measure of transparency, thereby impacts investors' willingness to invest (Setiany & Suhardjanto, 2021). This condition means that companies with a higher level of transparency will attract more investors, which will influence the market performance of the companies. Similarly, Gelb and Zarowin (2002) demonstrate that businesses with a high disclosure rate have higher share values than those

with a low disclosure rate, implying a better potential return for investors.

This study has several limitations that should be considered by future research. First, the result is obtained from a relatively small sample; therefore, the findings should be interpreted with caution since this limitation is related to the generalization of the results of this study. Second, this study assumes that investors use graphical information as part of their fundamental analysis when making investment decisions. Further research can directly examine investors regarding the use of graphic information to assess whether different types of graphical representations differ on investors' decisions.

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