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Shaping Sustainability in Southeast Asia: How ESG Scores, Supply Chain Practices, and Gender-Diverse Boards Drive Investment Decisions

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ABSTRACT

This research analyzes the influence of Environmental, Social, and Governance (ESG) disclosures, Supply Chain Sustainability (SCS), and Board Gender Diversity (BDIV_RATIO) on investor decision-making. A dataset of 78 observations from 26 manufacturing businesses in Southeast Asia (2020–2022), obtained from Bloomberg, was used to perform multiple linear regression analysis to evaluate their impact on stock trading volume. The findings demonstrate that ESG disclosures and SCS do not substantially influence investor behavior, but BDIV_RATIO has a detrimental effect. These results indicate that poor sustainable financial literacy may lead investors to disregard firms' sustainability initiatives. This research underscores the intricacies of sustainable investment and the need for enhanced investor understanding to optimize its advantages.

1. INTRODUCTION

Recently, the investment community has acknowledged the financial value of ESG issues and their associated risks [1]. Prompted by increasing public scrutiny and awareness of sustainability practices, companies have been encouraged to address matters outside the scope of financial performance and adopt ESG into their operations [2]. By the end of 2023, multiple institutions have used the ESG as its reference. This led to an increase in quantity and quality of sustainability disclosures. The information comes in many forms such as sustainability reports (SR) and other channels for companies to communicate with shareholders [3]. Which ultimately helps to ensure transparency, compliance, and continued participation in achieving a better future.

A massive part of the ESG fulfillment lies in the funding and support of investors on sustainable practices. Marti et al. [4] further stated that investors can influence a company's decisions in sustainability. Enhancing awareness of sustainability investing topics will lead to more informed investing decisions made by investors. Eventually contributing to fulfil the global movement of the SDGs 2030 deadline and BSI PAS Net-Zero Emission 2060.

The production capability of manufacturing companies often comes at a cost environmentally, being the third largest producer of greenhouse gases ranking [5]. Heavily dependent on raw material input, the manufacturing industry cannot be separated from a robust supply chain. The interconnected nature of the manufacturing industry and its suppliers have allowed some companies to enforce certain sustainability standards on their first-tier suppliers which in turn enforce the same standards from their suppliers, creating a cascading effect [6]. However, disruptions caused by the COVID-19 pandemic and ongoing geopolitical tension have shown the inadequacy of the current supply chain management practices [7]. By leveraging data-driven insights, companies can go beyond traditional evaluation methods and objectively measure a supplier's sustainable practices.

In securing its vision and commitment, diversification of gender in corporate structure enables a better understanding of the complexities of the organizational environment and thus improves decision making [8]. Furthermore, prior studies suggested women in top management are more attentive to maintaining societal relations, and stakeholder engagement and prioritize more on risk awareness compared to their male counterparts [9]. This heightened focus on critical aspects strengthens the company's ability to navigate challenges and pursue sustainable growth strategies.

Financial and non-financial information positively influence an individual investor's investment decision [10]. ESG disclosures, including CSR, and SR, among others, have provided investors with an additional crucial factor to consider when making investment decisions. In addition, a multitude of perspectives within the company in the form of strategic planning greatly enhances the prospective outlook from both financial performance and non-financial aspects such as ESG performance. We will delve deeper into the topic by incorporating the dimension of SCS and gender diversity among the BoD to assess its impact on sustainable investing (SI).

Legitimacy theory suggests that positive societal perception is required for companies to access resources. In essence, companies engage stakeholders and align their behavior with society's boundaries to be perceived as legitimate by the broad

community. When actions have resulted in unfavorable opinions from the community, corrective actions are to be expected [11]. Nearing the SDGs 2030 deadline, nations around the world have pushed forward their sustainability agenda by making information relating to company sustainability practices a legally required disclosure. This creates a new dimension of which a company is expected to comply and legitimize itself in. Thus, sustainability reporting and implementation of sustainable initiatives (e.g. SCS) serve as a form of conduct legitimacy and will have a positive effect on the firm's reputation [12].

1.1 Research questions

The research aims to understand the relationship between ESG disclosure, SCS, and Board gender diversity (BDIV_RATIO) to investor decision-making within the manufacturing sector during 2020-2022. Thereby, we have proposed several questions to facilitate the research:

Does ESG information have a significant effect on investors' decisions?

Does SCS have a significant effect on investors' decisions?

Does a BDIV_RATIO have a significant effect on investors' decisions?

1.2 Hypothesis development

The term ESG gained prominence in the early 2000s, it is a set of activities associated with the company's commitment towards CSR and the primary source to measure sustainability performance [13]. Originally used to promote socially responsible investing, investors can screen their portfolio according to each of the ESG factors, especially the environmental and social aspects [14]. As a response for SDGs 2030, the global economy has enacted regulations which leave the non-compliant companies at risk of legal liabilities in the future which can have a significant impact on profits through fines, and penalties [15]. As of 2021, Indonesia listed companies have an obligation to publish their SR. From the perspective of legitimacy theory, companies provide ESG disclosures to legitimate its continuous existence [16].

Investors have started to consider the measurement and inclusion of ESG risks in mutual funds and stock investment procedures [17]. Various studies and research show that ESG-based investments can provide better performance [18]. Further study by Cui and Docherty [19] investigated trading behavior concerning ESG news issuance, suggesting a reaction in trading volume, with a clear increase from negative news and a smaller increase from positive news. It should be noted, from an investor's perspective, that ESG-based investments are not only concerned with the environment and society but also increase the opportunities and risk management of the portfolio. In addition, sustainable initiatives as disclosed in Corporate Social Responsibility (CSR) reports have also been positively linked to financial analysts' recommendations [20].

H1: *There is a significant effect of reporting the ESG on investors' decisions.*
H1.a: *There is a significant effect of reporting the E score on investors' decisions.*
H1.b: *There is a significant effect of reporting the S Score on investors' decisions.*
H1.c: *There is a significant effect of reporting the G Score on investors' decisions.*

SCS refers to the practice of overseeing the entirety of the supply chain in a manner that addresses environmental, social, and economic concerns while ensuring long-term viability and resilience [21]. It poses a significant contribution to the continuation of companies' operating ability as customers often make significant relationship-specific investments in supply-chain networks, and they are exposed to adverse shocks to their suppliers [22]. Issues arising due to inadequacy in SCS would not only affect companies' functionality but also lead to a reputational crisis and subsequent litigation.

Several studies affirm that SCS offers notable competitive advantages and enhances a more environmentally conscious corporate reputation [23]. The pivotal role of Corporate Reputation (CR) practices influences financial analysts' recommendations [24]. These analysts, shaping investor perceptions, wield influence over the company's value by driving up demand for shares and subsequently impacting market prices [25]. However, SCS may lead to a negative response from investors due to increasing risks and uncertainties [26]. Furthermore, SCS practices are done on a rather practical basis than to gain stakeholder legitimacy [27].

H2: *There is a significant effect of SCS on investors' decisions.*

Gender diversity refers to the balance of male to female ratio serving in a governing body. Fair representation enables recognizing and valuing the contributions of people from diverse backgrounds and perspectives, regardless of gender identity or expression. As the helm of a public firm's decision-making process, the board decides on every major operational or strategic decision including those related to sustainability [28].

Walls et al. [29] suggested there is a positive association between female management and socially responsible firms, corporate social performance, and firm reputation. Other studies have also revealed that women demonstrate a propensity for ethical business practices and exhibit a stronger inclination towards CSR compared to men [30].

Furthermore, research highlights that enhancing board diversity, by integrating women into predominantly male corporate boards, could result in strengthened judgment. This improvement is prompted by a vigorous debate with varied perspectives and expertise, resulting in a broader range of solutions [31]. Such enhanced decision-making is crucial, especially for the non-routine nature of challenges encountered by boards, including those pertaining to environmental sustainability. Lastly, concerning risk perceptions, females' tendency to be more risk-averse may serve as a precaution, serving as an additional validator for crucial decision-making. Although other research present divergent perspectives, their findings suggest there is no clear positive correlation between BDIV_RATIO and strengths in environmental performance [30, 32]. Additionally, they indicate only a statistically weak connection between BDIV_RATIO and concerns related to environmental performance.

Board gender diversity is associated with enhanced sustainability reporting [33], which in turn support the legitimacy theory [34]. Effective implementation of environmental sustainability practices resulting in performance improvements and positive stock market responses over time and highlights the obstacles that

companies encounter in conceptualizing and executing such practices [35].

H3: *There is a significant effect of BDIV_RATIO on investors' decisions.*

2. RESEARCH METHODOLOGY

The research use quantitative method with secondary data from the Bloomberg database, Yahoo Finance, MarketWatch, and companies' annual reports (AR) and SR. Bloomberg was chosen for its comprehensive data for the selected geographical area, real-time and seamless news, and widely used by professional traders and top-tier institutions compared to other financial data provider (i.e., Refinitiv, Factset). Stata 17 is used to run the multiple linear regression to find the relation between the variables toward Investor decision. Our sample is chosen from the Indonesia Stock Exchange (IDX), Bursa Malaysia, Singapore Stock Exchange (SGX), Stock Exchange of Thailand (SET), and the Philippine Stock Exchange (PSE) with companies classified under the manufacturing industry. Using the purposive sampling method, companies are filtered based on the availability of their SR, the completeness of the ESG score, and the SCS score from 2020-2022. Furthermore, we also consider EBITUSD to reduce the impact of company profitability on the model. Following the selection steps, we acquired 78 data from 26 sample companies (refer to Table 1).

ESG scores and SCS are from the Bloomberg database, while BDIV_RATIO data are derived from companies' annual reports. The BDIV_RATIO data elaborate the ratio of female board members to the total number of board members as found in the AR while board number (BNUM) is utilized as a control variable. Whereas investor decision as the independent variable is measured by the stock trading volume 5 days upon the date the SR is disclosed, extracted from Yahoo Finance and MarketWatch. Utilizing the trading volume activity (TVA) formula of Copeland [36] the stock trading volume can be measured by the ratio between the number of shares traded at a certain time to the number of shares outstanding at a certain time.

$$\begin{aligned} TVA\_AFTER &= \alpha + \beta ESG + \beta E + \beta S + \beta G + \beta SCS \\ &+ \beta BDIV\_RATIO + \beta BNUM + \beta EBITUSD + \varepsilon \end{aligned} \quad (1)$$

3. RESULT AND DISCUSSION

3.1 Classical assumption test

Appraisal of the skewness and the kurtosis shows the data to be non-normally distributed. However, taking account of the sufficiently large sample size, the normality issue is deemed insignificant due to the central limit theorem [37]. Given the 0.000 p-value, it can be concluded that the observations have a heteroskedasticity issue, therefore the robust method is applied in the regression to improve the model. Based on the correlation matrix, only the p-values of E and S appear below the threshold of 0.8, meaning the variables highly correlated with the ESG variable making it redundant. Thus, they have been dropped to ensure the reliability and interpretability of regression analyses (refer to Table 2).

Based on the results, the data have passed the classical assumption tests and followed by the execution of the Hausman test to determine the regression model. The Hausman test reported a chi-square of 13.45 with a p-value of 0.00138 with a corresponding p-value of 0.00138, significant at 5% level. As the study failed to discover a systematic difference between the estimates obtained from the Random Effects model and the Fixed Effects model, the Fixed Effect model was applied [38].

Table 1. Sample distribution

Countries	Total	Indonesia	Malaysia	Singapore	Thailand	Philippine
Listed Manufacturing Companies	839	165	225	162	237	50
Publishing SR	243	52	98	18	47	28
Available ESG disclosure scores (DS)	60	15	8	17	14	6
Available supplier ESG DS	49	15	7	12	9	6
Outlier reduction	26	10	5	7	4	0

Table 2. Regression result

TVA_AFTER	Coef.	Robust St.Err.	t-Value	p-Value	[95% Conf.	Interval]
ESG	-.0001	0.0001	-0.99	.333	-.0003	-.0001
G	.00001	.00005	0.38	0.704	-.00008	.0001
SCS	-.00009	.00008	-1.13	.270	-.0003	.00007
BNUM	-.015495	.00681	-2.28	0.32	-.03	-.0014
BDIV_RATIO	-.0004	4.47e-09	-0.98	.336	-.001	.0004
EBITUSD	4.05e-09	.00563	0.91	.373	-5.15e-09	1.33e-08
Constant	0.154021	.00563	2.73	.011	.004	.027

3.2 Analysis and discussion

The ESG presented negative but insignificant impact to investor decisions as implied by the p-value exceeding 5%. Anderson and Robinson [39] highlighted the correlation between financial literacy and ESG-compliant investment. A study concerning financial literacy at Asia, presents Indonesia at 32, Malaysia at 36, and Thailand at 27 points each [40]. Meanwhile, Singapore has a much higher financial literacy score at 59. However, other studies have found that even in highly financially literate populations, the literacy of sustainable finance is still lacking [41]. Moreover, higher financial literacy means higher theoretical knowledge but does not guarantee practical application or better financial decisions [39]. Classical financial literacy level varies between countries, ranging between high and low. Meanwhile,

sustainability literacy is still a relatively new term in academic literature and in practical activities [42] although it has been gaining traction since 2020. Deloitte [43] estimated that ESG-related assets will account for more than half of all global assets under management by 2025. Higher ESG disclosure score increases investors' willingness to hold on to it [44], in consideration of better long-term prospects [45]. Hence, creates an imbalance between the supply and demand of ESG shares leading to lower stock liquidity. Furthermore, higher ESG shares tend to have a higher premium over non-ESG or lower ESG shares affecting investor preference. However, despite the underlying sustainability-related benefits, the information relating to it is still asymmetrical within population groups in the country and among countries.

To establish ESG as a primary consideration in investment decisions, it's evident that the broad scope of financial literacy is different from a comprehensive understanding of sustainability due to the different nature of the study. Given the complexity, addressing low levels of sustainable financial literacy necessitates widespread socialization efforts. These endeavors aim to cultivate a deep understanding of the benefits of sustainability, thereby appealing more to investors and receiving support from the broader public.

Although the average score for SCS stands at 52.94%, the relationship between SCS and investor decisions has proven to be negative but insignificant. The notion of SCS emerged roughly a decade ago, and gradual implementation has been underway. Based on our observation, access to detailed SCS information and scores remains limited, primarily through sources like the Bloomberg and Refinitiv, which are costly and inaccessible to the public. Moreover, we found that most research utilized the method of expert interpretation regarding SCS information from SR [46], interviews and surveys from firms, and sustainability supply chain management (SSCM) announcements [47] which are not easily accessible. Due to the extensive effort to acquire the SCS data, consideration for it particularly is low. Exposure is confined to per-company ESG metrics, rather than a specific factor (i.e., SCS). Hence, green investors utilize ESG as a carpet term as a placeholder for SCS. Investors exhibit a greater inclination to retain investments in companies with higher ESG scores compared to those with lower scores [44]. A study revealed that stock performance, in the long run, exhibits a positive reaction to SCCM implementation [47]. Concluding that investors with access to SCS data would display a hold behavior when the SCS data is above average rendering the stock volume unfluctuating. When a company applied SCS, investors had divergent behavior, some would regard it as a risk while others as a competitive advantage [26]. Those who regard it as a benefit show an increase in loyalty, showing the hold behavior.

Gender board diversity demonstrates a significant negative correlation, with a 5% level of significance, to investor decision-making. Notably, while Thailand and Indonesia do not exhibit a significant relationship, Malaysia and Singapore do, each at a 5% level of significance. The percentages of board-gender diversity are as follows: Indonesia (5.57%), Singapore (14.24%), Malaysia (24.76%), and Thailand (23.75%). In countries with higher financial literacy (Singapore and Malaysia), investors are more aware of socio-economic movements such as higher female board participation which may cause them to avoid investing due to ineffective boards in the form of risk arising from the firm's inability to adapt from changes on board composition.

The most noteworthy finding is the significant negative connection between BDIV_RATIO and investor choices at a 5% significance level. This phenomenon is especially evident in Malaysia and Singapore, where financial literacy levels are elevated. The gender diversity ratios of board members in the sampled nations were as follows: Indonesia (5.57%), Singapore (14.24%), Malaysia (24.76%), and Thailand (23.75%). Our regression result shows that BDIV_RATIO has a significant but negative correlation with an investor's decision to invest in a company. The presence of women on the board led to a decrease in the board's effectiveness [48]. Which subsequently negatively affected business performance, potentially discouraging investors from investing. Whereas contrasting views demonstrate women on corporate boards have heightened concern for ethical and sustainable matters in general [49], this translates to assuming the roles associated with sustainability or audit. The inverse correlation indicates that investors can see an enhancement in board gender diversity as a liability instead than a competitive benefit. Certain studies contend that more female involvement on corporate boards results in improved ethical monitoring and augmented environmental measures. Conversely, others argue that abrupt changes in board membership may diminish effectiveness, thereby heightening operational risks. This opinion corresponds with findings that gender-diverse boards prioritize sustainability, risk management, and compliance, which may not coincide with the desires of short-term profit-driven investors.

Moreover, the presence of women on corporate boards could potentially enhance a company's voluntary disclosure [49]. Despite the accepted hypothesis, we assessed the result to be inconclusive and needed further research while utilizing a larger sample size and gender parity on the boards. Were gender parity regulations to be formalized worldwide, following the initiatives from the European Union, it would be best to implement methods that would maintain effectiveness while keeping the benefits of divergent perspective. In the nations with elevated financial literacy, investors may exhibit heightened sensitivity to governance changes, which might explain the observed negative link. Although board gender diversity correlates with enhanced voluntary disclosure and ethical concerns, the general market reaction indicates skepticism over its short-term financial advantages. Future study should investigate if investor opinions change as gender diversity increasingly becomes a standard component of corporate governance.

4. CONCLUSION

This research has several shortcomings that need acknowledgment. The non-normal distribution of data may compromise the trustworthiness of regression analysis findings, even if the model is statistically significant (F-value = 0.039). Future study may use alternate statistical methods, such robust regression or bootstrapping, to address these issues. The constrained sample size of 26 manufacturing businesses in Southeast Asia limits the generalizability of the results. Augmenting the dataset to include a wider array of businesses and nations might provide more extensive insights. Third, dependence on Bloomberg for ESG data limits the analytical depth, since other databases may provide further insights on sustainability disclosures. Ultimately, SCS data is restricted to first-tier suppliers, so neglecting the intricate complexity of the supply chain and their possible influence on

investor behavior.

To advance sustainable investment in Southeast Asia, authorities should prioritize the incorporation of sustainable financial literacy into educational programs, improve public access to ESG and SCS data, and encourage transparent sustainability reporting via incentives. Financial institutions and market regulators may contribute by creating awareness campaigns and offering advise on ESG integration for investors.

Future study should investigate investor behavior across various areas and businesses to see whether knowledge and literacy levels differentially impact investing choices. Furthermore, examining the decision-making behaviors of institutional and individual investors may provide significant insights into how value-oriented and social-change objectives influence investment strategies. By correcting these deficiencies, further research may enhance the comprehensive knowledge of sustainable investment dynamics.

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AUTHOR CONTRIBUTORSHIP

Samuel Christevan Tulya: Methodology, Software, Formal Analysis, Resources, Data Curation, Writing - Original Draft, Visualization, Project Administration.

Livia Aurelia Wijaya: Methodology, Software, Formal Analysis, Resources, Data Curation, Writing - Original Draft, Visualization, Project Administration.

Michael Angelus: Conceptualization, Methodology, Validation, Formal Analysis, Resources, Writing - Original Draft, Writing - Review & Editing, Visualization, Supervision, Project Administration.

DATA AVAILABILITY

Data Support this study are openly available From Mendeley Data, DOI: 10.17632/9sdhwf8cn5.1.

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