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Sustainability Accounting Disclosure, Firm Value, and Intellectual Capital Mechanism

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ABSTRACT
Research Background: Sustainability accounting disclosures include voluntary disclosures aimed at creating a positive perception among stakeholders**. Introduction / Objectives:** This study aims to determine the impact of sustainability accounting disclosure on firm value through intellectual capital. **Methods:** The methods used were OLS regression and bootstrapping. The study sample consisted of 34 of the strongest banks from The ASEAN Banker for the period 2018 to 2024. **Results:** The study found that sustainability accounting disclosure has a direct effect on firm value without going through intellectual capital. However, intellectual capital does not act as a mediator in the effect of sustainability disclosure on firm value. Sustainability accounting disclosure can influence investment decisions. Signaling theory remains relevant in explaining the role of disclosure in investor investment decisions. Intellectual capital is more important for strengthening the breadth of sustainability accounting disclosure than for intermediating information to investors. **Conclusion:** These results validate the relevance of signaling theory, which states that sustainability disclosure is a strategic tool for banks to demonstrate their commitment to sustainability principles. The Asian Banker believes it is important to consider sustainability disclosure as part of its assessment metrics. This will encourage banks to further enhance transparency, competitiveness, and investor trust. Furthermore, banks can demonstrate their commitment to maintaining sustainability and sound risk management.

Keywords: Banking; Firm Value; Intellectual Capital; Sustainability Accounting Disclosure
JEL Classification: M40; M41.

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INTRODUCTION
Sustainability accounting disclosures include voluntary disclosures aimed at creating a positive perception among stakeholders (Hummel & Schlick, 2016; Rudyanto, 2021). Transparency in corporate social responsibility is considered increasingly important because it can enhance a company's reputation and value. Relevant sustainability information also helps investors and potential investors make better investment decisions (ElKelish & Hassan, 2015). Sustainability disclosures provide insight into non-financial performance related to environmental, social, and governance, which significantly influence a company's perceived value. However, previous studies have shown that banks in developing countries tend to have suboptimal levels of sustainability disclosure (Mallin et al., 2014; Van Der Zahn, 2023). Furthermore, sustainability disclosure in Indonesia remains low compared to several ASEAN countries (Pranata & Laela, 2020; Taufik et al., 2023).

Signaling theory explains that companies use annual report disclosure as a tool to convey positive information to potential investors, which is expected to reduce the risk of information asymmetry (Mamun & Aktar, 2020; Wang & Wang, 2024). Companies can influence these factors by sending signals to the market, which then influence investor perceptions and can lead to changes in company value (Musleh Al-Sartawi & Reyad, 2018; Shahid et al., 2024). If

a company does not convey information clearly, it is a signal that the company is likely investing or operating in a risky sector (Jamali et al., 2017). Therefore, sustainability disclosure serves as a positive signal, especially when measured using an adequate sustainability index (Musleh Al-Sartawi & Reyad, 2018). This needs to be done by all companies, especially banks, because banks play a crucial role in investment activities to maintain national sustainability, both through lending policies and investment strategies (Cerqueti et al., 2023; Serfes et al., 2023).

Intellectual capital has been identified as a strategic asset that can enhance competitive advantage and firm value, as stated by the resource-based view (RBV) theory (Monson, 2024). Bananuka et al. (2023) and Buallay & AlAjmi (2020) show varying relationships between intellectual capital, sustainability disclosure, and firm value. Intellectual capital plays a crucial role in supporting sustainability disclosure by providing a strategic resource base that enhances a company's ability to communicate information effectively. Therefore, further research is needed to develop a relevant sustainability index framework in this context.

Most previous studies have focused solely on the direct impact of sustainability disclosure on firm value without considering mediating variables (see Mallin et al., 2014; Ousama et al., 2020; Rismayanti et al., 2023; Van Der Zahn, 2023). Some literature also shows inconsistent research results regarding the influence of sustainability disclosure on firm value. Bansal et al. (2021) and Kamaliah (2020) indicate a positive impact, while Buallay & AlAjmi (2020) show a negative impact. Sustainability indices often refer to global frameworks such as the Global Reporting Initiative (GRI). This study fills this gap by developing a sustainability index based on the Sustainability Accounting Standards Board (SASB) (Ammar et al., 2023; Okumuş, 2024). Furthermore, intellectual capital, as strategic capital encompassing elements of knowledge, innovation, and corporate relationships, is expected to link sustainability disclosure and firm value. Intellectual capital plays a crucial role in improving operational efficiency, driving innovation, and creating competitive advantage, ultimately impacting the influence of sustainability disclosure on firm value. This study examines the role of intellectual capital as a mediating variable to clarify the mechanisms of this relationship and offer a new perspective in the sustainability literature.

This study aims to develop a more comprehensive sustainability index framework and examine the role of intellectual capital as a mediating variable in the relationship between sustainability disclosure and firm value. The primary contribution of this study is to provide a transparent and accountable alternative sustainability index that encompasses financial aspects. Practically, this study provides guidance for regulators in evaluating banks' sustainability performance. This study also contributes to the field of management accounting by encouraging banks to improve sustainability disclosure to support better decision-making by stakeholders.

Table 1. Sampling Process

Sample Criteria	**Amount**
Banks listed in the 2024 100 Strongest Banks ranking	100
Banks not listed on the Capital Market	(48)
Banks that published inconsistent financial reports from 2018 to 2024	(18)
Sample banks	34
Observation year	7
Final sample size	**238**

Source: data processed

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METHODS

Table 1 shows the sample selection process in this study. Based on Table 1, the data used in this study are annual reports of banks listed in The Asian Banker's Strongest Bank ranking for the years 2018 to 2024. This ranking was chosen as the research subject because it is widely used by investors, analysts, and the media as a source for assessing the financial strength of commercial banks. The research period began in 2018, coinciding with the launch of the Sustainable Finance Initiative (SFI), which encourages banks to adopt more transparent disclosure policies related to sustainability (Sciarelli et al., 2021). Furthermore, 34 banks were selected as the research sample using a purposive sampling technique.

Data analysis used ordinary least squares (OLS) regression. Mediation testing in this study used the Sobel test, the Ario test, the Goodman test, and the bootstrapping test. Model parameter estimation used the ordinary least squares approach on panel data. Next, robustness testing was conducted using different parameter estimation approaches, namely feasible generalized least squares (FGLS) and generalized method of moments (GMM).

Figure 1 shows the conceptual framework of this study. Based on Figure 1, the regression formula used is as follows:

$NP = \beta 1PA + \beta 2MI + e$ (i)

$IC = \alpha 2 + \beta 3SA + e$ (ii)

In models i and ii, NP represents firm value, PA represents accounting disclosure, and MI represents intellectual capital. Furthermore, bank age and total assets serve as control variables. The independent variable is sustainability accounting disclosure, implemented with four main objectives: protecting the value of human life; human self, society, and the environment. The four main objectives are then broken down into eight orientations (outcomes). These eight orientations are further broken down into 24 dimensions and then into 43 elements, ultimately resulting in 109 indicators. The modified design of the sustainability accounting disclosure index, as implemented by several researchers, such as Alhammadi et al. (2022), Okumuş (2024), and Shinkafi et al. (2017).

A company's value is referred to as its market capitalization, which is influenced by many factors such as its financial performance and sustainability. This study uses the Tobin Q ratio to measure company value because the Q value reflects investors' assessment of the company's future market prospects. In the Tobin model, when q is greater than one, investment should increase, conversely, when q is less than one, investment should decrease (Fontana et al., 2019). Intellectual capital is considered a competitive advantage that increases firm value. Intellectual capital can be human, structural, or relational capital, which is an important factor for long-term performance because it is a competitive advantage from the perspective of the resource-based view (RBV) theory (Bhatti et al., 2024; Monson, 2024). Intellectual capital as a mediating variable is measured by the value-added intellectual capital (VAIC) model as previously researched (see Ali et al., 2024; Iazzolino & Laise, 2013; Ting et al., 2023). A high level of VAIC in a firm indicates a high level of integration between intellectual capital and firm resources. Therefore, the proposed VAIC model has been considered as a primary measure of intellectual capital performance (Shahwan & Fathalla, 2020).

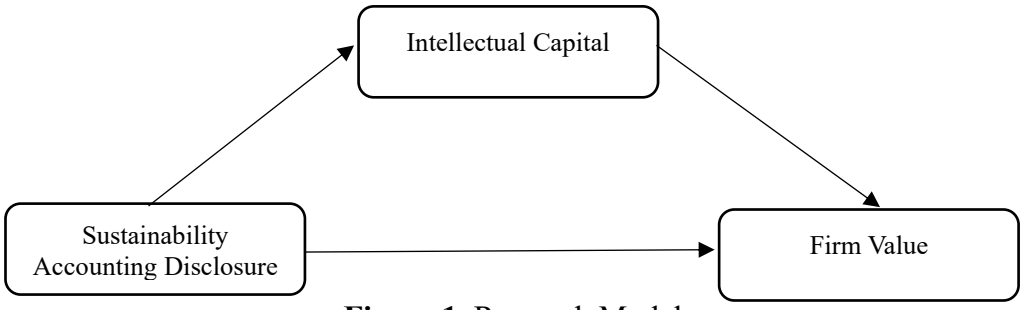

Figure 1. Research Model

RESULTS AND DISCUSSION

Table 2. Regression Test Results

Model	Hasil Regresi
PA → NP	(0,042)***
	(5,861)
SA → MI	-0,044
	(-0,591)
MI → NP	-0,041
	(-0,471)

Source: data processed

Table 2 shows the results of the regression test using the ordinary least squares (OLS) approach. Based on Table 2, the resulting equation is:

NP = 0.042SA – 0.044MI + e (ia)
MI = 0.041SA + e (iia)

The results of this equation indicate that accounting disclosure has a positive effect on firm value. This means that an increase in disclosure will lead to an increase in firm value. However, there is no significant effect of intellectual capital on firm value or accounting disclosure on intellectual capital.

Table 3 shows the results of the robustness test. This test was conducted using the feasible generalized least squares (FGLS) approach (Table 3, Estimate 1) and the generalized method of moments (GMM) approach (Table 3, Estimate 2). Based on Table 3, the resulting equation is:

NP = 0.044SA + 0.041MI + e (ib)
MI = 0.026SA + e (iib)

NP = 0.042SA – 0.041MI + e (ic)
MI = 0.075SA + e (iic)

The robustness test shows that the coefficients are all positive, although with different p-values. This indicates that the resulting model is consistent. In estimates 1 and 2, no significant effect of disclosure value on intellectual capital was found.

Table 4 shows the results of the mediation effect test. Based on Table 4, the insignificance of intellectual capital as a mediating variable is empirically proven by the Sobel

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test, Aroian test, Goodman test, and Bootstrap test. The Sobel test, Aroian test, and Goodman test show p-values greater than the specified alpha. This indicates no mediation effect. Furthermore, bootstrap results indicate that the average causal mediation effects (ACME) are insignificant, while the average direct effects (ADE) are significant at the 1% level. The next section describes the interpretation of the equation model.

Table 3. Robustness Test Results

Model	Estimation 1	Estimation 2
PA → NP	0,044***	0,042**
	(2,782)	(26,697)
SA → MI	0,026	-0,075
	(1,383)	(-0,290)
MI → NP	0,041	-0,401
	(0,585)	(-0,193)

Source: data processed

Table 4. Mediation Effect Test

Model	Sobel Test	Aroian Test	*Goodman Test*	*Bootstrap*
SADM → MI → NP	-0,182	-0,024	-0,178	
	(0,949)	(0,913)	(0,810)	
ACME				0,000012
ADE				0,010

Source: data processed

Sustainability accounting disclosure has a positive effect on bank firm value. This means that good sustainability accounting disclosure will increase firm value. This positive effect is indicated by the estimated coefficient value and validated by a robustness test. This finding aligns with research by Bansal et al. (2021) and Kamaliah (2020), which found that sustainability disclosure impacts firm value. This similarity is possible because the research subjects are within the ASEAN region, resulting in similar cultural practices, and the significant development of capital markets in Asia, leading to more efficient markets (Salerno, 2021). The development of the financial industry also shows significant value in Gulf Cooperation Council (GCC) countries and the United States (Kasi & Muhammad, 2018).

Companies can communicate with a wide range of potential partners through disclosure of economic, environmental, and social information, including suppliers, creditors, activist groups, governments, the media, customers, and the general public. This contrasts with the findings of Buallay (2019) and Buallay & AlAjmi (2020), which found a negative impact of disclosure on firm value. This is partly due to the condition of European capital markets, which, with their regulatory fragmentation, limited technological advancement, and conservative investment culture, pose significant barriers that can undermine the positive effects of disclosure on firm value (Kanagaretnam et al., 2022; Meoli et al., 2015). In addition to differences in research subjects, differences in policies between countries regarding mandatory sustainability reporting are reasons why companies may not fully report their sustainability activities.

Sustainability accounting disclosures in this study can demonstrate banks' strategies in balancing positive and negative impacts on the economy, environment, and social aspects. This disclosure also serves as a communication process that can reduce information asymmetry and

increase transparency between management and stakeholders. Transparency will increase investor attractiveness (Zhao et al., 2024). Transparency also serves as a signal that reduces inequality by providing relevant and high-quality information to various parties (Shahid et al., 2024; Wang & Wang, 2024). This disclosure can also be used as an instrument to identify risks related to a bank's economic, social, and environmental sustainability, which impact company value (Dienes et al., 2016). The primary function of signaling theory is to reduce information asymmetry. Disclosure of high-quality information requires an "honest signal" to have a relevant impact on stakeholders. Disclosures are expected to provide credible information to stakeholders, therefore, honest and accurate disclosure is essential.

This study empirically supports signaling theory. Banks that disclose sustainability values signal to customers that their activities are consistent with sustainability values (Alkhan & Hassan, 2021). Signaling theory plays a significant role in sustainability accounting disclosure. Extensive disclosure reduces investor uncertainty in evaluating a company. This suggests that sustainability accounting disclosure decisions lead to reporting relevant information about a broader set of information covering environmental management, social responsibility, effective governance, and ethics that will impact corporate value.

The Global Reporting Initiative (GRI) is a standard that has been improving environmental management transparency since 1997. However, this GRI standard remains weak in comparability and consistency because it does not encompass company types and sizes. The International Accounting Standards Board (IASB) recognizes that preparers of financial statements face challenges in applying judgment regarding what information should be disclosed (Parfitt, 2024). There is a need for clearer guidance on how to determine materiality and relevance, which are crucial for effective communication with users of financial statements (Ebaid, 2022).

The implications of developing an SASB-based disclosure index in this study are predicted to meet the need for information related to companies' sustainability risks and opportunities that is more specific to their industry type. This supports more consistent, comparable, and relevant reporting to support stakeholder decision-making. SASB is an international organization that develops industry-based sustainability reporting standards aimed at improving the relevance and comparability of sustainability information in financial statements. Meanwhile, the IASB has initiated a global initiative to integrate sustainability reporting into accounting practices by developing a more uniform framework, such as the IFRS Sustainability Disclosure Standards.

However, sustainability accounting disclosures are currently dominated by initiatives and developments in developed countries. Developing countries, including Indonesia, face unique challenges related to the adoption of these standards, such as differences in regulatory capacity, infrastructure readiness, and differing business cultures. Sustainability disclosures in developing countries do not always have to fully adhere to developed country frameworks. Instead, local adaptations that consider specific needs can be a more relevant and contextual approach. The development of the index in this study is one effort to bridge this gap by providing a sustainability reporting framework that aligns with local values while aligning with global efforts to achieve uniform financial reporting.

Regulatory support in developing countries is also key to encouraging the implementation of sustainability reporting, with proven benefits of increasing transparency, improving market perceptions, and effectively managing risks. Initiatives such as these can help developing countries adopt global standards without losing their local identities, thus strengthening the competitiveness of the financial industry, particularly banking, on the international stage.

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Based on model parameter estimates and robustness tests, sustainability accounting disclosure does not significantly affect intellectual capital. These results indicate that decisions related to sustainability disclosure do not impact intellectual capital, confirming the findings of Van Der Zahn (2023), who found that mandatory sustainability reporting is still considered too expensive by the management of companies listed on the Singapore stock market, resulting in low disclosure levels. This finding is inconsistent with the research of Aras et al. (2011), which found that intellectual capital significantly influences corporate social responsibility reporting. Fontana et al. (2019) argue that the value-added intellectual capital (VAIC) model is a proven model capable of objectively measuring intellectual capital. However, Li & Zhao (2018) argue that the intellectual capital coefficient methodology is based on historical information (taken from historical annual reports), so the valuation model only includes historical information and is unable to explain the difference between current and historical values. Intellectual capital valuation models need to be updated to provide more objective assessments and capture changes. These findings highlight the importance of updating intellectual capital assessment models to better capture strategic changes, including the influence of sustainability on creating long-term value. For example, a more dynamic approach that considers company investments in employee skills development, cross-functional collaboration, and knowledge-based innovation could provide a more accurate picture of the relationship between sustainability disclosure and intellectual capital. Furthermore, this study's findings fail to support the RBV theory's view that intellectual capital is a resource that serves as the core of value creation and competitive advantage for companies (Nakyeyune et al., 2023). Following the RBV, sustainability disclosure has not yet resulted in higher levels of intellectual capital in the form of developing unique skill sets related to environmental and sustainability knowledge.

The management challenge is that implementing a sustainability strategy can increase employee value (Berger et al., 2017). Unstandardized sustainability disclosure standards across countries can lead to differences in the implementation of sustainability strategies, whether targeting short-term or long-term strategies, despite the well-known long-term orientation of the banking industry (Rashid et al., 2020). Long-term strategies for developing the quality of intellectual capital must be disclosed in sustainability disclosures to enhance stakeholder trust.

This study found that intellectual capital was unable to mediate the effect of sustainability accounting disclosure on firm value. This implies that the impact of sustainability accounting disclosure on firm value is independent of intellectual capital. This means that broader sustainability accounting disclosure has no effect on the bank's intellectual capital, and therefore does not increase firm value. The more prominent direct effect between sustainability accounting disclosure and firm value suggests the importance of this disclosure beyond its mediating effect. Bala et al. (2021) and Mamun & Aktar (2020) found that intellectual capital had no direct effect on firm value. Similarly, Van der Zahn (2023) found that disclosure had no direct effect on intellectual capital, suggesting that firm value is not directly influenced by intellectual capital. Intellectual capital may, through other variables, influence firm value. Numerous previous studies have examined the effect of sustainability disclosure on firm value. These studies demonstrated that intellectual capital strengthens the effect of voluntary disclosure on stock returns. In accounting, sustainability accounting disclosures reflect a more comprehensive application of accounting ethics, extending beyond conventional financial reporting to encompass aspects of social and environmental responsibility. This approach aligns with accounting principles that prioritize the relevance and reliability of information to support stakeholder decision-making. However, the fact that intellectual capital is unable to mediate this relationship indicates that intangible assets such as intellectual capital are often not optimally represented in financial statements. This highlights the need to develop

accounting standards that reflect the strategic value of intellectual capital, particularly in the banking context. Therefore, disclosing intellectual capital in accounting reports can be a crucial element in increasing the relevance of accounting information for both internal and external stakeholders.

Sustainability disclosures can indeed signal to stakeholders, including employees, by demonstrating a company's responsibility towards the environment and prioritizing their interests and well-being (Shahid et al., 2024). This is evidenced by the positive relationship between sustainability and intellectual capital (Alvino et al., 2021). However, the differing focuses of the two can make it difficult for sustainability disclosures to effectively signal a company's commitment to developing and managing intellectual capital, which ultimately impacts company value. Sustainability disclosure primarily targets external stakeholders with a focus on environmental and social aspects, while intellectual capital focuses more on internal stakeholders with an emphasis on knowledge management and innovation.

In the context of sustainability accounting disclosure, the phenomena occurring in developing and developed countries show significant differences in their implementation and impact on company value. In developed countries, accounting education and training have high standards that emphasize ethical aspects, which contribute to the understanding and application of sustainability accounting principles (Nurunnabi, 2017; West, 2017). This implies that sustainability accounting disclosures in developed countries are more structured and can send a positive signal to stakeholders, including investors, regarding a company's commitment to sustainability and social responsibility. Conversely, in developing countries, the challenges faced in sustainability disclosure are more complex. Sustainability practices in developing markets are often inconsistently implemented due to variations in legal, cultural, and economic conditions. This results in sustainability accounting disclosures not always being well-received by stakeholders, which in turn can negatively impact company value (Budsaratragoon & Jitmaneeroj, 2019; Jasiulewicz-Kaczmarek & Gola, 2019).

Companies in developing countries often face difficulties in adopting new technologies that support sustainable practices, potentially hampering their innovation and competitiveness (Nurunnabi, 2017). Furthermore, in the context of intellectual capital, although there are no direct references to support this assertion, it is important to note that there is a positive relationship between sustainability and intellectual capital. In developed countries, intellectual capital is often more integrated into corporate strategy, whereas in developing countries, intellectual capital management may be less effective, reducing its potential impact on corporate value. The phenomenon in developing and developed countries shows that sustainability accounting disclosures have different impacts on corporate value, depending on the context and conditions in each country. In developed countries, these disclosures can serve as a positive signal that increases corporate value, while in developing countries, challenges in implementing and managing intellectual capital can hinder this positive impact.

The inability of intellectual capital to mediate disclosure and corporate value is due to the different focuses between sustainability disclosure and intellectual capital. On the other hand, this can be attributed to the intangible and subjective nature of intellectual capital, making it difficult to accurately measure and disclose its value, and the potential for its disclosure to have a negative and unintended effect on company value (Acuña-Opazo & González, 2021). The VAIC method for measuring intellectual capital focuses on human resources, ignoring other important components of intellectual capital, such as skills, knowledge, experience, and relationships (Soewarno & Tjahjadi, 2020). This limited scope can result in an incomplete picture of a company's intellectual capital. These elements represent challenges banks face when leveraging intellectual capital to enhance their value and expand

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the economic capacity in which they operate.

Banks that are emerging to offer ethical or cooperative financial products are required to possess intellectual capital with more complex capabilities, not only because of general banking operations but also because they operate within regulations. Banks' intellectual capital is expected to be more innovative in providing alternative banking solutions, taking into account the compliance and feasibility of their financial products, to gain a competitive advantage and improve company performance.

CONCLUSION

This study shows that sustainability accounting disclosures have a direct impact on increasing firm value. These results validate the relevance of signaling theory, which states that sustainability disclosure is a strategic tool for banks to demonstrate their commitment to sustainability principles. The Asian Banker believes it is important to consider sustainability disclosure as part of its assessment metrics. This will encourage banks to further enhance transparency, competitiveness, and investor trust. Furthermore, banks can demonstrate their commitment to maintaining sustainability and sound risk management. The information conveyed through sustainability disclosures can inform investors' holistic assessments, encompassing financial performance and compliance with sustainability values. Thus, investors will be more interested in investing, concluding that broader and higher-quality disclosures can be key to strengthening a bank's competitive position.

Intellectual capital, while important as a strategic resource, does not act as a mediator in the relationship between sustainability disclosure and firm value. This indicates that the relationship between disclosure and firm value is direct and independent of intangible assets such as intellectual capital. The measurement of intellectual capital, as an intangible asset, has the potential to obscure these interrelated effects. Banks can prioritize sustainability accounting disclosures relevant to stakeholder needs to create long-term value and enhance investment attractiveness. This research extends the signaling theory literature in the context of sustainability disclosure while highlighting the limitations of intellectual capital's role as a mediator in this relationship. This research also opens the door for further research to explore other factors that may strengthen the relationship between sustainability disclosure and firm value, such as financial performance or market dynamics, which would also expand the measurement of intellectual capital.

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