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Research paper

Intellectual Capital and Financial Sustainability During The Covid-19 Outbreak

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Abstract

By examining the banking industry in Indonesia during the Covid-19 pandemic, this study aims to explore the influence of intellectual capital on financial sustainability moderated by top management characteristics. This analysis combines data from annual reports and sustainability reports of 81 Indonesian banking companies listed on the Indonesia Stock Exchange in 2019-2020. Data analysis involves multiple linear regression. This study finds that intellectual capital has a substantial influence on the board of commissioners' knowledge and understanding of financial sustainability. However, an increase in the board's intellectual capital does not affect financial sustainability. Although intellectual capital is a form of capital that companies must possess to address future challenges, which are predicted to drive improvements in sustainable financial performance, research on the impact of intellectual capital on financial sustainability remains scarce.

Keywords: *Commissioners' Characteristics, Intellectual Capital, and Financial Sustainability*

1. Introduction

The pandemic has accelerated the digitalisation of Indonesian banking, but it has also triggered the end of restructuring, cyber risks, and financial unsustainability [1]. There have been 7,087 reports of cybercrime (fraud) in the last two years (2020–2021) [2]. This implies that while the COVID-19 pandemic has increased intellectual capital in the banking sector, it has also increased financial crime. Therefore, the objective of this study is to examine the impact of intellectual capital in the banking sector on financial sustainability during the COVID-19 pandemic. The banking industry currently relies heavily on intellectual capital obtained through human resource development and operational system improvements [3]. The quality of personnel and cutting-edge technology enhance knowledge, driving better financial and market performance [4]. Previous research has shown that the most important resources in today's knowledge-based economy are the creation of intangible asset value and innovation [5]. Previous research findings indicate that intellectual capital in the banking industry plays a crucial role in ensuring that the financial system will continue to function effectively in the future. Previous research has documented sustainable financial performance in the banking sector, but it has been limited to lending, financial performance, business models, sustainability practices, board features and proportions, and governance [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20]. Meanwhile, intellectual capital is beneficial for corporate sustainability and is closely related to the improvement of business strategies and innovation [21], [22], [23], [24], [25], [26], [27], [28].

In the context of sustainability, previous studies have shown that intellectual capital is closely related to long-term performance [24], [29], [30], [31]. Furthermore, Massaro et al. (2018) Conducted research using a content analysis approach, while Utama & Mirhard (2016) employed a VAIC model moderated by sustainability disclosure to examine financial performance in the context of Indonesian companies. In the context of Chinese manufacturing companies, Zhang & Wang (2022) found that intellectual capital has a beneficial effect on sustainable development performance both directly and through investor confidence. However, there is currently no clear data showing the significance of intellectual capital in improving sustainable performance disclosure in the banking industry. Various models have been used in research on intellectual capital performance over the past decade. Pulic (2000) proposed the VAIC (Value Added Intellectual Coefficient) model, which consists of three components: human capital, structural capital, and physical capital. This model has been widely accepted and used in research by [26], [36], [37], [38], [39], [40], [41], [42], [43]. The M-VAIC (Modified Value Added Intellectual Coefficient) model was then developed by Ulum et al. (2014) by incorporating relational capital into the VAIC model. Buallay et al. (2020); Ulum et al. (2017) used this model in their research. Furthermore, Nadeem et al. (2019) presented the A-VAIC model, which includes human capital, innovation capital, and physical capital. Soewarno & Tjahjadi (2020) used this model in their research on banking in Indonesia.

This study aims to fill the gap in previous research on the relationship between intellectual capital and sustainable financial performance disclosure in the banking sector. Based on top-tier theory and corporate theory, this study investigates the impact of the board of commissioners' characteristics and intellectual capital on sustainable financial performance disclosure in the Indonesian banking sector. This paper is divided into several sections, including Section 2 on literature review and development of research hypotheses; Section 3 on data

description and research design; Section 4 on presentation of research results; Section 5 on analysis of research findings; and Section 6 on conclusions.

2. Literature Review

The basic logic of the top-level theory is that executives make strategic decisions based on their interpretations of the situations they face, but there are at least two better logics. First and foremost, executives are interested in choosing strategies based on their qualities; second, the top-level theory predicts that executives with strong technological skills will invest extensively in R&D [49]. According to corporate theory logic [50]When a company can configure human resources, information technology, and build excellent relationships with clients, it will create sustainable corporate value.

2.1 Sustainable Financial Performance

Academics, scientists, policymakers, and citizens are increasingly concerned about the future of our planet [51]. The topic of sustainability has also gained attention with the launch of the United Nations' 2030 Agenda for Sustainable Development (SDGs) [28]. For the sake of sustainability and business existence, organisations must consider other important factors besides profit (financial), particularly People (social) and Planet (environmental) factors [52]. According to [53], economic, social, and environmental performance as the 'triple bottom line' is based on community, serving the real economy, long-term relationships with customers, and becoming a sustainable, independent, and resilient company. The GRI-3 guidelines can assist businesses in measuring, analysing, and communicating performance in three main areas: economic, environmental, and social [33]. Global businesses have grown rapidly, as evidenced by advancements in information and communication technology, science, and intense global competition [48]. Currently, the banking sector plays a crucial role in national economic development and growth by facilitating financial transactions [46]. The larger the business within a company, the higher the sustainability of its technological development [54]. Sustainable banking practices as a determinant of increased profitability [55].

2.2 Banking Digitalisation

Banks continue to evaluate and adjust their business strategies in line with developments in the operating environment [8]. Given the changing climate patterns, central banks are concerned that the financial system may not be prepared to face a potential increase in physical hazards and transition risks caused by policy, technological, and market developments that may occur during this period [56]. Although banks face a new operating environment as a result of legal, technological, and economic developments, it was not until the 2008 financial crisis that policymakers gave serious attention to the Bank Business Model (BBM) [57].

The impact of banking industry developments in the post-COVID-19 environment will be a key research issue in the future [58]. Financial institutions, such as banks, have experienced acute exogenous shocks, requiring them to prepare for extremely difficult and complex future challenges [59]. The COVID-19 pandemic has accelerated the adoption of digital services, with 1 in 3 consumers beginning to utilise digital services during the pandemic. The increasing pace of digitalisation has motivated banks to undertake reforms to ensure smooth and efficient operations (BI Institute, 2020). POJK No. 3 of 2021 categorises the assessment of digital banks, which includes data protection, technology, risk management, collaboration (e.g., interbank), institutional arrangements, and clients.

2.3 Intellectual Capital

Intellectual capital is a unique resource that can create a competitive advantage for companies [29]. Business actors are beginning to realise that competitiveness does not only lie in the ownership of tangible assets, but also in intangible capital [60]. In the era of globalisation, intellectual capital is recognised as an important factor in increasing company wealth [61]. In the modern economy, the most important asset for a company is intellectual capital [43]. Intangible assets, which are proxied by intellectual capital, play an important role in determining company value [62]. Intellectual capital helps improve financial performance systematically over time [63]. Pulic (2000) defines intellectual capital as human capital (HCE), structural capital (SCE), and physical capital employed (CEE) in the VAIC concept, while in the MVAIC concept, Ulum et al., (2017) add the customer capital component to intellectual capital (RCE). Human capital, particularly labour-management relations, can have a tactical impact on future earnings [64]. Organisational culture and organisational structure constitute structural capital. Organisational culture refers to values derived from the effective use of information and technology [46]. Customer capital is defined as 'the sum of relationships, interactions, and intimacy between a company and its internal and external stakeholders' [65]. Relationship capital, which involves relationships with other subjects, can be expanded from customer capital [66].

2.4 Characteristics of the Board of Commissioners

According to Hambrick & Mason (1984)The quality of top management or directors includes age, length of service, functional background, education, social and economic background, and financial condition. Fakoya & Nakeng (2019) show that although not all board qualities affect corporate environmental performance, having many independent board members can positively influence environmental decisions. King et al. (2016) show that banks with CEOs who hold MBAs are more profitable. Ho & Williams (2003) find that specific board characteristics, such as board size, percentage of outside directors, and board duality, have a significant impact on corporate value-added efficiency.

In Indonesia, the prevailing structure is a two-tier system, where the supervisory role of the board of commissioners and the executive role of the board of directors are divided [68]. Law No. 40 of 2007 of the Republic of Indonesia on Limited Liability Companies (PT) states that the Board of Directors is the company's governing body with full authority and responsibility for managing the company in the company's best interests, by the company's objectives and purposes, and representing the company both in and out of court by the provisions of the articles of association. so that in the event of a legal claim, the Board of Directors will represent the Company (Limited Liability Company, 2007).

2.5 Characteristics of the Board of Commissioners and Intellectual Capital

According to Hambrick & Mason (1984)The quality of the board influences the selection of risky strategies and corporate innovation. Miller & Triana (2009) believe that organisational outcomes such as corporate performance, strategic orientation, innovation, creativity, and diversification are influenced by the diversity of top management, such as educational level, gender, and nationality. According to Pant & Nidugala (2022)Board meetings and CEO duality play an important role in defining the efficiency of a bank's value added through the utilisation of total resources and intellectual capital resources. According to Bhuyan & Appuhami (2015)CEO duality, the composition of the independent board of directors, and independent directors on the compensation committee have a substantial impact on the intellectual capital of Australian companies. Considering the above discussion, the first hypothesis is formulated as follows:
H1a: The age of the board of commissioners has a positive effect on ICE
H1b: The experience of the board of commissioners has a positive effect on ICE
H1c: The education of the board of commissioners has a positive effect on ICE
H1d: The financial position of the board of commissioners has a positive effect on ICE
H1e: The homogeneity of the board of commissioners has a positive effect on ICE
H1f: The age of the Board of Commissioners has a positive effect on CEE
H1g: The experience of the Board of Commissioners has a positive effect on CEE
H1h: The education of the Board of Commissioners has a positive effect on CEE
H1i: The financial position of the Board of Commissioners has a positive effect on CEE
H1j: The homogeneity of the Board of Commissioners has a positive effect on CEE

2.6 Intellectual Capital and Sustainable Financial Performance

Intellectual capital has been identified as important for business continuity because of its importance in terms of overall company success [72]. According to Nuryaman (2015)Intellectual capital (IC) is a crucial resource for creating value and competitive advantage for companies in modern business. Hutahayan (2020) explains that intellectual capital meets the criteria as a unique resource capable of creating competitive advantage for organisations and therefore creating value for companies. Meanwhile, Massaro et al. (2018) state that intellectual capital (IC) and sustainability interact. According to Jordao & Almeida (2017)Intellectual capital systematically increases a company's profitability and returns over time. Buallay et al. (2020) found a beneficial relationship between intellectual capital and financial performance, as well as market performance of banks in Gulf countries. Petrov (2017) found that the impact of human capital on economic growth and performance can help a country or organisation. Furthermore, Zhang & Wang (2022) showed that intellectual capital influences corporate sustainability through investor confidence. Based on the previous discussion, the second hypothesis is as follows:
H2a: ICE has a positive effect on Sustainable Finance
H2b: CEE has a positive effect on Sustainable Finance

2.7 Intellectual capital enhances the impact of board characteristics on sustainable financial performance

The impact and consequences of these developments for the banking industry will be a key research issue in the post-COVID-19 era [58]. Bayangos et al. (2021) point out that climate change is a matter of concern. Meanwhile, Ulum et al. (2017) found that intellectual capital has a significant influence on the future financial performance of banking organisations, particularly in terms of policy and technology development. According to Nadeem et al. (2021), CEO's managerial skills have a substantial positive relationship with human resource investment, innovation, and relational capital. Wang et al. (2021) show that intellectual capital has a beneficial influence on information technology investment, which provides a competitive advantage for banks. Jain et al. (2021) show that the level of e-banking in banks is related to the information technology governance used by banks.
According to Hambrick & Mason (1984)Board characteristics influence the selection of risky strategies and corporate innovation. Meanwhile, Zenger (2016) explains that in corporate logic theory, a company will create sustainable corporate value when it is able to configure its human resources, information technology, and customer relationships. This study hypothesises, based on top-level theory and corporate theory, that intellectual capital influences the impact of board choices on sustainable financial success. Based on the above discussion, the third hypothesis is as follows:
H3a: ICE strengthens the impact of board age on Sustainable Finance
H3b: ICE strengthens the impact of the functional expertise of the board of commissioners on sustainable finance.
H3c: ICE enhances the impact of the education of the board on sustainable finance.
H3d: ICE strengthens the impact of the financial position of the board of commissioners on sustainable finance.
H3e: ICE strengthens the impact of the homogeneity of the board of commissioners on sustainable finance.
H3f: CEE strengthens the impact of board age on sustainable finance
H3g: CEE strengthens the impact of functional expertise of the board of commissioners on sustainable finance.
H3h: CEE increases the impact of board education on sustainable finance.
H3i: CEE strengthens the impact of the financial position of the board of commissioners on sustainable finance.
H3j: CEE strengthens the impact of the board of commissioners' homogeneity on Sustainable FinancePage style

3. Data and methodology

This study uses financial statements and sustainability reports for banking companies listed on the Indonesia Stock Exchange. The research period for this study is 2019–2020, which was chosen because 2019 reflects conditions before the COVID-19 pandemic hit Indonesia, and 2020 reflects conditions during the COVID-19 pandemic. This study collected data that could be used for this research from a total of 43 companies listed on the Indonesian Stock Exchange using two criteria. First, financial institutions that publish sustainability reports. Second, companies with complete financial information. Table 1 shows the specific data and sample of this study.

3.1 Measurement of Variables

GRI provides an important framework for reporting sustainability targets, including a set of social, environmental, and economic reporting criteria (GRI Website, n.d.). The GRI framework provides a set of indicators that can be used to assess the amount of sustainability issue reporting by organisations [51]. The indicators used in this study are taken from GRI-G4.
Companies with younger managers are more likely to pursue risky strategies than companies with older managers, according to [49]. Specific forms of risk include unrelated diversification, product innovation, and financial leverage, so the age of the board of commissioners is measured using the formula: Number of board members over 55 years old/Total number of board members. Companies with more top management having functional output experience, according to Hambrick & Mason (1984), will have a beneficial relationship with more complex corporate strategies. Product innovation, related diversification, advertising, and forward integration are all indicators of output emphasis. This study categorises two types of functional backgrounds and measures them using dummy variables, with CEOs oriented toward output (marketing, sales, R&D) coded as (1) and CEOs oriented toward throughput (legal, administration, finance, operations) coded as (0) [79], [80].
According to Hambrick & Mason (1984)Organisations with significant formal management education will have greater administrative complexity than companies with less formal management education. Thus, board education is calculated using the formula: number of board members with management education / total number of board members. According to Hambrick & Mason (1984)Company success is positively correlated with the total income earned by top managers from the company through salaries, bonuses, options, and dividends, rather than the percentage of shares owned by senior managers. Consequently, the financial status of the board of commissioners is measured using the formula: LN Total Remuneration earned by the board of commissioners. According to Hambrick & Mason (1984)A homogeneous top management team makes strategic decisions faster than a heterogeneous top management team. Therefore, the homogeneity of the board of commissioners in this study is calculated using the formula: Number of male commissioners / Total number of commissioners.
In this study, intellectual capital is calculated using the methodology employed in the research by Ulum et al. (2017), where intellectual capital consists of human capital (HCE), structural capital (SCE), and customer capital (RCE). Firm size and Covid year are control variables in this study: Firm size: Natural logarithm of Total Assets. COVID year: assigned a value of 1 if the COVID year is 2019–2020, and a value of 0 if it occurred before the COVID year.

3.2 Research Model

This study uses multiple linear regression analysis and moderated regression analysis to evaluate its hypotheses, while the following equation model is used to describe the study:

ICE 1t= 0 + β1Age_Kom.t + β2 Peng_Kom.t + β3 Pend_Kom.t+ β4Keu_Kom +
β5Hom_Kom + β6Size + β7 Year_Cov t Ɛ1.t
CCE 1t= 0 + β 1Age_Kom.t + β2 Peng_Kom.t + β3 Pend_Kom.t+ β4Keu_Kom +.
β 5Hom_Kom+ β 6Size + β 7 Year_Cov tƐ 1.t
SF 1t= = β0+ β1ICE.t + 2 CCE.t + β3 Size t + β4 Year_Cov t Ɛ 1.t
SF1t = β0+ β 1Age_Kom*ICE.t + β2 Kom_Peng*ICE..t + β3 Kom_Pend * ICE..t + 4Keu_Kom* ICE. t+.
β5Hom_Kom* ICE..t + β6 Size + β7 Year_Cov t Ɛ 1.t
SF1t = 0 + β 1Age_Kom*CCE.t + β2 Kom_Peng*CCE..t + β3 Kom_Pend. * CCE… t+ β4Keu_Kom* CCE… t +.
β5Hom_Kom*CCE..t + β6Size + β7 Year_Cov tƐ1.t

Five models are included in this study. The first model evaluates the impact of board characteristics on ICE. The second model tests the impact of board characteristics on CEE. The third model tests the impact of intellectual capital in addition to the control variables of size and the year of COVID-19. The fourth model tests the impact of board characteristics modified by ICE on sustainable financial performance. The fifth model tests the impact of board characteristics modified by CEE on sustainable financial performance.

4. Results

Table 1 shows that the average sustainable finance (SF) value is 0.362, the average intellectual capital (ICE) value is 2.572, the average capital employed (CEE) value is 0.027, and the average age of the board of commissioners (Age Kom) is - average 0.205 or 20%. This means that most board members are over 50 years old, the average functional experience of the board of commissioners (Peng_Kom) is 0.422, the average education level of the board of commissioners (Pend_Kom) is 0.270, the financial position of the board of commissioners (Keu_Kom) is 24,757, and the financial homogeneity of the board of commissioners (Hom_Keu).

Table 1: Descriptive Statistics

Variabel	Obs	Mean	Median	Std Deviasi	Min	Max
SF	81	0.362	0.400	0.209	0.074	0.725
HCE	81	1.606	4.932	1.981	-3.363	13.226
SCE	81	0.931	10.111	5.118	-18.404	38.625
RCE	81	0.033	0.373	0.097	-0.086	0.832
ICE	81	2.572	10.496	5.269	-17.521	38.513
CCE	81	0.027	-0.188	0.027	-0.068	0.171
AGE_KOM	81	0.205	0.333	0.185	0.000	0.667
PENG_KOM	81	0.422	0.375	0.214	0.000	0.750
PEND_KOM	81	0.270	0.333	0.186	0.000	0.667
KEU_KOM	81	24.757	24.679	1.586	21.360	27.997
HOM_KOM	81	0.849	0.750	0.164	0.500	1.000
Size	81	31.549		2.079	27.909	37.871

Source: Stata 14.2 Software Secondary Data Processing

Table 2 shows that the characteristics of the board of commissioners do not affect ICE or CEE at a significant level of 10% or 5% in models 1 and 2. Based on these findings, it can be concluded that the first hypothesis (H1) is not supported.

Table 2: Regression Analysis of the Effect on Intellectual Capital

Intellectual Capital	Model 1	Model 2
Age_Kom	1.000	0.327
	0.00	(0.99)
Peng_Kom	0.541	0.593
	0.62	(0.54)
Pend_Kom	0.809	0.235
	(0.24)	(1.21)
Keu_Kom	0.593	0.222
	0.54	1.25
Hom_Kom	0.901	0.362
Size	(0.12)	0.92
	0.004***	0.003***
	(3.07)	3.27
Year_Covid	0.013**	0.000***
	(2.63)	(4.12)
F-Stat	0.0809	0.0010
R^2	0.3008	0.4972

Note (s): Sign *, **, and *** indicate that the level of significance of p-value <0.1, 0.05, and < 0.01, respectively.
Source: Stata 14.2 Software Secondary Data Processing

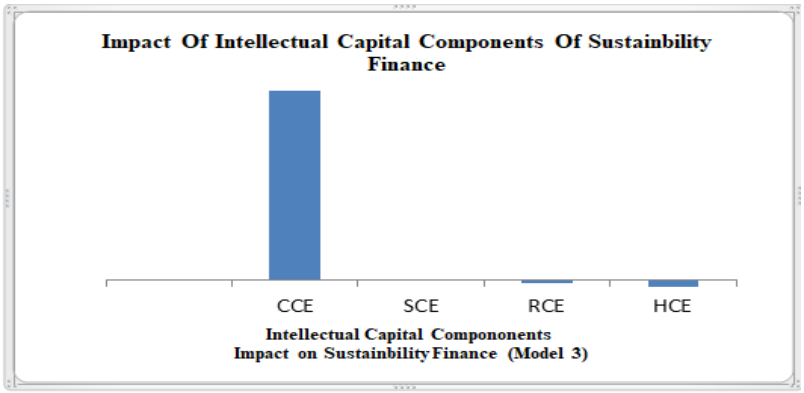

Fig. 1: Impact Of Intellectual Capital Components of Sustainability Finance

Figure 1 shows that of the four components of intellectual capital, namely CEE (physical capital), SCE (structural capital), RCE (relational capital), and HCE (human capital), their influence on sustainable finance. From the four components of intellectual capital above, it can be seen that CEE (physical capital) has a higher regression coefficient value compared to the other three components of intellectual capital, this shows that banks that have good physical capital will convey more extensive sustainable financial information compared to banks that have low physical capital, from this it can be concluded that banking in Indonesia still tends to rely on the use of physical capital compared to intangible capital, namely human capital, structural capital and relational capital.

Table 3: Regression analysis of the effect on sustainability finance

Sustainiblity Finance	Model 3	Model 4	Model 5
HCE	0.025**		
	(2.24)		
SCE	0.528		
	(0.63)		
RCE	0.991		
	(0.01)		
ICE	0.527		
	(0.63)		
CEE	0.193		
Age_Kom*ICE	0.213	0.393	
		0.85	
Peng_Kom*ICE		0.935	
Pend_Kom*ICE		(0.08)	
		0.036**	
		2.10	
Keu_Kom*ICE		0.085	
Hom_Kom*ICE Age_Kom*CCE		(1.72)	0.588
		0.032**	
		2.14	
			(0.54)
Peng_Kom*CCE			0.556
			(0.59)
Pend_Kom*CCE			0.956
			0.06
Keu_Kom*CCE			0.521
			0.64

Sustainiblity Finance	Model 3	Model 4	Model 5
Hom_Kom*CCE			0.786
Size	0.000***	0.000***	(0.27)
			0.000***
	5.11	4.86	4.22
Year_Cov	0.017**	0.029**	0.011**
	2.40	2.18	2.55
F-Stat		0.0000	0.0002
R2	0.3412	0.4202	0.3272

Note (s): Sign *, **, and *** indicates that the level of significance of p-value < 0.1, 0.05, and < 0.01, respectively.
Source: Stata 14.2 Software Secondary Data Processing

Table 4: Summary of Hypothesis Test Results

Hipotesis	Description	Information
H1a	Board of Commissioners' Age has a positive effect on ICE	Not supported
H1b	Board of Commissioners' Job Experience has a positive effect on ICE	Not supported
H1c	Board of Commissioners' Education has a positive effect on ICE	Not supported
H1d	Board of Commissioners' Financial Position has a positive effect on ICE	Not supported
H1e	Board of Commissioners' Homogeneity has a positive effect on ICE	Not supported
H1f	Board of Commissioners' Age has a positive effect on CEE	Not supported
H1g	Board of Commissioners' Job Experience has a positive effect on CEE	Not supported
H1h	Board of Commissioners' Education has a positive effect on CEE	Not supported
H1j	Board of Commissioners' Financial Position has a positive effect on CEE	Not supported
H1k	Board of Commissioners' Homogeneity has a positive effect on CEE	Not supported
H2a:	ICE has a positive effect on Sustainable Finance	Not supported
H2b:	CEE has a positive effect on Sustainable Finance	Not supported
H3a	ICE strengthens the impact of board age on Sustainable Finance	Not supported
H3b	ICE strengthens the impact of the board of commissioners' functional expertise on Sustainable Finance.	Not supported
H3c	ICE enhances the impact of board education on Sustainable Finance	Not supported
H3d	ICE strengthens the impact of the board of commissioners' financial position on Sustainable Finance.	Not supported
H3e	ICE strengthens the impact of homogeneity on Sustainability Finance	supported
H3f	CEE strengthens the impact of board age on Sustainability Finance	Not supported
H3g	CEE strengthens the impact of board functional expertise on Sustainability Finance.	Not supported
H3h	CEE strengthens the impact of board education on Sustainability Finance.	Not supported
H3i	CEE strengthens the impact of board financial standing on Sustainability Finance.	Not supported
H3j	CEE strengthens the impact of board homogeneity on Sustainability Finance	Not supported

5. Discussion

Intellectual capital is related to the company's business strategy and innovation [21], [22]. The characteristics of the top management team play an important role in strategy and innovation in a company, according to Hambrick & Mason (1984), but the results of this study indicate that all characteristics of the board of commissioners as a top management team do not affect intellectual capital in banking companies. The Indonesian Stock Exchange has recorded it. The findings of this study are in line with the findings of Diaz-Fernandez et al. (2015), who found that the strategic vision of the senior management team had no effect on company innovation. According to Wang et al. (2015), the functional heterogeneity of the senior management team has a detrimental impact on the company's innovation performance. According to Camelo et al. (2010), functional diversity and diversity of tenure in the senior management team have a direct and negative impact on innovation performance. According to Camelo-Ordaz et al. (2005), the diversity of senior management team tenure has a detrimental effect on innovation performance. This may be because the diversity of the top management team quality is seen as a double-edged sword. Diaz-Fernandez et al. (2015). To innovate in a corporation, its members must be active in smooth informal communication [81].

According to the concept of corporate theory [50]When a company is able to configure human resources, information technology, and produce good customer interactions, it will create sustainable corporate value. Previous studies have shown that intellectual capital improves business sustainability [23], [24], [25], [26], [27], [28], [85]. However, the findings of this study indicate that intellectual capital does not affect financial sustainability in banking companies listed on the Indonesian Stock Exchange. This can happen because banking companies in Indonesia still do not consider intellectual capital to improve company performance and prioritize physical assets. This is supported by research findings that show that the size measured using total assets has a positive effect on sustainable finance, and the covid-19-year variable also has a positive effect on sustainable finance, which shows that in facing the covid-19 pandemic, banking companies choose to improve their financial sustainability by utilizing their physical assets better. This study attempts to combine the concept of upper echelon theory with corporate theory, resulting in this research model.

Models 4 and 5 in this study look at the role of the board of commissioner characteristics when interacting with ICE and CEE on sustainable finance. The results show that only the board of commissioner education characteristics and homogeneity have a positive effect on sustainable finance when interacting with ICE. Board of commissioner education was measured in this study using the ratio of management education held by the board of commissioners, and board of commissioner homogeneity was measured using the ratio of the number of male commissioners, which has a positive effect on sustainable finance. However, when interacting with ICE, this shows that banking companies with a larger board of commissioners with high management education and homogeneity support sustainable finance. Meanwhile, the creation of added value using physical capital, as shown in the CEE variable, does not moderate all board of commissioner characteristics on sustainable finance. This may be due to the organizational structure of companies in Indonesia which adopts a two-tier system, so that in terms of decision making and delivery of transparency of corporate sustainability information, the role of the supervisor, namely the board of commissioners, and the role of the implementer, namely the board of directors, become one inseparable unit. Meanwhile, this study only considers the components of the board of commissioners in measuring the top management team. This study assumes that the board of commissioners is the top management in the company, whereas in the practice of disclosing sustainable

financial performance, the role of the board of directors is vital because they act as implementers who are very directly related to technical issues and the company's reporting responsibilities.
The results of this study cannot confirm the top-level theory and corporate theory, because banks in Indonesia still prioritise the use of tangible assets over intangible assets. This is supported by research findings showing that banks with large asset values tend to produce more comprehensive sustainability reports. Second, the top management system in the upper echelon theory is not suitable for predicting companies in Indonesia, as Indonesia adopts a two-tier system. In this system, the governance mechanism consists of oversight (board of commissioners) and execution (board of directors). This study only considers the characteristics of the board of commissioners, as in the governance structure, the board of commissioners is the highest level in top management. However, in practice, the role of the board of directors must also be considered, as they play an active role in corporate governance as executives. Third, this study has limitations because it only uses a sample of banks in Indonesia that are still dominated by dependence on physical capital, so the findings cannot comprehensively explain the influence of intellectual capital on sustainable finance.

6. Conclusion

Research on intellectual capital in sustainable finance is still rare, even though intellectual capital is a capital that companies must have to face future transformation challenges and generate sustainable financial performance. The prevalence of data theft and ATM hacking in Indonesian banking shows a deficit in intellectual capital in cybersecurity governance. This study aims to combine the concepts of top-layer theory and corporate theory by investigating the impact of the quality of the board of commissioners as the top management team on sustainable finance, moderated by intellectual capital. This analysis is a quantitative analysis using data from annual reports and sustainability reports collected from the websites of banking institutions listed on the IDX. Using STATA statistical software version 14.2, the data were analysed using multiple linear regression and moderated regression analysis. The results of the analysis show that all components of the board of commissioners'characteristics do not have a significant effect on intellectual capital, intellectual capital does not affect sustainable financial reports, intellectual capital does not strengthen the effect of all board of commissioners' characteristics on sustainable financial reports, and intellectual capital weakens the effect of educational characteristics and board homogeneity.
Translated with DeepL.com (free version). This study is expected to provide a perspective for Indonesian banking companies to pay more attention to intellectual capital to overcome various problems that occurred during the COVID-19 pandemic, which will have an impact on sustainable banking finance. Although the results of this study do not support the influence of intellectual capital on sustainable banking financial performance, it does not rule out the possibility that the use of intellectual capital will better support banks in conveying information related to sustainability, for example, ESG (environmental, social, and governance).
The results of the study indicate that almost all research hypotheses are not supported, this may be because banking in Indonesia still prioritizes tangible assets compared to intangible assets, suggestions for further research may be to conduct an analysis of banking in the Southeast Asia region regarding the impact of intellectual capital on sustainable banking financial reporting practices. This study only considers the characteristics of the board of commissioners. Suggestions for further research are expected to consider the characteristics of the board of directors because Indonesia adopts a two-tier system, a system that divides the supervisory and implementing functions into two different roles.

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