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The Impact of Board Diversity on Sustainability Finance: The Mediating Role of Green Intellectual Capital in Indonesian Manufacturing Firms

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ABSTRACT
This research examines the influence of board diversity on sustainability finance with green intellectual capital as a mediating variable. This topic is important because it supports companies' efforts to achieve sustainable development goals (SDGs) through a financial approach that considers environmental and social aspects. The main issue being examined is whether board diversity affects sustainable finance, and whether green intellectual capital can mediate that relationship. This research offers a new contribution by integrating three main concepts board diversity, green intellectual capital, and sustainability finance within the context of manufacturing companies in Indonesia, which have not been simultaneously studied in the previous literature. This research uses a quantitative method with a verification approach. The sample consists of 20 manufacturing companies purposively selected from the IDX for the period 2018–2022. Data analysis was conducted using Partial Least Square (PLS). The results show that board diversity has a significant negative impact on green intellectual capital, but does not have a significant impact on sustainability finance. GIC also does not mediate that relationship. The diversity of the board needs to be managed strategically to avoid conflicts that could hinder the company's sustainable financial performance.

1. INTRODUCTION

Today's global economic developments require companies to focus not only on achieving financial gains, but also on environmental and social sustainability. The concept of *sustainable finance* emerged as a strategic approach that integrates environmental, social, and governance (ESG) aspects in financial decision-making. Sustainable finance has become a priority agenda in

many countries, including Indonesia, as pressure mounts on the business sector to implement more responsible practices (Migliorelli, 2021; Ozili, 2023). OJK Regulation No. 51/POJK.03/2017 emphasizes Indonesia's commitment to encouraging the implementation of sustainable finance through action plans and the preparation of sustainability reports by business actors.

Companies need strategic resources to achieve sustainability performance. One of them is *green intellectual capital* (GIC), which is an intangible asset consisting of knowledge, systems, and corporate relationships that are oriented towards sustainable environmental management (Chen, 2008; Edvinsson & Malone, 1997). GIC is believed to play an important role in driving green innovation, production process efficiency, and corporate reputation in the face of market and regulatory demands (Mukherjee et al., 2019; Yusliza et al., 2020).

The optimization of GIC in an organization is highly dependent on the company's leadership structure and culture. One of the structural factors that has been widely researched in the context of sustainability is *board diversity*, which is the diversity of characteristics in the board of directors, both in terms of gender, age, citizenship, education, and work experience (Kamath, 2022; Kehelwalatenna & Premaratne, 2019). Agency theory states that board diversity can improve the quality of oversight and decision-making due to diverse perspectives and expertise (Clarke & Branson, 2012; Giuliani & Poli, 2019). Meanwhile, *the resource-based view theory* explains that the diversity of human resources can be a competitive advantage that supports the achievement of sustainability through the development of GIC (Chen, 2008; Bontis, 1999).

Previous research results show mixed findings. Several studies have shown the positive influence of board diversity on sustainability (Chiucchi et al., 2018; Lestari, 2021), while others have found that diversity can cause conflicts and obstacles in coordination if it is not supported by an inclusive organizational culture (Robbins & Judge, 2018; Pramono & Nasih, 2022). In addition, the role of GIC mediation in bridging the influence of board diversity on *sustainability finance* has not been extensively studied empirically, especially in manufacturing companies in developing countries such as Indonesia (Krisdatama & Nuraya, 2022; Adegboyegun & Igbekoyi, 2022).

The purpose of this study is to analyze the direct and indirect influence *of board diversity* on *sustainability finance* through *green intellectual capital* as a mediating variable. This research is focused on manufacturing companies listed on the Indonesia Stock Exchange during the period 2018–2022.

The contribution of this research lies in the integration of three important constructs: *board diversity*, *green intellectual capital*, and *sustainability finance* in one empirical model, emphasizing the role of GIC mediation as an internal mechanism that has not been widely studied in the previous literature. In addition, this study provides an empirical context on Indonesia's manufacturing sector, which is relevant to the national sustainability agenda and OJK's policy on sustainable finance.

2. LITERATURE REVIEW

Board Diversity

Board diversity refers to the variation in individual characteristics in the board of directors, such as gender, age, educational background, citizenship, and work experience (Mishra & Jhunjhunwala, 2013; Kurniawati, 2019; Robbins & Timothy, 2018). Jackson et al. (2003) in Clarke and Branson emphasized that personal diversity can increase work effectiveness through a variety of in-depth perspectives. Diversity is divided into two main categories: *task-oriented* (knowledge and skills) and relation-oriented (age, gender, ethnicity) (Clarke et al., 2012).

Previous research has shown that diversity in the board of directors, especially gender diversity, can improve management independence and decision-making quality (Kamath, 2022; Lestari, 2021; Giuliani & Poli, 2019). In the context of agency and feminist theory, diversity encourages monitoring functions and broader participation in corporate governance (Chiucchi et al., 2018; Pramono & Nasih, 2022).

Green Intellectual Capital (GIC)

Green Intellectual Capital is an intangible asset related to knowledge, capabilities, and innovations that support the management of the company's environment (Chen, 2008; Yusliza et al., 2020; Edvinsson & Malone, 1997). GIC encompasses three main dimensions: (1) Green Human Capital: knowledge, skills, and employee contributions in supporting sustainability (Dzinkowski, 2000; Bontis, 1999); (2) Green Structural Capital: systems, patents, processes, and organizational cultures that support green innovation (Chen, 2008; Yong et al., 2019); (3) Green Relational Capital: the company's external relationship with customers, partners, and communities in support of environmental values (Capello & Faggian, 2005).

Several studies state that board diversity positively influences GICs because differences in background and experience allow for the creation of environmentally-oriented innovations (Adegboyegun & Igbekoyi, 2022; Kehelwalatenna & Premaratne, 2019; Krisdatama & Setiawan Nuraya, 2022).

Sustainability Finance

Sustainability finance is a financing approach that considers environmental, social, and governance (ESG) aspects in financial decisions (Ryszawska, 2016; Migliorelli, 2021; Ozili, 2023). According to the World Bank, this approach aims to achieve inclusive and sustainable economic growth. In Indonesia, the OJK has encouraged the adoption of sustainable finance through POJK regulation 51/2017.

Sustainability finance is measured through indicators such as Return on Capital Employed (ROCE) and Equity Ratio (Gleißner et al., 2022). Previous research has shown that intellectual capital plays an important role in driving the achievement of sustainability performance (Mukherejee et al., 2019; Luo et al., 2022; Widyastuti et al., 2021; Chaudhry & Chaudhry, 2022).

This research is based on three main theories that complement each other to explain the relationship between *board diversity*, *green intellectual capital*, and *sustainability finance*:

1. **Agency Theory:** Agency theory explains the separation of roles between managers (agents) and owners (principals), which often leads to conflicts of interest. Diversity in the board of directors, such as differences in gender, educational background, or nationality, can strengthen the *monitoring* function and objective decision-making. Thus, board diversity has the potential to reduce agency risk and improve the quality of corporate governance which ultimately impacts sustainable financial performance (Giuliani & Poli, 2019; Kamath, 2022).
2. **Resource-Based View (RBV):** RBV views intangible assets such as knowledge, innovative capabilities, and external relationships as strategic resources that can create a sustainable competitive advantage. *Green Intellectual Capital*, which includes *green human, structural,* and *relational capital*, is seen as an internal force that can support environmentally friendly business practices and strengthen the financial sustainability of the company (Chen, 2008; Edvinsson & Malone, 1997).

3. **Feminism Theory:** Feminism theory emphasizes the importance of gender equality in all aspects of social life, including in the organizational structure of a business. In the context of the board of directors, this theory provides a foundation for the importance of women's representation in strategic decision-making. Women's participation in the board is believed to increase inclusivity, social sensitivity, and concern for sustainability issues, which helps strengthen the quality of *green intellectual capital* and the achievement of *sustainability finance* (Lestari, 2021; Pramono & Nasih, 2022).

With the integration of these three theories, the conceptual model in this study assumes that board diversity can affect sustainability finance**,** either directly or through the mediating role of green intellectual capital as an internal mechanism of value creation.

Research Hypothesis

Based on the literature review above, the hypotheses proposed in this study are as follows:

H1 : Board diversity affects sustainability finance.

H2 : Board diversity affects green intellectual capital.

H3 : Green intellectual capital has an effect on sustainability finance.

H4 : Green intellectual capital mediates the influence of board diversity on sustainability finance.

3. METHODOLOGY

This research uses a quantitative approach with a type of verifiable research. This approach is used to test the influence between variables in a predetermined model and to verify findings from previous studies. The population in this study is all manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2018–2022 period as many as 194 companies. The sample selection technique uses the purposive sampling method with certain criteria, so that 20 companies were obtained as research samples. The data used in this study are secondary data obtained from annual reports, sustainability reports, and company documents available on the IDX website and the company's official website.

Board Diversity is measured using indicators: age, gender (male/ female), citizenship (Indonesian citizen/foreigner), length of tenure, level of education (S1/ S2/ S3), and experience. **Green Intellectual Capital (GIC)** consists of: (1) Green Human Capital, which is measured by gross

profit, number of new products, and training costs; (2) *Green Structural Capital*, which is measured by the number of patents (dummy variable: 1 if it has a patent, 0 if it does not); (3) *Green Relational Capital*, which is measured by the company's total sales. **Sustainability Finance** is measured using two financial indicators: Return on Capital Employed (ROCE) and Equity Ratio (ER), which describe a company's long-term sustainability and financial health.

Data analysis was carried out using **the Partial Least Squares – Structural Equation Modeling (PLS-SEM)** method using SmartPLS software. This analysis tool was chosen because it is able to estimate the relationship between latent variables and their indicators, and is suitable for small to medium sample sizes. The statistical tests used include: (1) **Validity and reliability tests** to test the quality of indicators; (2) **Determination coefficient (R^2) test** to see the strength of the influence of the free variable on the bound variable; (3) **Path significance test to** test the direct relationship between variables; (4) **Mediation test** to determine the role of green intellectual capital as a mediator between board diversity and sustainability finance.

4. RESULT AND DISCUSSIONS

Table 1. Descriptive Analysis of Board Diversity

Criteria	Age	Gender		Citizenship	
		Woman	Man	Indonesian citizen	foreigner
Average	52.22	0.66	5.11	4.83	0.93
Median	52.33	0.00	5.00	5.00	0.00
Minimum	40.67	0.00	2.00	0.00	0.00
Maximum	72.33	6.00	15.00	10.00	8.00
Standard Deviation	5.68	1.19	2.50	2.29	1.67
Criteria	**Length of Service**	**Education**			**Experience**
		< S1	**S2**	**S3**	
Average	3.24	2.93	2.87	0.02	5.14
Median	2.57	3.00	2.00	0.00	4.13
Minimum	0.00	0.00	0.00	0.00	0.33
Maximum	12.67	8.00	7.00	1.00	18.33
Standard Deviation	2.65	2.06	2.15	0.14	3.75

Source: Processed Data for 2023

Based on the results of the descriptive analysis of Board Diversity in manufacturing companies in 2018-2022 above, it can be seen that the average age is 52.22, the median is 52.33, the minimum data is 40.67, the maximum is 72.33 and the standard deviation is 5.68, based on From this data it can be concluded that age is in the 52-53 year category, and if we look at the standard deviation, the age data on board diversity is among the distribute normal because the standard deviation value is lower than the average. Board diversity Younger members in an organization tend to have the ability to devise creative ideas, less interest in career stability, and less willingness to accept the current situation. On the other hand, older members have more work experience, accumulated managerial knowledge, and a better understanding of diverse market conditions than younger ones (Rahma, 2023). Judging from the average age, namely 52.22, it is considered old age which can produce inspirational and appropriate decisions.

Gender in the total of women the average is 0.66, the median is 0.00, the minimum data is 0.00, the maximum is 6.0 and the standard deviation is 1.19, while in the total of men the average is 5.11, the median is 5.00, the minimum data is 2.00, the maximum is 15.0 and the standard the deviation is 2.50. Based on the gender data, it can be seen that the highest total value is for men compared to women, and the standard deviation for men is more normally distributed than for women, because the standard deviation value for men is smaller than the average while for women the opposite is true. The Men are smaller than average while women are the opposite. Men and women behave differently. Women are believed to be more intuitive in decision making, have the ability to multitask, and are better at building relationships. Men tend to focus more on tasks and make decisions based on information and procedures (Mishra and Shital, 2013). Judging from the results, there are more men than women because men are more performance oriented, ensuring that company goals are achieved. Male directors with an autocratic leadership style can exercise better control over management (Mishra and Shital, 2013).

The average citizenship of Indonesian citizens is 4.83, the median is 5.00, the minimum data is 0.00, the maximum is 10.0 and the standard the deviation is 2.29, while the total number of foreign nationals has an average of 0.93, median 0.00, minimum data 0.00, maximum 8.0 and standard deviation is 1.67. Based on the citizenship data, it can be seen that the highest value is the total citizenship of Indonesian citizens compared to foreign nationals, and the standard deviation of Indonesian citizens is higher. has a normal distribution compared to foreigners, because the standard deviation value for Indonesian citizens is smaller than the average while

the opposite is true for foreigners. Foreign citizenship is considered to bring diverse opinions and perspectives, languages, beliefs, family backgrounds, and professional experiences that differ from one country to another (Kristina & Wiratmaja, 2018). The results of this research are that there are more Indonesian citizens than foreign nationals, which means that organizational culture is dominated by Indonesian culture.

Based on tenure, the average is 3.24, the median is 2.57, the minimum data is 0.00, the maximum is 12.67 and the standard the deviation is 2.65. Based on this data, it can be concluded that the average tenure is 3-4 years. Data on tenure on the diversity board is normally distributed because the standard deviation value is lower than the average. The diversity of tenure involves a balance between new and existing directors. Having reputable directors on the board for a long time can improve a company's reputation. From the results of this research, an average term of office of 3-4 years is sufficient time because directors who have sat on the board for a long time are likely to have a good understanding of the company, but there can be a risk that the directors will not keep up with the necessary changes in the business and maintain existing decisions may not be appropriate in the current situation, it can also affect the independence of directors (Mishra and Shital, 2013).

Total education <S1 average is 2.93, median 3.00, minimum data 0.00, maximum 8.0 and standard the deviation is 2.06, while in total S2 the average is 2.87, median 2.00, minimum data 0.00, maximum 7.0 and standard deviation is 2.15, then in total S3 the average is 0.02, median 0.00, minimum data 0.00, maximum 1.0 and the standard deviation is 0.14. Based on the education data, it can be seen that the highest total education value is <S1 compared to S2 and S3, and the standard deviation <S1 and S2 is more normally distributed than S3, because the standard deviation value <S1 and S2 is smaller than the average while S3 is the opposite. According to Kristina & Wiratmaja (2018) the level of education will influence members of the board of directors in the decision-making process. The influence of a person's education is very important in organizations because they are charged with the mandate for decision making. At S1, S2, and S3 levels, they have different ways of thinking. At the undergraduate education level, the way of thinking is usually more systematic, while at the master's level the way of thinking is more strategic, and at the doctoral level of education the way of thinking is more philosophical which can influence a person in the decision making process. In this research, undergraduate and

postgraduate education dominates so that the board of directors can make decisions systematically and strategically.

The average experience is 5.14, the median is 4.13, the minimum data is 0.33, the maximum is 18.33 and the standard deviation is 3.75. Based on this data it can be concluded that the average experience is 5-6, the experience data on the board Diversity includes those with a normal distribution because the standard deviation value is lower than the average. The experience can be defined as something that has been experienced, lived or felt, either a long time ago or something that has just happened. Having a lot of experience is more able to influence performance because the board carries out work based on its knowledge and experience (Rahma, 2023).

Table 2. Descriptive Analysis of Green Intellectual Capital

Criteria	*Human Capital*			*Structural Capital*	*Relationship Capital*
	Gross Profit	Number of New Products	Training Costs	Number of Patents	*Sales*
Average	781,108,774,253.95	7.34	1,894,999,267	0.01	2,002,811,741,422
Median	17,500,640	0.00	1,494,250	0.00	155,072,356
Minimum	(110,108,711,011)	0.00	-	0.00	175,046
Maximum	11,704,066,436,276	231.00	25,554,508,600	1.00	28,933,502,646,719
Standard Deviation	2,374,209,553,747	26.68	4,899,345,824	0.10	5,596,871,111,519

Source: Processed Data for 2023

Based on the results of Green Intellectual Capital which is divided into 3 dimensions, namely Human Capital, Structural Capital, and Relation Capital, based on the results of the descriptive analysis are divided into 3 indicators, namely Gross profit Capital, number of new products, and training costs. Gross profit capital has an average of 781,108,774,253.95, median 15,500,640, minimum (110,108,711,011), maximum 11,704,066,436,276, and a standard deviation of 2,374,209,553,747. The number of new products has a mean of 7.34, a median of 0.00, a minimum of 0.00, a maximum of 231.00, and a standard deviation of 26.68. Training costs have a mean of 1,894,999,267, a median of 1,494,250, a minimum of 0, a maximum of 25,554,508,600, and a standard deviation of 4,899,345,824. Based on the human capital dimension values, it can be seen that each human capital indicator has a standard deviation value that is higher than the average. The ability of employees to provide solutions to customers for innovation and renewal. In line with the definition of Green Human Capital, it talks about the results of developed ideas producing new products and gross profits that support green companies. about environmental

protection or green innovation, and embedded in employees rather than in the organization. The measurement of Green human capital consists of the following five items: (1) whether the productivity and environmental protection contributions of employees in the company are better than those of its main competitors; (2) whether the competence of environmental protection employees in the company is better than that of its main competitors; (3) whether the quality of environmental protection products or services provided by the company's employees is better than that of its major competitors; (4) whether the level of cooperative teamwork regarding environmental protection in the company is more than that of its main competitors; (5) whether managers can fully support their employees to achieve their environmental protection work (Bontis, 1999; Edvinsson and Malone, 1997; Johnson, 1999; Roos and Roos, 1997; Stuart, 1994)

Structure Capital which is measured by the number of patents where this dimension is use ful right dummy var, 1 for those who have patent rights and 0 for those who do not have patent rights, then the descriptive analysis is the average value is 0.01, the minimum is 0.0 and maximum1.Structure Capital Efficiency covers matters related to Intellectual Capital such as patents, brands, company strategies and others. This ratio measures quantity Structure Capital needed to earn every dollar fromValue Added company, which is an indication of how successful it is Structure Capital in value creation (Ulum, 2009).Therefore, Sustainable Structural capital can be used as an organizational resource, such as a management system, computer system, organizational process, management philosophy, organizational culture, patents, copyrights, brands, information technology, or management mechanisms, related to environmental protection or ecological innovation in companies (Chen, 2008; Yong et al., 2019; Yusliza et al., 2020). Green Innovation can be an important factor in achieving sustainable company performance

Relations Intellectual Capital calculated from Sales has an average of 2,002,811,741,422, a median of 155,072,356, a minimum of 175,046, a maximum of 28,933,502,646,719, and a standard deviation of 5,596,871,111,519. Based on the relation capital dimensions of manufacturing companies in 2018-2022, the data distribution is not too normal because the value standard deviation has a higher value than the average. This discussion refers to the definition of Relational capital from Johnson (1999), Bontis (1999), Capello (2002), and Capello and Faggian (2005), and defines Green relational capital as a company's share of interactive relationships with customers, suppliers, network members, and partners regarding company environmental

management and green innovation, which makes it possible to create luck and gain competitive advantage, Green relational capital indicators can be produced, namely sales to see trust with consumers, while looking at internal supplier relationships, the company has alliance partners such as ISO which are related to the green environment.

Table 3. Descriptive Analysis*SustainabilityFinance*

Criteria	Rose	E.R
		Equity Ratio
Average	0.363	1,245
Median	0.264	0.766
Minimum	-3,011	-3,434
Maximum	3,845	16,765
Standard Deviation	0.862	2,176

Source: Processed data for 2023

Based on descriptive results Sustainability finance which is divided into two dimensions, namely ROCE and ER Equity Ratio, ROCE results show an average of 0.363, with a median of 0.264, a minimum value of -3.011. Based on the calculations above, it is known that the average ability of manufacturing sector companies listed on the Indonesian Stock Exchange for the 2018-2022 period has the ability to generate profits based on their capital of 0.363 or 36.3%. This condition shows that efficiency achieving profits from the capital used has not been optimally achieved. Factors that cause this achievement to not be optimal could be because the company has not optimized the sales it makes, factor others are the number of costs that are not yet efficient, and the amount of debt that is still high. The main area of overall operational inefficiency that can be improved is performing inventory management right. Proper inventory management can often be a very effective way to improve financial performance the company as a whole. Proper monitoring, organization and coordination of inventory orders can significantly improve cash flow company and available working capital. This allows the company to reinvest more capital into the company on a regular basis, allowing it to grow and increase its market base.

The maximum value is 3.845 and the standard deviation is 0.862. then the Equity Ratio shows an average of 1.245, a median of 0.766, a minimum value of -3.434, a maximum of 16.765 and a standard deviation of 2.176. The achievement of an average equity ratio of 1.245 indicates

that the performance conditions of manufacturing sector companies have shown good performance, where the ratio equity achieved above 100% or more than 1. One of the main reasons why equity ratios may vary is the nature of the industry capital intensive. Capital intensive industries, such as manufacturing require large financial resources and large amounts of money to produce goods, make huge investments in infrastructure, install factory installations to produce goods to be sold to customers or buyers. Apart from capital expenditure Such initial, maintenance, upgrades, and expansion of the required service area require large additional capital expenditures. Industries such as manufacturing require companies to make large financial commitments before undertaking the production process. According to Bemmann 2007 in (Gleibner et al., 2022), the measure is used, which consists of two indicators - equity ratio (ER) and total return on capital employed (ROCE) - to estimate the probability of bankruptcy.

The research structural model can be seen in the following picture:

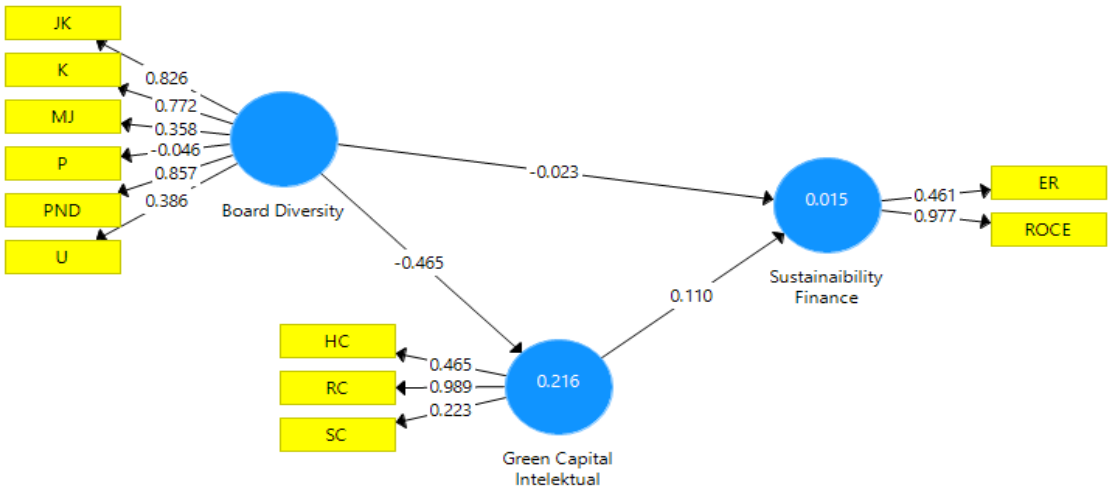

Figure 1. Standardized model

Figure 1 depicts a research model that tests the relationship between board diversity and sustainability finance, with green intellectual capital as a mediating variable. The results of the standardized model analysis show that board diversity has a very weak negative effect on sustainability finance, with a path coefficient of -0.023. This indicates that variations in board diversity in the sample companies have little direct contribution to achieving sustainable finance goals.

Furthermore, the relationship between board diversity and green intellectual capital (GIC) was found to be negative, with a coefficient of -0.465. This means that higher levels of board diversity are accompanied by a decrease in the company's green intellectual capital capacity. This finding differs from some previous literature, which suggests that board diversity enriches perspectives and innovation. However, in the context of this study, differences in board member backgrounds may actually hinder the alignment of a company's environmental strategy.

Meanwhile, the effect of green intellectual capital on sustainability finance is positive, with a coefficient of 0.110, although its strength is relatively weak. This suggests that increasing GIC—which encompasses human capital, relational capital, and structural capital—makes only a small contribution to strengthening sustainable finance.

Overall, these results indicate that efforts to improve sustainable finance in manufacturing companies cannot simply rely on board diversity or green intellectual capital. Companies need to leverage external factors such as industry regulations, government policies, market pressures, and stakeholder demands to optimally achieve sustainability goals.

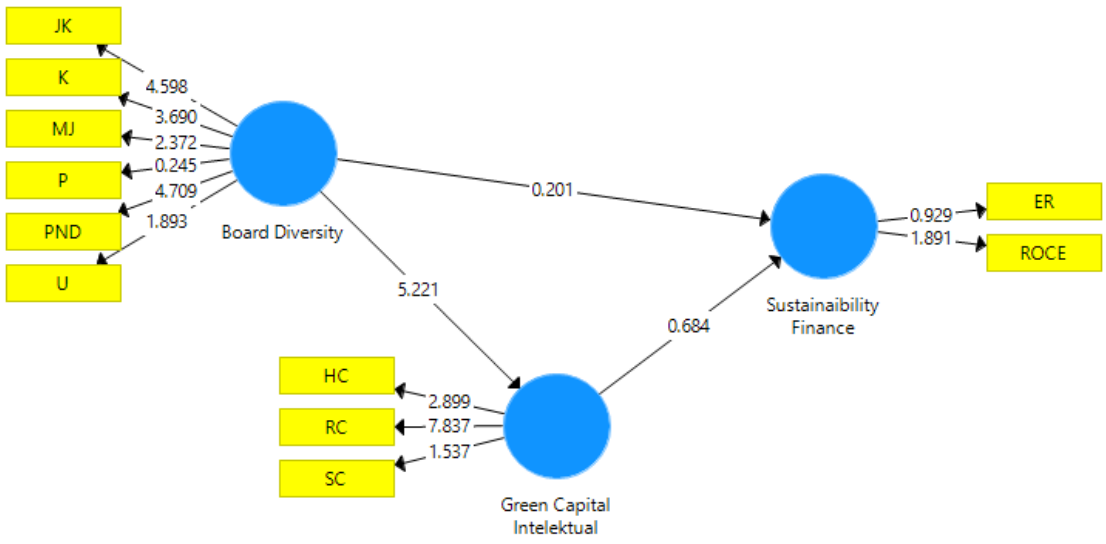

Figure 2. T-value model

The equation obtained is as follows, based on this equation, it can be concluded:

1. The R2 value of Sustainability Finance (Z) is = 0.015, meaning that Sustainability Finance (Y) is influenced by the Board Diversity (X) and Green Capital Intellectual (Y) variables by 1.5% while the rest is influenced by other factors not studied, namely 0.985 or 98 .5%.

2. The Board Diversity (X) path coefficient is 0.023 with a negative direction, meaning that there is a relationship in a different direction. If Board Diversity (X) increases by 1 unit then Sustainability Finance(Z) will decrease by 0.023 units
3. The path coefficient for Green Intellectual Capital (Y) is 0.110 with a negative direction, meaning that there is a relationship in a different direction. If Green Intellectual Capital (Y) increases by 1 unit then Sustainability Finance (Z) will decrease by 0.110.

Table 4. Calculation of Q2 Predictive Relevance

	R1	R2	Q Square =1 – (1 - R12) (1 – R22)
Sustainability Finance	0.015	0.216	0.0469

Source: Data processed in 2023

From the calculation results in the table above, the Q2 value for the variable Sustainability Finance (Z) is 0.0469. Because the Q2 value is more than zero, the model has fulfilled predictive relevance where the model has been reconstructed well. The Determination Coefficient (R2) is used to determine the magnitude of the ability of endogenous variables to explain the diversity of exogenous variables or in other words to determine the magnitude of the contribution of exogenous variables to endogenous variables. This effect ranges from 0 to 1, with 1 representing complete prediction accuracy. Because R2 is adhered to by various scientific disciplines, researchers must rely on rules of thumb regarding acceptable R2, with levels of predictive accuracy of 0.75 (substantial), 0.50 (moderate), and 0.25 (weak). The following are the results of the R2 analysis:

Table 5. Results of the Coefficient of Determination (R2)

Variable	R Square	Adjusted R Square
GreenIntellectualCapital	0.216	0.208
SustainabilityFinance	0.015	-0.005

Source: Data processed in 2023

The table above shows that the R2 value is variable Sustainability Finance(Z) is 0.015 (in the very weak category), meaning Sustainability Finance(Z) is influenced by Board Diversity (X) and Green Intellectual Capital (Y) by 1.5% while the rest is influenced by other factors not examined in this research. while the R2 value of the Green Intellectual Capital (Y) variable is 0.216 (in the weak category), meaning that Green Intellectual Capital (Y) is influenced by Board Diversity (X) by 21.6% while the rest is influenced by other factors not examined in this research.

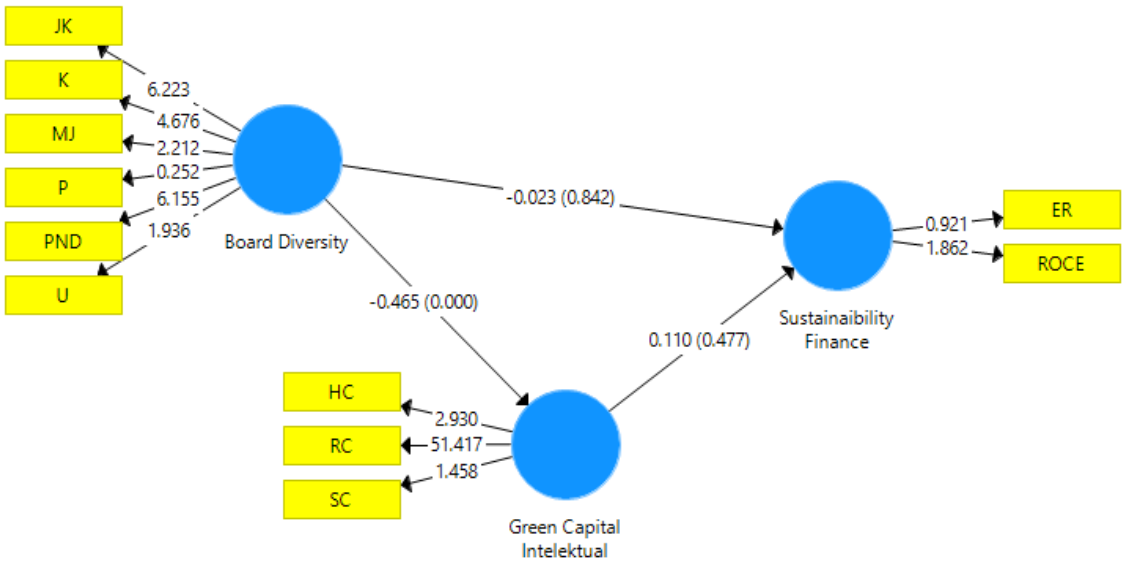

Figure 3. Inner Model Results

Figure 3 Shows, the board diversity has a very weak negative effect on sustainability finance, with a path coefficient of -0.023. This indicates that variations in board diversity in the sample companies have little direct contribution to achieving sustainable finance goals.

Furthermore, the relationship between board diversity and green intellectual capital (GIC) was found to be negative, with a coefficient of -0.465. This means that higher levels of board diversity are accompanied by a decrease in the company's green intellectual capital capacity. This finding differs from some previous literature, which suggests that board diversity enriches perspectives and innovation. However, in the context of this study, differences in board member backgrounds may actually hinder the alignment of a company's environmental strategy.

Meanwhile, the effect of green intellectual capital on sustainability finance is positive, with a coefficient of 0.110, although its strength is relatively weak. This suggests that increasing GIC—which encompasses human capital, relational capital, and structural capital—makes only a small contribution to strengthening sustainable finance.

Overall, these results indicate that efforts to improve sustainable finance in manufacturing companies cannot simply rely on board diversity or green intellectual capital. Companies need to leverage external factors such as industry regulations, government policies, market pressures, and stakeholder demands to optimally achieve sustainability goals.

Table 6. Significance Table

	Original Sample (O)	T Statistics (|O/STDEV |)	P Values
Board Diversity -> Green Intellectual Capital	-0.465	6,327	**0,000**
Board Diversity -> Sustainability Finance	-0.023	0.206	**0.837**
Green Intellectual Capital -> Financial Sustainability	0.110	0.689	**0.491**

Source: Data processed in 2023

Table 6, explain it can be seen that the value of Board Diversity is Green Intellectual Capital has a negative and significant influence, this can be seen from the P value which has a value of 0.00 < α (0.05), while board diversity sustainability finance have that influence negative not significant while Green Intellectual Capital has an insignificant positive influence on sustainability finance This can be seen from the P value which has a value of 0.00 > α (0.05).

Table 7. Table of the indirect influence of Board diversity on Financial Sustainability through Green Intellectual Capital

	T Statistics (|O/STDEV|)	P Values
Board Diversity -> Green Intellectual Capital -> Sustainability Finance	0.635	**0.526**

Source : Processed Data for 2023

Based on the results of the indirect influence of Board diversity on Financial Sustainability through Green Intellectual Capital, it can be seen that the P Value > α (0.05), it can be concluded that Green Intellectual Capital does not mediate (intervening) the influence of Board diversity on Sustainability Finance.

H1: Board Diversity (X) has an effect on *SustainabilityFinance*(Z)

In the test results listed in the table above, the path coefficient value of the variable Board Diversity (X) is *Sustainability Finance* (Z) is 0.023 in the negative direction. This means that there is a relationship in the opposite direction between Board Diversity (X) and Sustainability Finance(Z), if Board Diversity (X) increases then Sustainability Finance(Z) will decrease. The P-value is 0.837. Because the value is > 0.5, it means that Board Diversity (X) has no significant effect on Sustainability Finance(Z).

H2: Board Diversity (X) has an effect on Green*IntellectualCapital*(Y)

In the test results shown in the table above, the path coefficient value of the variable Board Diversity (X) on Green Intellectual Capital (Y) is 0.465 in a negative direction. This means that there is a relationship in the opposite direction between Board Diversity (X) and Green Intellectual Capital (Y), if Board Diversity (X) increases, Green Intellectual Capital (Y) will decrease. The P-value is 0.000. Because the value is <0.5, it means that Board Diversity (X) has a significant effect on Green Intellectual Capital (Y).

H3: Green Intellectual Capital (Y) has an effect on*SustainabilityFinance*(Z)

In the test results listed in the table above, the value of the Green variable path coefficient Intellectual Capital(Y) against Sustainability Finance(Z) is 0.110 in the positive direction. This means that there is a unidirectional relationship between Green Intellectual Capital (Y) with Sustainability Finance (Z), if Green Intellectual Capital(Y) increases then Sustainability Finance(Z) will increase. The P-value is 0.491. Because the value is > 0.5, it means that Green Intellectual Capital (Y) has no significant effect on Sustain ability Finance (Z) in a negative direction.

The results of this research show that board diversity that is not managed effectively can hinder the optimization of the company's green intellectual assets. Apart from that, the ineffective implementation of green intellectual capital means that its contribution to financial sustainability is not yet significant. This indicates that simply having diverse structures and green knowledge assets is not enough; Companies need to ensure that these two elements are truly integrated in business strategy and operations. These findings enrich the literature by confirming the importance of a strategic approach in managing diversity and developing environment-based intellectual capabilities. In the future, it is hoped that further research can explore the role of moderating variables or other contextual conditions that can strengthen the relationship between organizational structure, knowledge assets and financial sustainability.

Previous research has also emphasized the importance of integrating social dimensions in achieving sustainable financial performance. The research show that strengthening financial literacy and inclusion in sharia cooperatives through mentoring and counseling can increase member participation and strengthen the financial foundation of the institution in a sustainable manner (Sobana, Yusup, Asih, Yulandri, & Ahmad, 2025). These findings indicate that education and financial empowerment are an integral part of sustainability strategies. Other research found that the performance of Islamic banking has a significant contribution to improving social welfare in Indonesia. This is in line with the concept of *sustainability finance*, which places social and

environmental dimensions as the main pillars in financial decision-making (Durohman, Sutisna, Wirdyansyah, & Rinaima, 2025). Thus, the results of this study strengthen the argument that board diversity and the optimization of *green intellectual capital* must be managed in a framework that considers the dimensions of education, inclusion, and social welfare to achieve sustainable finance goals.

5. CONCLUSION

This research aims to analyze the influence of board diversity on sustainable finance with green intellectual capital (GIC) as a mediating variable in manufacturing companies in Indonesia. The results of the analysis show that board diversity has a significant negative effect on GIC, but does not have a significant effect on sustainable finance. Apart from that, GIC does not have a significant influence on sustainability finance and does not mediate the relationship between board diversity and sustainability finance.

These findings indicate that diversity in the board of directors has not been able to make a positive contribution to achieving sustainable financial performance if it is not accompanied by appropriate management strategies. The low level of GIC optimization in the context of manufacturing companies is also a challenge in driving sustainable performance.

The theoretical implications of this research enrich the literature regarding the role of GIC as an internal mechanism in linking organizational structure with financial sustainability. In practical terms, companies need to strengthen the integration of board diversity with green knowledge asset development strategies to support the achievement of long-term sustainability.

REFERENCE

Adegboyegun, AE & Igbekoyi, OE. (2022). Board Diversity and Financial Performance of Listed Manufacturing Firms in Nigeria. Saudi Journal of Business and Management Studies, 7(2), 50–60. https://doi.org/10.36348/sjbms.2022.v07i02.001

Al-juaidi, OEM (2020). Impact of Characteristics of Board of Directors on Intellectual Capital Performance for Banks Listed in Gulf Markets. International Journal of Innovation, Creativity and Change, 14(2), 602–624.

Ali, JAB, & Oudat, MS (2021). Board characteristics and intellectual capital performance: Empirical evidence of Bahrain Commercial Banks. Academy of Accounting and Financial Studies

Journal, 25(4), 1–10.

Barde, I.M., Lawal, T., & Lawal, L.O. (2022). Impact of Board Diversity on Voluntary Disclosure of Intellectual Capital: Evidence from Listed Non-Financial Services Firms in Nigeria. The International Journal of Business & Management, 10(5), 87–94. https://doi.org/10.24940/theijbm/2022/v10/i5/bm2205-016

Basel, A., & MS, O. (nd). Ard Characteristics And Intellectual Capital Performance: Empirical Evidence Of Bahrain Commercial Banks. Academy Of Accounting And Financial Studies Journal, 25(ue 4).

Bontis, N. (nd). Managing Organizational Knowledge by Diagnosing Intellectual.

Capello, R. (nd). Spatial and Sectoral Characteristics of Relational Capital in Innovation Activity'. European Planning Studies, 10(2), 177–200. https://doi.org/10.1080/09654310120114481

Chaudhry, N. I., & Chaudhry, M. A. (2022). Green Intellectual Capital and Corporate Economic Sustainability: The Mediating Role of Financial Condition. Pakistan Journal of Commerce and Social Science, 16(2), 257–278.

Chen, Y.-S. (nd). The Positive Effect of Green Intellectual Capital on Competitive Advantages of Firms. J. Bus. Ethics, 77, 271–286. https://doi.org/10.1007/s10551-006-9349-1

Chiucchi, M. S., Giuliani, M., & Poli, S. (2018). Do Ownership Gender Diversity and Size Matter? A Focus on Intellectual Capital Performance. International Journal of Business and Management, 13(3), 1. https://doi.org/10.5539/ijbm.v13n3p1

de Villiers, C., & Sharma, U. (2020). A critical reflection on the future of financial, intellectual capital, sustainability and integrated reporting. Critical Perspectives on Accounting, 70, 0–25. https://doi.org/10.1016/j.cpa.2017.05.003

Do Rosário Cabrita, M. (2009). Intellectual capital: A phenomenon of interrelationships. International Journal of Business and Systems Research, 3(2), 229–256. https://doi.org/10.1504/IJBSR.2009.024864

Do Rosário Cabrita, M., & Bontis, N. (2008). Intellectual capital and business performance in the Portuguese banking industry. International Journal of Technology Management, 43(1–3), 212–237. https://doi.org/10.1504/IJTM.2008.019416

Dumay, J., & Garanina, T. (nd). Intellectual Capital Research: A Critical Examination of the Third Stage. J. Intellect. Cap, 14, 10–25. https://doi.org/10.1108/14691931311288995

Durohman, H., Fajar Andrian Sutisna, Danial Muhammad Wirdyansyah, & Chetrine Alya Rinaima.

(2025). Does Islamic Banking Performance Enhance Social Welfare? Evidence from Indonesia . *Journal of Islamic Economics and Business*, *4*(2), 228–251. Retrieved from https://journal.uinsgd.ac.id/index.php/jieb/article/view/45727

Dzinkowski, R. (nd). The Value of Intellectual Capital'. The Journal of Business Strategy, 2(4), 3–4.

Edvinsson, L., & Malone, M.S. (nd). Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden. New York, NY, USA.

Githaiga, P. N., Soi, N., & Buigut, K. K. (2023). Does intellectual capital matter to MFIs' financial sustainability? Asian Journal of Accounting Research, 8(1), 41–52. https://doi.org/10.1108/AJAR-06-2021-0080

Giuliani, M., & Poli, S. (2019). Which is the Relationship between Gender Diversity, Intellectual Capital and Financial Performance? International Journal of Business and Management, 14(10), 101. https://doi.org/10.5539/ijbm.v14n10p101

Gleißner, W., Günther, T., & Walkshäusl, C. (2022). Financial sustainability: measurement and empirical evidence. In Journal of Business Economics (Vol. 92, Issue 3). Springer Berlin Heidelberg. https://doi.org/10.1007/s11573-022-01081-0

Guthrie, J., Ricceri, F., & Dumay, J. (nd). Reflections and Projections: A Decade of Intellectual Capital Accounting Research. Br. Accounts. Rev., 44, 68–82. https://doi.org/10.1016/j.bar.2012.03.004

Hurley, R.F., & Hult, GMT (nd). Innovation, market orientation, and organizational learning: An integration and empirical examination. Journal of Marketing, 62(4), 42–54 10 2307 1251742.

Husen Sobana, D., Kamaludin Yusup, D., Suci Asih, V., Yulandri, E., & Zulfikar Ahmad, F. (2025). Strengthening Financial Literacy and Inclusion in Islamic Cooperatives Through Mentorship and Counseling in Indonesia. *Journal of Islamic Economics and Business*, *4*(2), 171–193. Retrieved from https://journal.uinsgd.ac.id/index.php/jieb/article/view/45654

Issa, A., & Fang, H. X. (2019). The impact of board gender diversity on corporate social responsibility in the Arab Gulf states. Gender in Management, 34(7), 577–605. https://doi.org/10.1108/GM-07-2018-0087

Jelinkova, E., & Jirincova, M. (2015). Diversity Management as a Tool of Managing Intellectual Capital. Journal of Competitiveness, 7(4), 3–17. https://doi.org/10.7441/joc.2015.04.01

Jermsittiparsert, K. (2021). Green Intellectual Capital Factors Leading to Business Sustainability. E3S Web of Conferences, 277. https://doi.org/10.1051/e3sconf/202127706009

Joiya, WF and JQ (nd). impact of Intellectual Capital on Firm Performance. International Journal of Management and Economics Invention, 4(10), 75–87. https://doi.org/10.1080/0034340052000320851

Kamath, B. (2022). Board Gender Diversity and Intellectual Capital Performance of Firms in India. Journal of Women's Entrepreneurship and Education, 2022(1–2), 97–116. https://doi.org/10.28934/jwee22.12.pp97-116

Kehelwalatenna, S., & Premaratne, G. (2019). Diversity in Estimates of the Impact of Intellectual Capital on Firm Performance Created by Varied Adoptions of VAIC Method. Colombo Business Journal, 10(1), 66–113. https://doi.org/10.4038/cbj.v10i1.43

Khalil Omar, M., Yusoff, Y.M., Delima, M., & Zaman, K. (2017). The Role of Green Intellectual Capital on Business Sustainability. World Applied Sciences Journal, 35(12), 2558–2563. https://doi.org/10.5829/idosi.wasj.2017.2558.2563

Krisdatama, K., & Setiawan Nuraya, A. (2022). The influence of gender diversity of directors and commissioners on return on assets in companies. The Influence of Gender Diversity of Directors and Commissioners on Return on Assets in Companies, 217–223.

Kujansivu, P. (nd). Operationalizing Intellectual Capital Management: Choosing a Suitable Approach. Meas. Bus. Excell, 12, 25–37. https://doi.org/10.1108/13683040810881171

Kurniawati. (2019). Demographic Diversity of Board Composition on Strategy Changes with Company Performance as a Moderating Variable. Journal of Accountancy, 4(1), 133–146.

Lestari, RA (2021). Gender Diversity, Board Composition, Intellectual Capital and Its Effect on Firm Performance. Management Analysis Journal, 10(1), 62–76. https://doi.org/10.15294/maj.v10i1.45522

López-Gamero, M.D., Molina-Azorín, J.F., & Claver-Cortés, E. (nd). The Whole Relationship between Environmental Variables and Firm Performance: Competitive Advantage and Firm Resources as Mediator Variables. J Environ. Manag, 90, 3110–3121. https://doi.org/10.1016/j.jenvman.2009.05.007

Luo, W., Tian, Z., Zhong, S., Lyu, Q., & Deng, M. (2022). Global Evolution of Research on Sustainable Finance from 2000 to 2021: A Bibliometric Analysis on WoS Database. Sustainability (Switzerland), 14(15). https://doi.org/10.3390/su14159435

Massaro, M., Dumay, J., Garlatti, A., & Dal Mas, F. (nd). Practitioners' Views on Intellectual Capital and Sustainability: From a Performance-Based to a Worth-Based Perspective. J. Intellect.

Stamp, 19, 367–386. https://doi.org/10.1108/JIC-02-2017-0033

Migliorelli, M. (2021). What do we mean by sustainable finance? Assessing existing frameworks and policy risks. Sustainability (Switzerland), 13(2), 1–17. https://doi.org/10.3390/su13020975

Mukherjee, T., & Sankar Sen, S. (2019). Impact of Corporate Governance on Corporate Sustainable Growth. International Research Journal of Business Studies, 12(2), 167–184. https://doi.org/10.21632/irjbs.12.2.167-184

Nicolò, G., Sannino, G., & Iorio, S. De. (2022). Gender diversity and online intellectual capital disclosure: Evidence from Italian-listed firms. Journal of Public Affairs, 22(4), 1–13. https://doi.org/10.1002/pa.2706

Ozili, P. K. (2023). Theories of Sustainable Finance. Managing Global Transitions, 21(1). https://doi.org/10.26493/1854-6935.21.5-22

Pirsch, J., Gupta, S., & Grau, S.L. (nd). A framework for understanding corporate social responsibility programs as a continuum: An exploratory study. Journal of Business Ethics, 70(2), 125–140. https://doi.org/10.1007/s10551-006-9100-y

Pramono, C., & Nasih, M. (2022). The Effect of Gender Diversity in the Boardroom and Company Growth on Environmental, Social, and Governance Disclosure (ESGD). Journal of Accounting and Investment, 23(3), 460–477. https://doi.org/10.18196/jai.v23i3.14402

Robbins, S.P., & Timothy, P.J. (2018). Essentials Of Organizational Behavior.

Ryszawska, B. (2016). Sustainability transition needs sustainable finance. Copernican Journal of Finance & Accounting, 5(1), 185. https://doi.org/10.12775/cjfa.2016.011

Salehi, M., & Zimon, G. (2021). The effect of intellectual capital and board characteristics on value creation and growth. Sustainability (Switzerland), 13(13), 1–16. https://doi.org/10.3390/su13137436

Sardo, F., Serrasqueiro, Z., & Alves, H. (nd). On the Relationship between Intellectual Capital and Financial Performance: A Panel Data Analysis on SME Hotels. Int. J. Hosp. Manag, 75, 67–74. https://doi.org/10.1016/j.ijhm.2018.03.001

Secundo, G., Dumay, J., Schiuma, G., & Passiante, G. (nd). Managing Intellectual Capital through a Collective Intelligence Approach: An Integrated Framework for Universities. J. Intellect. Stamp, 17, 298–319. https://doi.org/10.1108/JIC-05-2015-0046

Susila, MP, & Prena, G. Das. (2019). The Influence of Funding Decisions, Dividend Policy, Profitability and Corporate Social Responsibility on Company Value. Journal of Accounting:

Scientific Accounting Studies (JAK), 6(1), 80. https://doi.org/10.30656/jak.v6i1.941

Tajudeen Lawal, Daniya Adeiza, MS (2022). Board Diversity and Financial Performance of Listed Manufacturing Firms in Nigeria. Accounting Analysis Journal, 11(2), 85–93. https://doi.org/10.36348/sjbms.2022.v07i02.001

Vale, J., Miranda, R., Azevedo, G., & Tavares, M. C. (2022). The Impact of Sustainable Intellectual Capital on Sustainable Performance: A Case Study. Sustainability (Switzerland), 14(8), 1–17. https://doi.org/10.3390/su14084382

Vetchagool, W. (2021).*ความสัมพันธ์ระหว่างความหลากหลายของคณะกรรมการบริษัทกับทุนทางปัญญาของบริษัทจดทะเบียนกลุ่มอุตสาหกรรมเกษตรและอาหารในตลาดหลักทรัพย์แห่งประเทศไทยBoard Diversity and Intellectual Capital : An Analysis of Thai Listed Agriculture and Food Companies*. 133–153.

Wafa Farrukh. (2018). Impact of Intellectual Capital on Firm Performance. International Journal of Management and Economic Invention, 4(10), 1943–1952. https://doi.org/10.31142/ijmei/v4i10.01

Wendra, W., Sule, ET, Joeliaty, J., & Azis, Y. (2019). Exploring dynamic capabilities, intellectual capital and innovation performance relationship: Evidence from the garment manufacturing. Business: Theory and Practice, 20(October 2020), 123–136. https://doi.org/10.3846/BTP.2019.12

Weqar, F., Khan, A.M., Raushan, M.A., & Haque, SMI (2021). Measuring the Impact of Intellectual Capital on the Financial Performance of the Finance Sector of India. Journal of the Knowledge Economy, 12(3), 1134–1151. https://doi.org/10.1007/s13132-020-00654-0

Widyastuti, J., R, P., & Permana, E. (nd). Green Intellectual Capital and Sustainability Performance of Companies in Indonesia. Turkish Journal of Computer and Mathematics Education.

Xu, J., & Li, J. (2019). The impact of intellectual capital on SMEs' performance in China: Empirical evidence from non-high-tech vs. high-tech SMEs. Journal of Intellectual Capital, 20(4), 488–509. https://doi.org/10.1108/JIC-04-2018-0074

Xu, J., Shang, Y., Yu, W., & Liu, F. (2019). Intellectual capital, technological innovation and firm performance: Evidence from China's manufacturing sector. Sustainability (Switzerland), 11(19), 1–16. https://doi.org/10.3390/su11195328

Yusliza, MY, Yong, JY, Tanveer, MI, Ramayah, T., Noor Faezah, J., & Muhammad, Z. (nd). A Structural Model of the Impact of Green Intellectual Capital on Sustainable Performance. J. Clean. Prod, 249, 119334. https://doi.org/10.1016/j.jclepro.2019.119334

Yusoff, YM, Omar, MK, Zaman, KMD, & Samad, S. (nd). Do All Elements of Green Intellectual Capital Contribute toward Business Sustainability? Evidence from the Malaysian Context Using the Partial Least Squares Method. J. Clean. Prod, 234, 626–637. https://doi.org/10.1016/j.jclepro.2019.06.153