

## THE EFFECT OF INTELLECTUAL CAPITAL ON FINANCIAL PERFORMANCE IN ENERGY SECTOR COMPANIES LISTED ON THE INDONESIAN STOCK EXCHANGE (IDX) IN 2020-2022

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### ABSTRACT

*This study aims to determine how intellectual capital affects financial performance in energy sector companies listed on the Indonesian Stock Exchange (IDX) in 2020-2022. This study uses Financial Performance as an independent variable measured by Return On Asset (ROA) and uses Intellectual Capital (IC) as the dependent variable measured by Value Added Intellectual Coefficient (VAIC™) which consists of Value Added Human Capital (VAHU), Value Added Capital Employed (VACA), and Structural Capital Value Added (STVA). The theory used as the basis of this research is Resources-Based Theory (RBT) and supported by Knowledge-Based Theory. From the use of the purposive sampling method, 24 companies were obtained as samples and 72 observation data were used. The analytical tool used is SmartPLS with the Structural Equation Model (SEM). The hypothesis was analyzed from the results of bootstrapping in Path Coefficients which resulted in Intellectual Capital having a positive and significant effect on Financial Performance with a large effect obtained of 64,7%.*

*Keywords: Financial Performance, Intellectual Capital, Resources-Based Theory, Knowledge-Based Theory.*

### INTRODUCTION

The economic progress felt today has grown increasingly complex in line with the growth of science, technology and the international trade system that supports the flow of endless rivalry in the global economy. This progress is used to open opportunities for entrepreneurs to own or build companies in various sectors, characterized by the increasing number of similar and dissimilar companies in Indonesia. Companies are urged to improve their performance in order to win the existing competition, especially for companies that have been listed on the Indonesia Stock Exchange (IDX) which are bound to the observations of external parties, especially investors.

Financial performance is a parameter needed in calculating the company's capability in maintaining and improving the stability of the company's financial health. Evaluation of financial performance is needed by managers in choosing the right decisions regarding the management of company resources. The resources owned by the company if taken care of optimally will be able to manifest added value that affects the improvement of its financial

performance. One of the company's believed to able to produce financial performance growth, especially during the covid 19 pandemic that has hit Indonesia since 2020 until the recovery period in 2022. Intellectual capital is a vital resource that is important for the sustainability of companies in the face of economic instability and enables companies to adapt to this situation so that they can survive (Chandra & Agnes, 2021).

Companies with good financial performance are able to maintain themselves and avoid large losses in the midst of economic instability, and their performance is generally calculated from continuously increasing profit for the company (Chusnah, et al. in Hidayat & Dana, 2019). In a pandemic, companies have restrictions in carrying out their activities freely so that companies must be able to maximize their assets in conducting operational activities. So, the financial performance in this study focuses on assessing the profit generated from the use of the company's assets as measured by return on assets (ROA).

Currently, more and more companies have modified their business patterns by using new knowledge-based business patterns that were

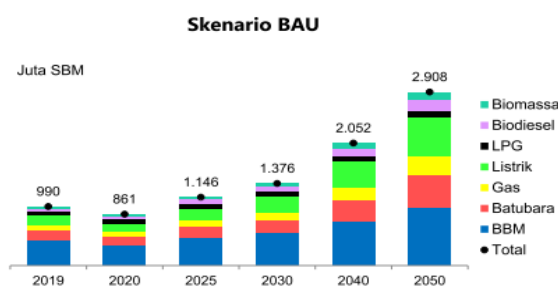


previously based on labor. Knowledge is an important component for companies that are considered a major asset that generates continuous growth and competitive excellence. (Nawang Sari, 2016) argues that the company's competitive excellence are calculated from how the company manages its resources, renewable informatics systems as intangible assets that the company must prioritize.

In the knowledge - based business pattern, one of the approaches used in the calculation and measurement of intangible assets is intellectual capital (IC). Intellectual capital began to gain prominence in Indonesia after the emergence of PSAK No.19 (revised 2000) on intangible assets, although is is not directly declared, but intellectual capital has gained enough attention. Ihyaul Ulum describes intellectual capital as a term for the integration of intangible assets, intellectual property, infrastructure, and employees that enable companies to be effective (Puspita & Wahyudi, 2021). Companies with knowledge-based business patterns centered on improving financial performance require

employees who have expertise and skills with high innovation and creativity. Therefore, the company's investment in intangible assets in the from of intellectual capital is increasingly being increased. This can be seen from increasing research and development budget and training budget for employees in many companies.

Energy sector companies on the IDX are faced with challenges, especially fears of an energy crisis. Companies must find ways to use existing energy efficiently and as well as possible to meet market demand, this happens because the increasing demand for energy is not proportional to the limited energy supply. Based on the BAU (Business As Usual) scenario shown by the size of SBM (Oil Barrel Equivalent) reviewed by the Agency for the Assessment and Application of Technology (BPPT), national energy demand from 2019 - 2050 is expected to continue to grow at an average growth rate of 3.5% per year in accordance with economic and population growth, energy prices, and government policies (Dr. Edi Hilmawan, B.Eng., 2021).



**Image 1. Energy Requirements Per Type**  
 Source: BPPT 2023

Energy sector companies need a knowledge-based business pattern by utilizing intangible assets, especially intellectual capital, to be able to manage definite energy efficiently and meet existing market demands. Companies need not only manpower, but expertise, skills, technology, structure, and good relationships with customers, the environment, and the government to be able to overcome challenges and solve existing problems so as to manifest sustainable financial performance. This is done in order to be able to maintain the stock market index owned, on October 3-7, 2022 the energy sector company is still the stock market leader with an index of 6,05% according to data obtained from the Indonesian Stock Exchange (IDX) analyzed and published by (Kontan.co.id, 2022).

Intellectual capital is quite difficult to

measure so Pulic (1998) in (Ulum, 2017) recommends the Value Added Intellectual Coefficient (VAIC™) measurement model which is very often used in various countries. VAIC™ does not measure IC directly but measures the effects resulting from IC management (Ulum, 2017). VAIC™ is used to calculate the efficiency of added value crated from the company's intellectual capabilities. Value Added Intellectual Coefficient (VAIC™) which consists of 3 (three) intellectual capital measurements, namely Value Added Human capital (VAHU), Value Added Capital Employed (VACA), and Structural Capital Value Added (STVA) which will be used as a measure of intellectual capital in this study.

(Andriana, 2014) conducted previous research on how intellectual capital affects the



financial performance of 70 mining and manufacturing companies listed on the Indonesia Stock Exchange. The research found that intellectual capital has a negative and significant impact on financial performance. In their 2018 study on the effect of intellectual capital on financial performance in the IT and service industries, (Pohan et al., 2018) found that intellectual capital is good and significant to financial performance. In addition, a study conducted by (Usman & Mustafa, 2019) on the effect of intellectual capital on financial performance and market value of companies in 19 companies listed on the Jakarta Islamic Index shows that intellectual capital does not have a significant effect on financial performance but has an influence on the company's market value. Furthermore, Rahmadi & Mutasowifin's research, (2021) research examines the influence of intellectual capital on financial performance and company value on the Indonesia Stock Exchange. The research found that intellectual capital has a good and significant effect on financial performance and company value.

There are inconsistent findings about the effect of intellectual property on financial performance; Therefore, researchers believe that additional research should be conducted. Researchers used data from various energy sector companies listed on the Indonesia Stock Exchange (IDX). The purpose of this study is to find out how intellectual capital impacts the financial performance of energy sector companies listed on the IDX from 2020 to 2022.

#### **Resources-Based Theory (RBT)**

(Penrose, 1959) initiated resource-based theory, which analyzes competitive advantage by considering available resources (Aprilia & Isbanah, 2019). According to (Barney, 1991) this theory states that the utilization of resources allows a company to continue to develop advantages continuously. According to RBT theory, competitive advantages can be created using scarce resources because they cannot be imitated, replaced, or transferred (Ulum, 2017). In the context of this theory, it shows that companies can maximize the management of intellectual capital resources, which are resources that cannot be replicated and generate added value. Effective use of intellectual capital resources can reduce costs, increase company profits, demonstrate good financial performance, and enable continuous improvement in the long run. RBT theory reveals that companies that have

resources can generate competitive advantages and are able to focus the company on producing good long-term performance (Ulum, 2017).

#### **Knowledge Based Theory**

Knowledge, according to the knowledge based theory, is a resource that has a great influence on the survival of a business. Knowledge can help businesses increase efficiency and sell more products and services (Ulum, 2017). This theory suggests that a knowledge-based company will develop new knowledge and use the capabilities generated from its human resources to gain a competitive advantage. The use and management of intellectual capital is essential to gain competitive advantage and improve a company's financial performance due to human involvement in the form of intellectual capital, i.e. knowledge.

#### **Intellectual Capital**

The knowledge, experience, technology, techniques, relationships, and skills that can give companies a competitive advantage and wealth are referred to as intellectual capital (Xu & Wei, 2023). Intellectual capital includes the knowledge, knowledge, and skills possessed by employees, infrastructure, infrastructure, and information technology used by employees.

The Value Added Intellectual Coefficient (VAIC<sup>TM</sup>), proposed by Pulic (1998), can be used to measure intellectual capital as an independent variable (Ulum, 2017). The advantage of VAIC<sup>TM</sup> is that the data needed can be easily obtained from various company sources. Data for calculating ratios are calculated using financial figures available in commonly available financial statements. VAIC<sup>TM</sup> generates added value that is influenced by the efficiency of three elements of the company: human capital, structural capital, and capital employed (Tan et al., 2007). VAIC<sup>TM</sup> consists of Value Added Human Capital (VAHU), which shows the amount of value added generated from 1 (one) rupiah given to employees; Value Added Capital Employed (VACA), which indicates the amount of value added or value added generated from physical capital used in business activities; and Structural Capital Value Added (STVA), which shows the amount of structural capital required to obtain 1 (one) rupiah of added value and an indication of the success of structural capital in creating added value.

#### **Financial Performance**

A company's success in generating profits and avoiding losses is closely related to financial



performance, which is also a measure in assessing a company's ability to manage and utilize its resources. According to Sukhemi in (Wijayani, 2017) financial performance is an achievement that shows how well a company's finances are within a certain period of time. Ratios in financial statements are used to measure a company's financial performance. To achieve the company's goals, its financial performance must be continuously improved. Generally, a company's goal is to profit from what it does.

### Effect of Intellectual capital on financial performance

Intellectual capital is a measurable resource in increasing competitive advantages so that financial performance can be improved (Chen et al., 2005). The results of research by (Lamusu, 2017); (Wijayani, 2017); (Pohan et al., 2018); (Johan & Iksan, 2018); (Annisa, 2019); (Rahmadi & Mutasowifin, 2021) state that intellectual

capital has a significant positive effect on financial performance.

There is a common belief that effectively managing intellectual capital, which includes employee capabilities, performance, and organizational structure will help companies improve financial performance by increasing the efficiency of costs generated and incurred. The company's financial performance will increase along with the quality of its asset management. The asset in question can be tangible assets or intellectual capital. It is believed that the financial performance of a business can be improved by utilizing and managing intellectual capital. Therefore, the hypotheses made in this study are:

**Hypothesis = Intellectual capital has a positive and significant effect on financial performance.**

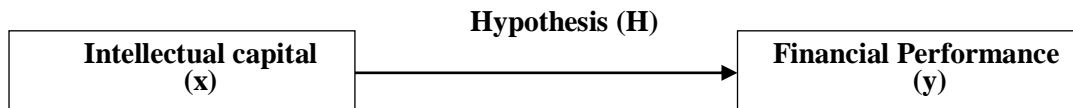


Image 2. Theoretical Framework

## RESEARCH METHODS

### Type of Research and Population

The type of research used is quantitative research with the aim of measuring the relationship of influence between variables. Population is the overall object or subject to be studied, according to (Sugiyono, 2022). The research involved 79 companies in the energy sector listed on the Indonesia Stock Exchange (IDX), which can be found on the [www.idx.co.id](http://www.idx.co.id).

### Research Sample

Some or all of the required population characteristics are referred to as samples (Sugiyono, 2022). To determine the sample to be studied, this study used the purposive sampling method, which is based on certain parameters and considerations (Sugiyono, 2022). This method is used to determine which part of the population will be studied based on the purpose of the study. The parameters used to select the sample include:

1. Energy sector companies listed on the Indonesia Stock Exchange (IDX).
2. Energy sector companies that have published annual financial reports consecutively in the 2020-2022 period at [www.idx.co.id](http://www.idx.co.id).
3. Energy sector companies that include the nominal payment of salaries and employee

benefits in the annual financial statements published for the 2020-2022 period.

4. Energy sector companies that are included in the main board, namely large companies with good finances and have reported their net profit.

Based on the parameters above, there are 24 companies that have met all the conditions as samples that will be used in testing the variables in this study.

### Data Type and Source

The data used in this study is known as secondary data. The term "secondary data" refers to data collected by researchers from indirect sources that can support research, such as literature or documentation (Sugiyono, 2022). The company's financial statements, which are quantitative data, can be found in [www.idx.co.id](http://www.idx.co.id).

### Data Collection Technique

To collect data, the study used documentation techniques, which include journals, books, and articles related to the subject. (Sukmadinata, 2013) states that documentation techniques are methods of data collection by reviewing and analyzing a number of documents, whether written, pictorial, or electronic.



**Operational Definition and Variable Measurement**

The variables that become attributes in this study consist of dependent variables (Y), namely financial performance with return on assets (ROA) as the measuring indicator and independent variables (X), namely intellectual capital with VAIC™ components consisting of VAHU, VACA, and STVA as the measuring indicator.

**Financial Performance**

Financial performance is an indicator of a company's financial health. One profitability ratio, the return on assets (ROA) ratio, was used to project the financial performance of the study. This ratio is very popular and is most often highlighted because it is able to indicate the company's ability to generate profits from the assets used in its operations. As stated by Wiratna Sujarweni, (2017:65), ROA can be calculated using the following formula:

$$ROA = \frac{\text{Net income}}{\text{Total assets}}$$

**Intellectual Capital**

Intellectual capital (IC) is an intangible asset consisting of knowledge, expertise, and skills, as well as infrastructure, means, and information technology owned by employees. This enables the company to operate and generate sustainable financial performance and competitive advantage. The Value Added Intellectual Coefficient (VAIC™) component, consisting of Value Added Human Capital (VAHU), Value Added Capital Employed (VACA), and Structural Capital Value Added (STVA), is used to measure the intellectual value of capital by Pulic (Ulum, 2017).

1) **Value Added Human Capital (VAHU)**

$$VAHU = \frac{\text{Value added}}{\text{Human capital}}$$

2) **Value Added Capital Employed (VACA)**

$$VACA = \frac{\text{Value added}}{\text{Capital employed}}$$

3) **Structural Capital Value Added (STVA)**

$$STVA = \frac{\text{Structural capital}}{\text{Value added}}$$

Description:

Value added (VA) = total revenue (output) - expenses (other than employee expenses (input))

Human Capital (HC) = total salaries and benefits

Capital Employed (CE) = Total equity and net income

Structural capital (SC) = Value added (VA) -

Human Capital (HC)

**Analysis Techniques and Hypothesis Testing**

The software program used in this research is SmartPLS 4 with the Structural Equation Model (SEM) analysis model.

1) Measurement model (Outer Model)

**Convergent Validity & Discriminant Validity**

To determine construct convergent validity, the Average Variance Extracted (AVE) value and the outer loading factor value. The AVE value must be at least 0,5 and the outer loading factor value must be more than 0,7 (Rahmadi & Mutasowifin, 2021).

Discriminant validity is used to evaluate the quality of indicators used to indicate variables or constructs that have a high correlation value to their constructs. The cross-loading value is used to run this check.

**Reliability**

This test is done to assess the reliability of the research data, which means whether the measures used to measure the variables in the study are consistent with each other. A variable is considered reliable if it has a composite reliability value greater than 0,7 and a Cronbach alpha greater than 0,6.

2) Structural model (Inner Model)

**R-Square**

The purpose of this test is to determine how much influence the independent variable (intellectual capital) has on the dependent variable (financial performance). R-Square values are in intervals of  $0 \leq R^2 \leq 1$ , with larger R-Square values close to 1 indicating that the regression model used is good enough, and lower R-Square values close to 0 indicate that the regression model used is not good enough or even the independent variable cannot explain the dependent variable well. The R-Square value is classified into 3 (three), namely substantial (0,67), moderate (0,33), and weak (0,19) by (Chin in Rahmadi & Mutasowifin, 2021).

3) Hypothesis Testing

Hypothesis testing is performed by generating t-statistical values on the path coefficients of the bootstrapping output. The influence and direction of significant significant influence are assessed by comparing t-table values with t-statistical values. The path coefficient ranges between -1 and +1. If the value is close to +1 or positive, the direction of influence is positive, indicating a strong relationship



between the two variables. Conversely, if the value is close to -1 or negative, the direction of influence is negative. If the value of the t-statistic is greater than the t-table (the t-

statistic is greater than 1,96) and the p-value is less than 0,05, the relationship of the variable is said to be significant. An alpha value of 5% is used as a significance value.



**Image 3. Research Analysis Model**  
 (Source: processed dataSmart PLS, 2024)

**RESULTS AND DISCUSSION**

**Measurement Model (Outer Model) Results**

How latent variables relate to their measurement parameters or indicators is measured using measurement models, also known as outside models. At this point, two tests are carried out, namely validity and reliability

tests. For example, the measurement model used in this study uses SmartPLS:

**1) Convergent Validity**

This test is used to assess whether the measure used in measuring latent variables is valid or not.

**Table 1. Outer Loading or Loading factor**

Variables	Measuring indicator	Outer Loading
Intellectual capital	STVA	0,686
	VACA	0,655
	VAHU	0,911
Financial performance	ROA	1,000

(Source : processed)

The valid outer loading factor value or valid construct loading factor is more than 0,7. This can be seen from the figure and table above, which is the result of data processing that has been done. The VAHU intellectual capital variable and the ROA financial performance variable have an out-of-charge value of 0,911 and 1,000, respectively. However, two variable measures of additional intellectual capital, STVA with an outside load of 0,686 and VACA with an outside load of 0,655, are still below 0,7 or below 0,7. However, Chin, as quoted by (Susanto, et al, stated that the outer filling values of at least 0,5 and 0,6 are considered sufficient for convergent validity tests. The following table shows the Average Variance Extracted (AVE) values:

**Table 2. Average Variance Extracted**

Variable	AVE
Intellectual capital	0,577
Financial performance	1,000

(Source: processed)

From the table above, it can be seen that the AVE value of intellectual capital and financial performance is 0,577 and 1,000 respectively, with an AVE value above 0,5, respectively. The

error variations of these variables are considered smaller than the variances of variables, so they can be considered valid (Rahmadi & Mutasowifin, 2021). It is possible that the structure has met the requirements of convergent validity tests based on the outer loading value and AVE obtained.

**2) Discriminant validity**

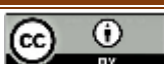
The purpose of this test is to show how much the measure is able to reflect the latent variable (Rahmadi & Mutasowifin, 2021). This test is carried out by paying attention to the cross loading value.

**Table 3. Cross Loading**

	Intellectual capital	Financial performance
ROA	0,805	<b>1,000</b>
STVA	<b>0,686</b>	0,398
VACA	<b>0,655</b>	0,359
VAHU	<b>0,911</b>	0,873

(Source: processed)

As shown by the results of the calculation of the cross loading value above, each indicator as a measure has a larger loading factor in its latent variable compared to other variables. Table 3



above shows that, since each indicator has a larger cross loading value compared to latent variables of other sizes, each indicator has been able to correctly show its latent variables, thus having good discriminant validity.

**3) Reliability**

This test is carried out to assess the reliability of the data, namely whether the data in the study as a measure is consistent in measuring the variable.

**Tabel 4. Composite Reliability**

Variable	Composite reliability
Intellectual capital	0,880
Financial performance	1,000

(Source: processed)

From the table above, it is clear that the two variables each have a composite reliability value of more than 0,7, which is 0,880 for intellectual capital and 1,000 for financial performance. The following table shows Cronbach's alpha results:

**Tabel 5. Cronbach's Alpha**

Variable	Cronbach's alpha
Intellectual capital	0,662
Financial performance	1,000

(Source: processed)

From the table above, it can be seen that both variables have a high level of reliability and meet the requirements of the reliability test,

**Tabel 7. Hypothesis Testing Results- Path Coefficients**

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV)	P Values
Intellectual Capital -> Financial performance	0,805	0,821	0,041	19,630	0,000

(Source: processed)

The results of testing the hypothesis of the effect of intellectual capital on financial performance display a positive path coefficients value as seen from the original sample value of 0,805 with a sample mean of 0,821. This shows that the effect of intellectual capital on financial performance produces a positive direction. Furthermore, the significance can be seen from the t-statistics value of 19,630 > t-table 1,96 so that the effect is significant with p-values of 0,000 < 0,05 which indicates that the hypothesis is accepted by the data.

**Discussion**

**The effect of intellectual capital on financial performance**

namely having an alpha Cronbach value of > 0,6, with an intellectual capital of 0,662 and a financial performance of 1,000.

**Structural module (inner model) results**

The R-Square test is carried out to test and determine how many percent of the influence of the independent variable (intellectual capital) on the dependent variable (financial performance).

**Tabel 6. R-Square**

Variable	R-Square
Financial performance	0,647

(Source: processed)

From the table above, it is obtained that the R-square value of financial performance is 0,647 close to the substantial (strong) classification, which means that 0,647 x 100% = 64,7% of intellectual capital variables have a strong influence on financial performance variables, while the remaining 100% - 64,7% = 35,3% is influenced by other variables outside this research model. The substantial R-square value of financial performance is supported by the increasing attention of companies to intellectual capital in accordance with the background of this study.

**Hypothesis Testing Results**

The hypothesis testing procedure is obtained from the bootstrapping output which produces the t-statistic value on the path coefficients.

With a positive initial sample value of 0,805 and a t-statistic value of 19,630 which is greater than the t-table value of 1,96, it can be concluded that intellectual capital measured by human capital value added (VAHU), capital employed value added (VACA), and structural capital value added (STVA) has a positive and significant impact on financial performance as measured by return on assets (ROA). This suggests that the utilization and enhancement of intellectual capital will increase a company's ability to profit from its assets. This is in accordance with resource-based theory which argues that intellectual capital is a very important resource that can improve a company's financial performance consistently. In



addition, RBT theory says that companies that have resources can gain a competitive advantage, which allows them to devote their attention to achieving better performance in the long run (Ulum, 2017). It is also supported by the knowledge-based theory that the involvement of human capital in the form of intellectual capital positively impacts how a business runs its operations. Therefore, the utilization and management of intellectual capital is necessary to gain competitive advantage and improve business financial performance.

In this study, Value Added Intellectual Coefficient (VAIC™) was introduced by Pulic (1998) (Ulum, 2017). The model starts with the assumption that IC utilization will have an impact, and this impact will be measured using VAIC™. VAIC™ is a tool to measure the performance generated by ICs, and is based on the company's ability to generate added value (Pulic in Aprilia & Isbanah, 2019).

VAIC™ consists of VAHU, VACA, and STVA. The individual knowledge of company employees acquired through competencies, attitudes, skills, and intellectual intelligence is incorporated into VAHU (Rifqi in Ningsih Marta, 2017). VAHU shows that employees have the ability to generate added value for the company from the costs that the company has incurred for its employees. Effective and efficient HR management produces high-quality employees. The capital used in VACA is the funds or expenses available in the form of total equity and net income. VACA indicates the amount of value added or value added generated from physical capital used in business activities. STVA is used to calculate the added value generated from the utilization of structural capital. Structural capital includes all things owned by companies other than humans, such as organizational structure, databases, culture, strategy, routines, software, and hardware (Novitasari in Setyawatia & Irwantob, 2020).

In fact, managers' efforts based on knowledge efforts are known as intellectual resources; this includes employee development, organizational structure rearrangement, and improving marketing activities (Hermawan et al., 2020). Profitability itself is a concrete criterion to assess the company's financial performance, and within the scope of business profitability, it has an important role in the company's structure and improvement because it is able to measure the company's performance and success

(Widiatmoko in Hermawan et al., 2020).

Effective utilization and management of intellectual capital includes human capital, structural capital, and capital employed. All of these can result in a company's competitive advantage and have a positive impact on improving financial performance, which can be measured by ROA, projections for financial performance. Thus, the higher the level of intellectual capital, the better the company's financial performance.

Based on the study's findings, it is expected that businesses in the energy sector will be able to better manage their intellectual capital, or intangible assets, to help them overcome barriers and increase their profits.

## CONCLUSION

The purpose of this study is to determine how the financial performance of energy companies listed on the Indonesia Stock Exchange (IDX) in 2020–2022 is influenced by intellectual value. The results of the analysis and testing that have been carried out, as well as the discussion in the previous chapter, resulted in the following conclusions:

The intellectual capital variable has a positive and significant effect on financial performance. This is indicated by the bootstrapping results on the path coefficient, namely the original sample value which shows the direction of the positive effect of intellectual capital on financial performance and the t-statistics value which shows the significant effect of intellectual capital on financial performance with p-values which indicate that the hypothesis is accepted by the data.

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