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The Role Of Institutional Ownership In Human And Structural Capital Efficiency In Increasing Firm Value

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ABSTRACT

This study investigates the impact of Intellectual Capital on company valuation in the technology industry in Indonesia, highlighting the role of institutional ownership as a moderator. Data covering 35 technology entities listed on the Indonesia Stock Exchange (IDX) during the period 2022 to 2024 are analyzed using multiple linear regression methods. The research findings show that Structural Capital Efficiency increases company valuation. However, Human Capital Efficiency cannot increase company valuation. Furthermore, institutional ownership is identified as positively moderating the correlation between Human Capital Efficiency and company valuation, indicating that the presence of institutional investors has the potential to increase market appreciation of the Human Capital aspect. This study underlines the significance of Intellectual Capital in the form of Human Capital Efficiency and Structural Capital Efficiency as well as institutional ownership in increasing the value of technology sector companies in Indonesia.

INTRODUCTION

Firm Value, which is considered a reflection of overall performance and the main focus of investors and other stakeholders (Handini & Susilo, 2025). Therefore, investors often use Firm Value as the basis for investment decisions, where high Firm Value will increase the attractiveness of investment. In the context of the technology sector, Firm Value is very crucial because it reflects the potential for growth and innovation that characterizes this industry. The stability of Firm Value is an important factor for investors in allocating capital.

However, global economic uncertainty can disrupt this stability. For example, the Fed's interest rate hike policy in 2022 encouraged foreign investors to reduce their portfolio risk, resulting in investment withdrawals from the Indonesian capital market, especially from the technology sector which is considered riskier (Maryonto, 2022). The increase in interest rates also increased borrowing costs, which further depressed the operating profits of technology companies, raised investor doubts, and caused a drastic decline in the stock prices of the

technology sector in Indonesia by 42.61% (Sandria, 2023). The profitability of technology companies is under pressure due to increased operating costs and decreased investment, which directly negatively impacts Firm Value.

The decline in Firm Value in the technology sector is exacerbated by internal problems such as a shortage of skilled labor and intense competition (Oswaldo, 2022). This condition forces many technology companies to carry out efficiency, including layoffs, which has the potential to reduce Human Capital and worsen the company's overall Intellectual Capital. Intellectual Capital, which is very important for the technology sector that relies on innovation, can be eroded by the loss of talent due to layoffs, which can ultimately reduce Firm Value.

Intellectual Capital is an intangible asset, which is one of the main resources of a company in creating prosperity (Saraswati et al., 2024). Generally, a company's Intellectual Capital consists of 3 components, namely Human Capital, Structural Capital, Relational Capital (Ting et al., 2020). For the technology sector, which relies heavily on innovation and knowledge, Intellectual Capital is a very vital resource and has great potential to increase Firm Value. Human Capital, as a component of Intellectual Capital, includes the knowledge, skills, experience, and creative abilities of employees, which empower companies to improve performance and productivity. Despite its importance, research on Human Capital efficiency and its impact on firm performance in developing countries is still limited (Tran & Vo, 2020). In the technology sector, the quality of Human Capital directly affects a company's ability to innovate and produce high-value products or services, which ultimately affects profitability and Firm Value. Meanwhile, Structural Capital, as a component of Intellectual Capital that focuses on innovation, includes knowledge assets embedded in organizational structures and processes, such as patents, information systems, corporate culture, and copyrights. These assets enable companies to transform Human Capital into intellectual property and greater Firm Value. In the technology sector, Structural Capital plays a crucial role because it is the foundation for the rapid development and commercialization of technological innovation. The effectiveness of Structural Capital in facilitating innovation can directly affect the Firm Value of technology in a competitive market.

Previous studies have found that various components of Intellectual Capital can increase Firm Value (Appah et al., 2023; Indriastuti & Kartika, 2021; Skhvediani et al., 2022). However, the measurement of Intellectual Capital that varies between researchers creates a research gap. This study will use Human Capital Efficiency and Structural Capital Efficiency as measures, which are different from previous studies, for example, Skhvediani et al. (2022) used Intellectual Capital Efficiency, Human Capital Efficiency and Structural Capital Efficiency, while Indriastuti & Kartika (2021) used Value Added Intellectual Coefficient which assesses Intellectual Capital as a whole. In the technology sector, proper measurement of Intellectual Capital and Human Capital efficiency can provide a deeper understanding of how these intangible assets contribute to Firm Value.

In addition to Human Capital and structural, there is Institutional Ownership which is part of a company's governance. Institutional Ownership is the number of company shares owned by institutions, private or government which is compared to the total shares outstanding to get the percentage. The existence of Institutional Ownership can monitor the behaviour of managers in making a decision (Sudiyatno et al., 2023).

This study uses Institutional Ownership as a moderating variable. In accordance with the Resource-Based View theory, Institutional Ownership can strengthen the influence of Human Capital Efficiency and Structural Capital Efficiency on Firm Value because of their role and influence in the company. The use of this moderating variable is based on the research gap from previous studies. García Castro et al. (2021) stated that Structural Capital Efficiency has no effect on Firm Value, but Human Capital Efficiency does. This finding is inconsistent with other studies. For example, Appah et al. (2023) found that Human Capital has no significant effect on Firm Value, while Structural Capital has a significant effect. Then, Shkvediani et al. (2022) tested the effect of Human Capital Efficiency, Structural Capital Efficiency, capital efficiency used, and

relationship capital, but found that only Human Capital Efficiency, Structural Capital Efficiency, and capital efficiency used have an effect on Firm Value in the technology sector. Moderating variables can affect the direction or strength of the relationship between independent and dependent variables (Baron & Kenny, 1986). Therefore, this study aims to test whether Institutional Ownership can moderate the effect of Human Capital Efficiency and Structural Capital Efficiency on Firm Value. In the context of the technology sector, a high level of Institutional Ownership has the potential to moderate the impact of Human Capital Efficiency and Structural Capital Efficiency on Firm Value because supervision and active involvement from institutional investors can strengthen market confidence in the value of these intangible assets.

The focus of this study is to analyze the effect of Intellectual Capital components, namely Human Capital Efficiency and Structural Capital Efficiency on Firm Value and the moderating effect of Institutional Ownership on this relationship in the Indonesian technology sector, especially after the global economic dynamics in 2022. The aim is to empirically test and prove the effect of Human Capital Efficiency and Structural Capital Efficiency on Firm Value, as well as to identify the role of Institutional Ownership in strengthening or weakening this relationship. The benefits of this study are to provide insight for investors and stakeholders on the determinants of technological Firm Value, as well as to contribute to the development of corporate management theory and practice in Indonesia. By understanding how Human Capital Efficiency, Structural Capital Efficiency, and Institutional Ownership interact in influencing technological Firm Value, investors can make more informed decisions, and corporate management can formulate more effective strategies to increase their Firm Value.

LITERATURE REVIEW

Resource-Based View

This study uses Resource-Based View (RBV) Theory as the main theory of the study. RBV Theory focuses on identifying the sources of a company's competitive advantage that come from its internal capabilities and assets (Kraaijenbrink et al., 2010). This theory emphasizes the importance for companies to utilize all their resources in order to create a superior competitive position in the market (Florensia et al., 2022). According to Wernerfelt (1984), company resources can be categorized into tangible and intangible assets. Thus, intangible assets such as Intellectual Capital, and corporate governance, and tangible assets such as profitability in this study can be conceptualized as internal company resources.

Company Value

Firm Value is an important indicator that reflects the overall performance of a company and is a major concern for investors, creditors, and other stakeholders (Handini & Susilo, 2025). Specifically, Firm Value can be defined as how the market views the company's future prospects and performance, which is reflected in its stock price and market capitalization (Koller et al., 2010). Thus, Firm Value is an important benchmark for stakeholders in evaluating the attractiveness and growth potential of a business entity. Therefore, increasing Firm Value is often the main strategic goal of management to attract investment, increase creditor confidence, and maximize shareholder prosperity.

Intellectual Capital

Intellectual Capital is a combination of intangible assets that play an important role in the sustainability of a company's operations (Brooking, 1996). These intangible assets can be defined as knowledge, experience, relationships, processes, discoveries, innovations, market presence, and community influence owned by the company (Akpinar & Akdemir, 1999). Therefore, Intellectual Capital is one of the company's resources that can be utilized to improve its welfare (Saraswati et al., 2024). The relationship between Firm Value and Intellectual Capital can be

explained through the Resource-Based View theory, which views Intellectual Capital as one of the assets in a company that can be used as a tool to generate competitive advantage in the market. Various previous studies have examined the relationship between Intellectual Capital and Firm Value, such as Appah et al. (2023), Indriastuti & Kartika (2021), and Skhvediani et al. (2022), which consistently found a positive correlation between Intellectual Capital and increased Firm Value.
H1: Human Capital Efficiency has a positive effect on Firm Value.
H2: Structural Capital Efficiency has a positive effect on Firm Value.

Institustional Ownership

Institutional ownership, which is the percentage of a company's total outstanding shares owned by private or government institutions, is viewed as a company resource in the Resource-Based View theory and plays a role in corporate governance to increase company value. The existence of Institutional Ownership can monitor the behavior of managers in decision making (Sudiyatno et al., 2023). So that Institutional Ownership can regulate the running of a company which can ultimately have an impact on Firm Value.
H3: Institutional Ownership moderates the relationship between Human Capital Efficiency and Firm Value .
H4: Institutional Ownership moderates the relationship between Structural Capital Efficiency and Firm Value.

METHODS

Sample

This study uses secondary data obtained from consolidated financial statements and annual reports of companies through the Indonesia Stock Exchange website covering 48 technology sector companies. The sampling method applied is purposive sampling with the criteria that the company has complete data for the research variables, publishes financial statements during the period 2022-2024 or 2023-2024, and has complete historical stock prices during the period 2022-2024, so that out of 48 technology companies listed on the IDX, 35 companies meet the criteria to be processed in this study.

Variabel and Measurements

Firm Value Measurements

Firm Value can be measured using various formulas, but this study will use Tobin's Q to assess Firm Value. Tobin's Q is a ratio first developed by Tobin (1969). Tobin's Q has long been recognized as a relevant indicator for measuring Firm Value through a comparison between the company's market value and the replacement cost of the company's assets. However, the implementation of the initial calculation of Tobin's Q was hampered by the difficulty in determining the replacement cost of its assets. Therefore, Chung & Pruitt (1994) simplified the calculation of Tobin's Q. Research by Butt et al. (2023) provides further evidence of the reliability of Tobin's Q as a superior measure of performance and Firm Value compared to stock returns. Previous research also indicates that Tobin's Q is very relevant for evaluating Firm Value in industries that rely significantly on intangible assets; therefore, Tobin's Q is appropriate to be applied in this study which uses the technology industry as a sample.

$$Tobin's\ Q\ (Chung\ \&\ Pruitt, 1994) = \frac{Market\ Value\ of\ Equity + Debt + Preference\ Stock}{\text{Total Assets}}$$

Table 1. Indicator for

Tobin's Q Value	Indicator
<1	Undervalued
>1	Overvalued

Human Capital & *Intellectual Capital* Efficiency Measurements

Human Capital Efficiency and Structural Capital Efficiency are measured using a method developed by Pulic (2000), namely the Value-Added Intellectual Coefficient (VAIC). VAIC calculates the Intellectual Capital owned by the company by considering tangible assets and intangible assets owned by the company which are divided into four different components, namely Human Capital Efficiency, Structural Capital Efficiency, Capital Employed Efficiency, and Intellectual Capital Efficiency which are then added together to find the Value-Added Intellectual Coefficient. This method is easier to apply compared to other methods because the data needed is already listed in the company's financial statements. Thus, this study measures Human Capital Efficiency and Structural Capital Efficiency using VAIC.

Human Capital Efficiency measurement using VAIC (Pulic, 2000):

$$Human\ Capital\ Efficiency = \frac{Value\ Added}{Human\ Capital}$$

Table 2. Formulas for HCE Components

HCE Component	Formula
Human Capital	Total Wages from COGS, Sales and Administrative Expense
Value Added	Total Wages from COGS, Sales and Administrative Expense + Pension + Total Depreciation from COGS, Sales and Administrative Expense + EBIT

Intellectual Capital Efficiency measurement using VAIC (Pulic, 2000):

$$Structural\ Capital\ Efficiency = \frac{Structural\ Capital}{Value\ Added}$$

Table 3. Formulas for SCE Components

SCE Component	Formula
Structural Capital	Value Added – Human Capital

Data Analysis Method

This study uses the Multiple Linear Regression method which is used to see the relationship arising from the independent variables on the dependent variable. The independent variables in this study are Human Capital Efficiency and Structural Capital Efficiency, then the dependent variable is Firm Value. In addition to independent and dependent, this study adds control variables such as company age, company size, leverage, current ratio and Altman Z-Score. Multiple Linear Regression allows us to assess the extent to which these independent variables can explain variations in the dependent variable. In addition to Multiple Linear Regression, descriptive analysis can be used to provide an overview of the distribution of the observed variables. Statistical hypothesis testing, such as the t-test to assess the significance of each regression coefficient, and the F-test to evaluate the overall significance of the regression model, can be performed. By using this data analysis method, we can see more deeply about the relationship between Human Capital Efficiency, Structural Capital Efficiency or other factors on Firm Value in the technology sector.

RESULTS

Descriptive Statistic

From a total of 105 initial data, 97 observations were analyzed after removing outliers. Based on Table 4, the average Human Capital Efficiency (HCE) of 1.82 and Structural Capital Efficiency (SCE) of 2.52 indicate a moderate level of Intellectual Capital efficiency in the sample companies. However, the relatively high standard deviations for HCE (3.26) and SCE (3.34) indicate that there is quite a large variation between companies in utilizing their Human Capital and Structural Capital. The wide range of HCE values (-15 to 19) and SCE (-1 to 11) shows that there are companies with very low to very high levels of Intellectual Capital efficiency. This difference can be influenced by various factors such as business strategy, investment in human resource development, and the quality of organizational infrastructure.

The average Institutional Ownership of 52.12% indicates that institutional ownership in the sample companies is quite dominant. The very high standard deviation (30.35) indicates significant differences in the level of Institutional Ownership between companies, with a minimum value of 0% and a maximum of 100%. This variation reflects the diversity of ownership structures and the level of involvement of institutional investors in corporate decision-making. High levels of Institutional Ownership in some companies may indicate tighter supervision and the potential for significant influence on corporate policy.

Table 4. Descriptive Statistic Result

Variables	Obs	Mean	Std. Dev	Min	Max
Human Capital Efficiency (HCE)	97	1.824176	3.261197	-15	19
Structural Capital Efficiency (SCE)	97	2.516484	3.344523	-1	11
TobinsQ (Firm Value)	97	1.060092	1.847413	-.57	14.17
Institutional Ownership	97	52.11711	30.34367	0	100
Firm Size	97	27.45593	2.254698	22.34	32.57
Firm Age	97	17.01099	11.85795	1	49
Leverage	97	1.385275	9.673065	-84.55	26.43
Current Ratio (CR)	97	5.909121	9.155591	.44	50.27
Finansial Distress (FD)	97	7.375385	11.21433	-32.51	49.26
Earnings Per Share (EPS)	97	19.54639	152.8724	-913	626
N	97				
T	3				

Source: Data Processed, 2025

Data Quality and Test Results

The results of the classical assumption test indicate that the data meets the assumptions of normality and multicollinearity. However, the assumption of heteroscedasticity is not met so that the regression analysis uses the Robust method.The observational data of this study, which amounted to 97 after the data analysis process, were then used for regression and hypothesis testing.The observational data collected have mostly met the data quality, as presented in table .

Table 5. Classical Test Asumption Test Results

Test	Methods	Results
Normality	Skewness-Kurtosis	Prob > chi2 = 0.0574
Multicollinearity	VIF	Average VIF = 7.37
Heteroskedasticity	Breusch-Pagan	0.0000

Source: Data Processed, 2025

Model Feasibility Test Results, Hypotheses And Coefficient Of Determination

Based on the results of the F test in Table 6 with a probability value of F (p-value) of 0.0000, this research model is declared feasible to test the influence of the variables studied on Firm Value. The results of the t-test in Table 6 indicate that Human Capital Efficiency (HCE) can directly reduce the company's Firm Value, while Structural Capital Efficiency (SCE) can directly increase the company's Firm Value. Furthermore, the results of the t-test show that the interaction between Human Capital Efficiency (HCE) and Institutional Ownership (HCE * IO) if combined can increase the company's Firm Value, which supports the acceptance of the third hypothesis. Then Institutional Ownership cannot directly increase the company's value. After that, the interaction between Structural Capital Efficiency (SCE) and Institutional Ownership (SCE * IO) if combined does not have an impact on the company's Firm Value, so the fourth hypothesis is rejected. The R-Squared value of 0.6016 shows that Human Capital Efficiency, Structural Capital Efficiency, Institutional Ownership, and their interactions are simultaneously able to explain 60.16% of the variation in Firm Value, while the remaining 39.84% is influenced by other factors outside the model.

Table 6. F-Test Results And Coefficient of Determination

Prob > F	R-Squared
0.0000	0.6016

Source: Data Processed, 2025

Table 7. Hypothesis Test Results (Robust)

Variables	Coef.	t	P>|t|
HCE	-.3821075	-2.00	0.049
SCE	1.050127	2.71	0.008
Leverage	.0040336	0.57	0.572
CR	.0616798	2.82	0.006
FD	-.0653751	-2.55	0.013
EPS	.0013656	2.94	0.004
Firm Size	-.0175371	-0.18	0.860
Firm Age	-.0124351	-0.98	0.328
Institutional Ownership (IO)	-.0047023	-0.66	0.513
HCE*IO	.0088902	2.39	0.019
SCE*IO	-.01228947	-1.20	0.232
Cons	1.609172	0.65	0.519

Source: Data Processed, 2025

Table 8. Hypothesis Test Results

Hypothesis	Results
H1 (HCE)	Hypothesis not accepted
H2 (SCE)	Hypothesis accepted
H1a (HCE*IO)	Hypothesis accepted
H2a (SCE*IO)	Hypothesis not accepted

Source: Data Processed, 2025

DISCUSSION

This discussion section interprets the research findings on factors influencing Firm Value in the technology sector in Indonesia, with reference to the research objectives, analysis results, relevant literature, managerial implications, study limitations, and suggestions for further research. This study aims to analyse the direct effect of Human Capital Efficiency (HCE) and Structural Capital Efficiency (SCE) on Firm Value, as well as the moderating role of Institutional Ownership in this relationship, based on the Resource-Based View (RBV) theory.

The summary of the research results shows that the first Hypothesis is rejected. HCE has a direct negative and significant effect on Firm Value. The findings of this study indicate that, in the context of the technology sector in Indonesia, efficiency in managing Human Capital can actually be associated with cost pressures or restructuring that are not necessarily responded positively by the market at first. This result is different from the research of Skhvediani et al. (2022) and Sisodia et al. (2021) which found that Human Capital Efficiency can increase a company's Firm Value, but in line with Appah et al. (2023) who found that Human Capital has no impact on Firm Value. This difference is interesting especially since Skhvediani et al. (2022) also conducted research on the technology sector, although the geographical context is different, namely Russia.

This difference in findings may be due to different market focuses. In Indonesia, the market may be more sensitive to initial investments in technology development and innovation that are not necessarily directly reflected in traditional Human Capital Efficiency metrics. While in Russia, efficiency in talent utilization may be more directly valued. The difference in the research period in Skhvediani et al. (2022), namely 2016-2020, may also be relevant. In the early period of rapid technological development, large investments in human resources may be seen as an important foundation. However, as the sector matures, the market may focus more on the output and innovation produced, where overemphasizing efficiency in Human Capital can be interpreted as a reduction in long-term investment. On the other hand, the second Hypothesis is accepted, which finds that SCE can increase a company's Firm Value. This finding is in line with the findings of Skhvediani et al. (2022) and Appah et al. (2023) who also stated that SCE has a positive effect on Firm Value. Structural Capital, which includes patents, concepts, models, and computer and administrative systems (Akpinar & Akdemir, 1999), is a strategic resource that can provide competitive advantage according to RBV theory. Technology companies that have strong Structural Capital tend to be more innovative, efficient in operations, and responsive to market changes, thus attracting investors and ultimately increasing Firm Value.

Furthermore, the third Hypothesis is accepted, which indicates that Institutional Ownership positively moderates the relationship between HCE and Firm Value. Institutional Ownership changes the initially negative effect of HCE to positive and significant. This means that the effect of Human Capital Efficiency on Firm Value becomes positive when the level of Institutional Ownership is high. Institutional investors, with deeper analytical and monitoring capacities, are likely to be better able to recognize and appreciate the potential long-term value of efficient human resource management, even though the market generally responds negatively to it initially. Strong institutional oversight can ensure that Human Capital Efficiency is not done at the expense of long-term investment in talent, thus ultimately increasing market appreciation. This supports the corporate governance view in the RBV, where effective oversight can maximize the value of owned resources. Finally, the fourth Hypothesis is rejected, which shows that Institutional Ownership does not moderate the relationship between SCE and Firm

Value. The effectiveness of Structural Capital in creating Firm Value seems to have been recognized by the market in general, regardless of the level of Institutional Ownership. This implies that institutional investors in the Indonesian technology sector pay consistent attention to the importance of Structural Capital, regardless of their level of ownership. In other words, the presence of institutional investors does not significantly change how the market assesses the contribution of Structural Capital to Firm Value. The focus of their oversight and analysis seems to be more on how the company manages its Human Capital (HCE), especially in ensuring that such efficiency contributes to long-term value.

CONCLUSION

The main findings of this study reveal that Structural Capital Efficiency by itself can increase a company's Firm Value. Meanwhile, Human Capital Efficiency is found to decrease the Firm Value of technology companies in Indonesia. However, after considering the role of Institutional Ownership as a moderating variable, it was found that the effect of Human Capital Efficiency on Firm Value changed to positive and significant. Conversely, Institutional Ownership did not significantly moderate the relationship between Structural Capital Efficiency and Firm Value. The implications of this study underline the crucial role of Structural Capital in increasing the Firm Value of technology in Indonesia. Furthermore, this study highlights the important role of Institutional Ownership in changing market perceptions of Human Capital Efficiency. The presence of institutional investors seems to encourage a higher appreciation of efficient human resource management, which was previously considered negative by the market. On the other hand, the presence of institutional investors does not change the positive effect of Structural Capital on Firm Value. The difference in findings related to the initial negative effect of Human Capital Efficiency, in contrast to several previous studies, indicates the existence of specific factors in the Indonesian context and the development of the technology industry that need to be considered in the assessment of intangible assets. Future research can deepen the understanding of the moderating mechanism of Institutional Ownership on the relationship between Human Capital and Firm Value, as well as explore other relevant contextual factors in the Indonesian technology sector.

LIMITATION

This study has several limitations that need to be acknowledged. The focus of this study is limited to only a few technology companies that have been listed on the Indonesia Stock Exchange (IDX), so the generalization of findings to the wider technology sector may be limited. In addition, the use of secondary data and measurement of variables using financial ratios have the potential to be limited in capturing the complexity of Intellectual Capital and Firm Value as a whole. Further research is suggested to expand the scope of the industrial sector, using qualitative research methods such as considering other variables that have the potential to influence the relationship studied, such as other governance variables. Then, future research can try to explore more deeply how Institutional Ownership can moderate the relationship between HCE and SCE on Firm Value, as well as conducting cross-country comparisons to see the validity of the findings in different contexts.

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