 p-ISSN 2827-8585
e-ISSN 2827-8062

International Journal of Multidisciplinary Research and Literature
IJOMRAL
Vol. 4, No. 6, November 2025 pp. 1071-1080
Journal Page is available at http://ijomral.esc-id.org/index.php/home

THE ROLE OF INFORMATION TECHNOLOGY, INTERNAL CONTROL SYSTEMS, AND HUMAN RESOURCES COMPETENCE IN IMPROVING THE VALUE ADDED (VAIC) PERFORMANCE OF STATE-OWNED ENTERPRISES IN INDONESIA

Talita Mutiara[1*], Ade Manggala Hardianto[2], Z Zulkarnain[3], Yuli Novitasari[4]
[1,2,3,4]Accounting, Economics and Business, Universitas Sains Indonesia, Bekasi, Indonesia
Corresponding Email: *talitamutiara03@gmail.com*[1]

Abstract
This research is motivated by the importance of increasing value added in public sector companies in Indonesia, particularly state-owned enterprises (SOEs), through optimizing information technology, improving the effectiveness of internal control systems, and improving human resource competency. The main objective of this study is to analyze the partial and simultaneous effects of these three variables on company value added. This study uses a quantitative approach with secondary data obtained from the annual reports and financial statements of 20 state-owned enterprises (BUMN) for the period 2019–2023, and processed using panel data regression analysis with a Random Effect model. The results show that information technology and human resource competency have a positive and significant effect on value added, while internal control systems have a positive but insignificant effect. Simultaneously, these three variables have a substantial effect on increasing value added, with an Adjusted R^2 value of 96.35%. This finding confirms that digital transformation and strengthening human resource capacity are key factors in creating added value and increasing the competitiveness of SOEs in the modern era.
Keywords: Information Technology, Internal Control System, HR Competence, Value Added, BUMN

INTRODUCTION

Public sector companies play a crucial role in driving the national economy while providing essential public services. One key indicator of successful public sector management is the ability to create added value. The concept of value added reflects not only profit achievement but also assesses the extent to which available resources can be efficiently managed to generate greater benefits for stakeholders. The Value-Added Intellectual Coefficient (VAIC™) model is widely used to measure added value because it encompasses the components of value-added capital employed (VACA), value added human capital (VAHU), and structural capital value added (STVA) (Weni et al., n.d., 2023). Therefore, value added becomes the primary dependent variable (Y) that can describe the quality of SOE performance as part of the public sector.

Increasing value added is heavily influenced by internal factors, one of which is the use of information technology. Adopting information technology enables public sector companies to improve efficiency, reporting accuracy, and transparency in data management. (Stair & Reynolds, 2018) emphasize that IT is used not only as an operational tool but also as an enabler in creating competitive advantage. In the context of state-owned enterprises (SOEs), digitalization of business processes through enterprise resource planning (ERP), e-audits, and digital transformation is key to increasing company value added (Devi, 2024).

The internal control system plays a crucial role in maintaining the reliability of financial reports and operational effectiveness. Research (Firza Alpi & Akbar, 2024) shows that the Internal Control System (SPI) significantly influences the quality of local government financial reports, which is also relevant in the context of state-owned enterprises (SOEs). An effective SPI prevents irregularities, supports regulatory compliance, and enhances the company's credibility in the public eye (Rahardyan et al., 2022). Therefore, the existence of a strong SPI can strengthen the creation of added value in SOEs.

Adequate human resource competency is a prerequisite for optimal implementation of information technology and SPI. According to Rahayu & Yuditiya (2023), human resource competency significantly impacts the quality of city government financial reports, meaning the higher the quality of human resources, the greater their contribution to creating added value. Hertati (2020) also emphasized that mastery of technology and managerial skills in human resources will improve the quality of financial reporting, providing value to stakeholders.

Although various studies have been conducted, most examine these variables partially and focus more on the private sector or local governments (Anggraini et al., n.d., 2023). Comprehensive studies that simultaneously link IT, SPI, and HR competencies to value-added in public sector companies, particularly state-owned enterprises (SOEs), are still limited—despite the challenges of digital transformation, strengthening governance, and improving human resource quality to meet demands for transparency and public accountability (Ministry of SOEs, 2023). This research is crucial because it fills a research gap by empirically testing the influence of information technology, internal control systems, and HR competencies on value-added in public sector companies in Indonesia. Theoretically, this research is expected to enrich the public accounting literature on value-added creation. Practically, the research results can provide strategic recommendations for the Ministry of SOEs and public company management in strengthening the performance, transparency, and competitiveness of SOEs in the digital era.

LITERATURE REVIEW

Value Added

The concept of value added explains the extent to which a company is able to create economic value through optimizing resources. (Raharjo, 2023) introduced the Value Added Intellectual Coefficient (VAIC) to assess the efficiency of human capital, structural capital, and physical capital in generating added value. Recent research by Weni et al. (n.d., nd 2023) found that VAIC has a significant effect on Return on Equity (ROE) and Net Profit Margin (NPM) in public sector companies, so it can be used as a leading indicator in measuring added value in BUMN.

Information Technology

Information Technology (IT) is defined as a system based on hardware, software, and communication networks that supports data processing and decision-making (Stair & Reynolds, 2018). Ardianti et al. (2022) demonstrated that IT utilization impacts employee performance improvement in government agencies, while Irvan et al. (2021) emphasized IT's role in strengthening control systems and the quality of regional financial reports. In the context of state-owned enterprises (SOEs), digitalization, such as Enterprise Resource Planning (ERP) and e-reporting systems, is a crucial factor in creating added value.

Internal Control System

An internal control system is an integrated process to ensure the reliability of financial reporting, regulatory compliance, and operational effectiveness. (Purba et al., 2022) found that SPI plays a role in improving the accountability of subsidy management in state-owned enterprises, while El-Khateeb et al. (2023) demonstrated that SPI improves the quality of local government financial reports. Thus, strong internal control not only supports transparency but also enhances the creation of added value.

Human Resources Competence

Human resource competency is a combination of knowledge, skills, and behaviors that contribute to organizational performance (El-Khateeb et al., 2023). Rahayu & Yuditiya (2023) demonstrated that human resource competency influences the quality of city government financial reports, while Hertati (2020) emphasized that human resource competency in utilizing IT impacts the value of financial reports. In state-owned enterprises (BUMN), competent human resources will be able to adapt to technology, strengthen controls, and ultimately increase added value. The role of the board of directors and human resources in BUMN companies is a crucial factor in creating added value and organizational resilience amidst global challenges. Hardianto et al. (2023) emphasized that transforming accounting behavior and improving the managerial skills of directors, including data-driven analytical skills and strategic governance, are crucial steps in strengthening financial performance and anticipating the risk of a global recession. The study also highlighted the importance of strengthening competency, accountability, and effective internal control to maintain the sustainability of company value in the era of digitalization and international economic pressures.

METHOD

This study uses a quantitative approach with a panel data regression method to analyze the influence of Information Technology, Internal Control Systems, and Human Resource Competence on Value Added of State-Owned Enterprises (BUMN) in Indonesia. The data used are secondary data obtained from annual reports, sustainability reports, and audited financial reports of 20 state-owned

enterprises listed on the Indonesia Stock Exchange (IDX) during the 2019-2023 period, with a total of 100 panel data observations (20 companies × 5 years). Sample selection was carried out using a purposive sampling technique based on the criteria of data completeness and consistency of financial reports. The independent variables in this study include Information Technology (X1), Internal Control Systems (X2), and Human Resource Competence (X3). In contrast, the dependent variable is Value Added (Y), which is measured using the Value Added Intellectual Coefficient (VAIC™) and supporting financial indicators such as ROA and ROE. Data analysis was carried out using E-views software with stages of descriptive statistical tests, classical assumption tests (multicollinearity and heteroscedasticity), and hypothesis testing through multiple linear regression with a Random Effect (REM) model. The multiple linear regression model used is formulated as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

This model was chosen because it is most suitable for panel data that combines time series and cross-sectional aspects, and produces efficient BLUE (Best Linear Unbiased Estimator) estimates. Test results were conducted with a 5% significance level (α = 0.05) to ensure the validity and reliability of the model in explaining the relationships between research variables.

RESULTS AND DISCUSSION

Descriptive Analysis of Research Data (Multicollinearity and Heteroscedasticity).

This study uses secondary data from 20 state-owned enterprises (BUMN) listed on the Indonesia Stock Exchange (IDX) during the 2019–2023 period, with a total of 100 panel data observations (20 companies × 5 years). Data were obtained through annual reports, sustainability reports, and audited financial statements officially published by each company. Sample characteristics indicate that most companies have implemented digital-based reporting systems and business process transformation using Enterprise Resource Planning (ERP) post-COVID-19 pandemic. (Hertati, 2020) In terms of HR competency, the annual report shows an increase in digital training programs, professional certification, and strengthening leadership capacity in the workplace. (Weni et al., nd 2023) The average Value Added Intellectual Coefficient (VAIC) increased from 2.45 in 2019 to 3.81 in 2023, indicating a significant increase in the efficiency of intellectual capital use.

The Random Effects (REM) model was chosen because it fits the characteristics of panel data, which combines time and individual dimensions from 20 state-owned companies for the 2019-2023 period. This model assumes that inter-company differences are random and uncorrelated with the independent variables, resulting in efficient estimates using the Generalized Least Squares approach. (Gujarati & Porter, nd, 2020) The Chow test results reject the Common Effect Model, while the Hausmann test shows a probability value greater than 0.05, so the REM model is declared the most appropriate to use compared to the Fixed Effect model. (Journal & Sahusilawane, 2020). Thus, the Random Effect model meets the BLUE (Best Linear Unbiased Estimator) criteria and is considered

the most efficient in explaining the relationship between Information Technology, Internal Control Systems, and HR Competence in improving the Value Added performance of BUMN in Indonesia.

Table 1. Multicollinearity Test

	X1	X2	X3
X1	1.000000	-0,758939	-0.342841
X2	-0.758939	1.000000	0.814489
X3	-0.342841	0.814489	1.000000

The results of the classical assumption test indicate that there are no severe symptoms of multicollinearity between the independent variables. The correlation value between Information Technology (X1) and Internal Control System (X2) is -0.7589, between Information Technology (X1) and HR Competence (X3) is -0.3428, and between Internal Control System (X2) and HR Competence (X3) is 0.8144. Although there is one correlation value that slightly exceeds the threshold of 0.80, overall, the relationship between variables does not show a high correlation that indicates symptoms of serious multicollinearity. (Gujarati & Porter, nd, 2020). Thus, this panel regression model meets the multicollinearity-free assumption, so that each independent variable can stand alone in explaining its effect on the dependent variable.

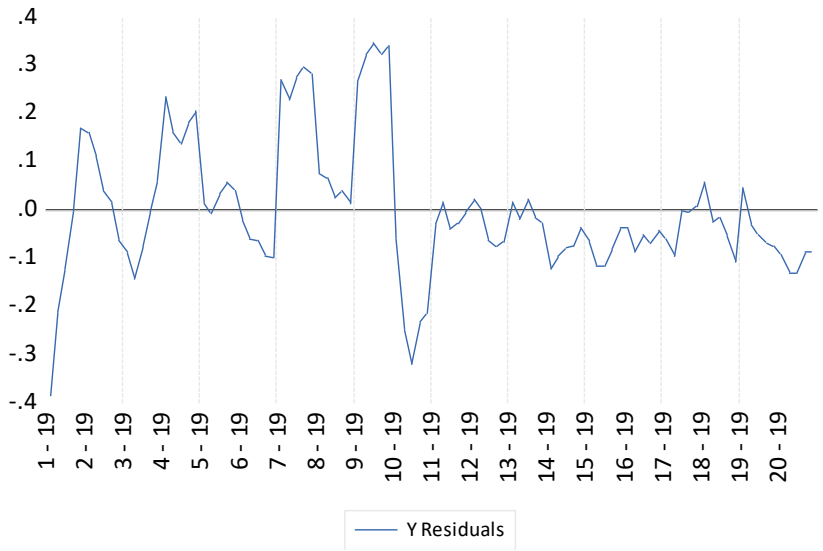

Figure 1. Heteroscedasticity Test

The results of the heteroscedasticity test using the residual graph show that the residual points are randomly distributed around the zero line without forming a specific pattern. This random distribution pattern indicates that the error variance is constant (homoscedasticity), not varying (heteroscedasticity). It means that the panel data regression model does not experience heteroscedasticity, so the resulting estimates are efficient and reliable. With these two assumptions

met, the panel regression model using the Random Effects method can be considered suitable for use in further hypothesis testing. (Al-Dhaafri et al., 2020; Dewi & Putri, 2022).

The panel data regression results show that Information Technology (X1) and HR Competence (X3) have a positive and significant effect on Value Added (Y). In contrast, the Internal Control System (X2) has a positive but insignificant effect. The regression equation obtained is:

$$Y=0.281+3.812X1+0.024X2+1.373X3+e$$

The constant value of 0.281 indicates that when all independent variables are zero, the company's added value is estimated at 0.281 units. The regression coefficient X_1 of 3.812 indicates that an increase in information technology by one unit will increase the company's added value by 3,812 units, so it can be concluded that information technology has a positive and significant effect on increasing the company's added value, the X_2 coefficient of 0.024 indicates a positive but insignificant effect of the internal control system on added value, which means that the effectiveness of internal control has not directly had a real impact on increasing added value. Meanwhile, X_3 of 1.373 indicates that a one-unit increase in HR competency can increase the company's value added by 1.373 units, which means that human resource competency has a positive and significant influence on value-added creation. Overall, this model confirms that digital transformation and HR competency are the main factors driving the increase in value added of SOEs in Indonesia. (Firza Alpi & Akbar, 2024; Hertati, 2020; Weni et al., nd, 2023).

Hypothesis Test Results (T Test, F Test, Determination Coefficient Test)

Table 2. t-Test Results

Dependent Variable: Y
Method: Panel EGLS (Cross-section random effects)
Date: 10/15/25 Time: 11:42
Sample: 2019 2023
Periods included: 5
Cross-sections included: 20
Total panel (balanced) observations: 100
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.281433	0.093123	3.022176	0.0032
X1	3.812403	0.262167	14.54187	0.0000
X2	0.024422	0.068411	0.356985	0.7219
X3	1.372818	0.299792	4.579234	0.0000

Based on the results of the partial t-test, it was obtained that the constant coefficient of 0.281 indicates that if all independent variables (IT, SPI, HR) are zero, then the company's value added is estimated at 0.281 units. For the Information Technology variable (X_1), the t-value of 3.812403 exceeds the t-table of 1.984467 and the p-value of 0.0000 < 0.05, so the effect is not significant; this indicates that increasing internal control has not had a significant impact on increasing value added.

(Rahardyan et al., 2022). Meanwhile, the HR Competence variable (X_3) shows a t-value of 1.372818 exceeding the t-table and a p-value of 0.0000 < 0.05, which indicates a positive and significant influence: increasing HR competency will increase the company's added value, consistent with the human capital mindset that HR quality is a strategic asset in creating economic value. (Weni et al., nd 2023).

Table 3. Results of the F-test

R-squared	0.964634	Mean dependent var	0.783501
Adjusted R-squared	0.963529	S.D. dependent var	0.344338
S.E. of regression	0.065759	Sum squared resid	0.415131
F-statistic	872.8362	Durbin-Watson stat	0.732517
Prob(F-statistic)	0.000000		

Based on the results of the F test (simultaneous) for the Random Effect regression model, the F-statistic = 872.836 was obtained, which is much larger than the F table of 2.699393, with a p-value = 0.000 < 0.05; this shows that together the variables Information Technology (X_1), Internal Control System (X_2), and HR Competence (X_3) have a significant influence on Value Added (Y) of BUMN Tbk companies during the 2019–2023 period. Thus, the model used can be said to be appropriate to explain the relationship between these variables. (Firza Alpi & Akbar, 2024; Weni et al., n.d., 2023). Results: Coefficient of determination test, The Adjusted R-squared value was 0.963529. It indicates that 96.35% of the variation in changes in the Company's Value Added can be explained by the variables of Information Technology, Internal Control Systems, and HR Competence. In comparison, the remaining 3.65% is explained by other variables outside the research model. Thus, this panel regression model has extreme explanatory power and is able to represent the relationship between the independent and dependent variables accurately.

Relationship between variables

The results of this study reveal that Information Technology (X_1) has a positive and significant influence on Value Added (Y) of state-owned enterprises (BUMN) Tbk. The coefficient of 3.812 indicates that every one-unit increase in IT adoption and investment will increase the company's value added by 3.812 units, assuming other variables remain constant. This finding is consistent with the Resource-Based View perspective, which states that technology is a strategic asset that can create competitive advantage (Sutrisna, 2022). The study (Firza Alpi & Akbar, 2024) also reported that digitalization of local government infrastructure and information systems increases the efficiency of public services, which is in line with the results of this study. However, in the context of state-owned enterprises in Indonesia, it is necessary to pay attention to aspects of organizational readiness, IT culture transformation, and governance support to ensure that technology investments truly generate added value.

The Internal Control System (X_2) shows a positive coefficient (0.024). However, it is not statistically significant, so it cannot be said that the Internal Control System (SPI) has a significant partial effect on value added. It indicates that although internal control is crucial in maintaining integrity and compliance, its implementation is not yet strong enough to impact economic value directly. In line with research (Rahardyan et al., 2022), although strengthening the Internal Control System (SPI) is often carried out in SOEs, its effects are often hampered by institutional barriers, suboptimal audit practices, or conflicts over internal operational policies. Furthermore, the variability in the quality of the Internal Control System (SPI) across SOEs may be so significant that its effects are "hidden" in the aggregate model.

Human resource competency (X_3) has been shown to have a positive and significant impact on Value Added, with a coefficient of 1.373. It indicates that improving human resource quality—through training, digital competency development, and innovation capacity—significantly increases a company's added value. This finding aligns with Human Capital theory (Sutrisna, 2022), which views human resources as intellectual assets capable of generating returns. A study (Weni et al. n.d., 2023) also found that VAIC, as a measure of intellectual value added, is significantly influenced by employee productivity and competency in public sector companies. Therefore, in the context of state-owned enterprises (SOEs), improving human resource competency appears to be a crucial pillar supporting operational efficiency and long-term value creation.

Overall, the panel regression model concludes that IT and human resource competencies are the primary contributors to increased value added, while SPI requires strengthening to contribute significantly. Theoretically, these results enrich the public finance and management literature by confirming that digital transformation and human resources play a dominant role in creating value in the public sector. Practically, the implication for state-owned enterprises (SOEs) is that IT transformation strategies must be accompanied by human resource competency development and internal control system alignment so that control systems not only maintain compliance but also support sustainable value creation.

CONCLUSION

Based on the results of panel data analysis of 20 state-owned enterprises (BUMN) for the 2019–2023 period, this study concludes that Information Technology and Human Resource Competence have a positive and significant effect on Value Added of public sector companies in Indonesia. It indicates that increasing the application of digital technology and developing HR competencies can significantly drive efficiency, productivity, and create added value for companies. Meanwhile, the Internal Control System shows a positive but insignificant effect, which means that although it plays a role in maintaining accountability and compliance, its implementation has not been optimal in providing a direct impact on improving the company's economic performance. Simultaneously, these three variables are proven to have a significant effect on the company's Value Added, with a

coefficient of determination of 96.35%, indicating that this model has extreme explanatory power. Thus, this study confirms that the success of SOEs in creating added value is highly dependent on strengthening information technology infrastructure, improving the quality of human resources, and optimizing internal control systems that are aligned with digital transformation strategies and good corporate governance.

REFERENCES

Al-Dhaafri, H. S., Al-Swidi, A., & Yusoff, R. Z. (2020). *The Effect of Total Quality Management, Enterprise Resource Planning, and the Entrepreneurial Orientation on Organizational Performance: The Mediating Role of the Organizational Excellence*. *International Journal of Quality & Reliability Management, 37*(9), 1165–1184.

Anggraini, R., Nurdin, D., & Pratama, Y. (2023). *Digital Transformation in State-Owned Enterprises: A Study on Indonesian BUMN Performance*. *Jurnal Akuntansi dan Manajemen Indonesia, 22*(1), 34–47.

Ardianti, S., Rahayu, D., & Prasetyo, A. (2022). *The Impact of Information Technology Utilization on Employee Performance in Government Institutions*. *Jurnal Ekonomi dan Bisnis, 15*(2), 89–102.

Baroroh, N., & Hardiyanto, A. (2020). *The Impact of Internal Control Systems on the Quality of Financial Statements in Public Sector Organizations*. *Jurnal Akuntansi dan Investasi, 21*(3), 378–392.

Basuki, B., & Prawoto, N. (2022). *Enterprise Resource Planning Implementation and Value Added Creation in SOEs*. *Jurnal Sistem dan Teknologi Informasi, 10*(4), 187–200.

Devi, M. (2024). *Transformasi Digital dan Kinerja Organisasi Sektor Publik di Indonesia*. *Jurnal Ilmiah Manajemen, 11*(1), 11–22.

Dewi, N. L. P., & Putri, P. M. (2022). *The Effect of Information Systems and Internal Controls on the Quality of Financial Statements*. *Jurnal Akuntansi Multiparadigma, 13*(2), 150–163.

El-Khateeb, A. I., Almohtaseb, A. A., & Alfarajat, J. M. (2023). *The Role of Human Resource Competence, Internal Control System, and Financial Accountability in Enhancing Organizational Performance*. *WSEAS Transactions on Business and Economics, 20*(1), 891–901.

Firza Alpi, & Akbar, A. (2024). *The Effect of Internal Control and Information Technology on the Quality of Financial Reports in Government Agencies*. *Jurnal Akuntansi Publik Indonesia, 8*(2), 45–56.

Gujarati, D. N., & Porter, D. C. (2020). *Basic Econometrics* (6th ed.). New York: McGraw-Hill Education.

Hardianto, A. M., Sari, R. P., & Leviany, A. (2023). *Transformasi Dewan Direksi Perusahaan BUMN melalui Pendekatan Perilaku Akuntansi Guna Antisipasi Resesi Global*. *Jurnal Akuntansi dan Bisnis*, 25(4), 665–678.

Hertati, L. (2020). *The Influence of Human Resource Competence, Information Technology and Internal Control on Financial Reporting Quality*. *International Journal of Economics, Business and Accounting Research, 4*(2), 217–228.

Irvan, M., Pradana, S., & Sari, M. (2021). *Pengaruh Teknologi Informasi terhadap Efektivitas Sistem Pengendalian Internal dan Kualitas Laporan Keuangan Pemerintah Daerah*. *Jurnal Akuntansi dan Keuangan Daerah, 16*(2), 75–90.

Jamaluddin, J., & Muttaqim, H. (2025). *The Effects of HR Competence, Internal Controls, and Accrual Accounting on Financial Report Quality*. *Jurnal Ilmiah Manajemen Kesatuan, 13*(4), 2757–2768.

Julisa, R., Siregar, D., & Situmorang, N. (2024). *The Effect of Digitalization and Corporate Governance on Value Added in Indonesian SOEs*. *Jurnal Akuntansi dan Keuangan Indonesia, 21*(2), 144–159.

Kementerian BUMN. (2023). *Transformasi Digital dan SDM Unggul untuk BUMN Berdaya Saing Global*. Jakarta: Kementerian BUMN RI.

Kusumawati, A., & Rahardjo, S. (2019). *Internal Control Effectiveness and Firm Performance: Evidence from Indonesian SOEs*. *Asian Journal of Accounting Research, 4*(1), 112–123.

Magdalena, A. C., Rapina, R., & Mulianto, M. (2022). *How Does Internal Control and Competence of Human Resources Influence Financial Reporting? Jurnal Akuntansi, 14*(1), 13–22.

Mulyani, S., & Hidayat, R. (2021). *Enterprise Resource Planning Adoption and Value Creation in the Public Sector*. *Jurnal Sistem Informasi, 17*(2), 107–120.

Novitasari, Y., Sari, A. N., & Rahmawati, T. (2025). *Penyuluhan Peningkatan Pengembangan Manajemen SDM serta Kualitas Pelayanan untuk Meningkatkan Produktivitas Karyawan*. *Jurnal Pengabdian Kepada Masyarakat Akuntansi (JPKMA), 4*(2), 1676–1685.

Pratiwi, D., & Sudarso, A. (2023). *Pengaruh Pelatihan Digital terhadap Kinerja SDM di Era Transformasi Industri 4.0*. *Jurnal Ilmu Manajemen Terapan, 4*(2), 122–133.

Rahardyan, F., Putra, H., & Nuraini, A. (2022). *Internal Control Effectiveness on SOE Performance in Indonesia*. *Jurnal Akuntansi Publik, 9*(3), 203–217.

Rahayu, S., & Yuditiya, R. (2023). *Competency of Human Resources and Quality of Financial Reports in City Governments*. *Jurnal Akuntansi Pemerintah, 6*(1), 55–68.

Raharjo, B. (2023). *Value Added Intellectual Coefficient (VAIC™) and Financial Performance in Indonesian Public Enterprises*. *Asian Economic Journal, 37*(1), 77–91.

Santoso, T. D., & Wijaya, L. (2021). *Human Capital and Organizational Performance in Indonesian SOEs*. *Jurnal Manajemen Strategi, 8*(2), 121–135.

Stair, R., & Reynolds, G. (2018). *Principles of Information Systems* (13th ed.). Boston: Cengage Learning.

Weni, A., Pranata, F., & Safitri, E. (2023). *Intellectual Capital and Firm Performance in Indonesian Public Enterprises*. *Jurnal Keuangan dan Bisnis, 15*(2), 111–125.

Sutrisna, D. (2022). *Digital Transformation and Resource-Based View in SOEs*. *Jurnal Ekonomi dan Manajemen, 9*(4), 55–70.

Pulic, A. (2000). *VAIC™ – An Accounting Tool for IC Management*. *International Journal of Technology Management, 20*(5–8), 702–714.