



The Impact of Intellectual Capital (MVAIC) on Financial Leverage in The Asean Telecommunication Industry: The Mediating Role of Firm Profitability

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ABSTRACT

Intellectual Capital (IC) significantly enhances financial performance and influences capital structure. This study examines IC's impact on financial leverage using the Modified Value Added Intellectual Coefficient (MVAIC), mediated by firm profitability. IC components – Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Relational Capital Efficiency (RCE), and Capital Employed Efficiency (CEE) – are analyzed in 120 ASEAN telecommunication firms through panel data regression. Findings confirm IC positively affects profitability (ROA), supporting Resource-Based Theory, while profitability negatively influences financial leverage (DAR), aligning with Pecking Order Theory. Among IC components, only CEE significantly impacts ROA and DAR via profitability mediation. Firms with high capital efficiency achieve better profitability and lower external debt dependence, emphasizing IC management for financial stability.

INTRODUCTION

The rapid advancement of information and communication technology (ICT) has significantly transformed industries worldwide, including the ASEAN telecommunications sector. The increasing demand for high-speed internet and the expansion of digital services have encouraged companies to invest heavily in technological infrastructure and intellectual capital (IC). Despite these advancements, challenges persist in the form of financial constraints, regulatory disparities, and skill gaps in digital talent acquisition.

According to the ASEAN ICT Masterplan 2020 (ASEAN, 2019), the digital economy in ASEAN is projected to reach \$240 billion by 2025, necessitating increased investment in IC components such as human capital, structural capital, and relational capital. Leading firms such as Singtel, Telkom Indonesia, and Axiata have made significant strides in leveraging IC to improve operational efficiency and service delivery (Singtel Annual Report, 2021).

Guangchun et al., (2022) identified a paradox in IC investment and financial leverage. While firms with high IC investments tend to have lower debt levels due to increased risk, these investments also enhance profitability, thereby improving debt servicing capacity. Research by Matsoma (2022) indicates a significant negative relationship between liquidity and Return on Assets (ROA), suggesting that firms with higher leverage may experience increased profitability due to financial discipline. Similarly, Tasneem et al., (2022) found that company-specific factors such as profitability and Z-score influence debt adjustments toward an optimal leverage level in Indian telecommunications firms.

Given these insights, this study examines the relationship between IC, financial leverage, and firm profitability in the ASEAN telecommunications industry. It aims to determine whether IC positively impacts firm profitability and whether firm profitability mediates the relationship between IC and financial leverage.

THEORETICAL REVIEW

Resource-Based Theory (RBT)

Resource-Based Theory (RBT) states that a firm's competitive advantage is determined by its ability to manage and control valuable, rare, inimitable, and non-substitutable resources. Intellectual Capital (IC) is considered a strategic asset that contributes to firm performance and long-term competitive advantage (Belkaoui, 2003; Sigit Hermawan et al., 2020). Firms leveraging IC efficiently are more likely to sustain superior financial performance. Firms with higher IC can improve profitability through innovation, efficiency, and strategic decision-making.

H1: Intellectual Capital (MVAIC) has a positive and significant effect on Firm Profitability (ROA).

H2: Intellectual Capital (MVAIC) has a positive and significant effect on Financial Leverage (DAR).

H5: The components of Intellectual Capital, namely Human Capital Efficiency (HCE) have a positive and significant effect on Firm Profitability (ROA)

H6: The components of Intellectual Capital, namely Structural Capital Efficiency (SCE) have a positive and significant effect on Firm Profitability (ROA)

H7: The components of Intellectual Capital, namely Relational Capital Efficiency (RCE) have a positive and significant effect on Firm Profitability (ROA)

H8: The components of Intellectual Capital, namely Capital Employee Efficiency (CEE), have a positive and significant effect on Firm Profitability (ROA)

Pecking Order Theory (POT)

Pecking Order Theory suggests that firms prefer internal financing over external financing. Companies with high profitability and strong IC typically rely less on debt, as they generate sufficient funds internally (Myers, 1984; D'Amato, 2021). This theory supports the notion that more profitable firms will rely less on external debt.

H3 : Firm Profitability (ROA) has a negative and significant effect on Financial Leverage (DAR).

Stakeholder Theory

Stakeholder Theory emphasizes the importance of balancing the interests of all stakeholders in decision-making. Firms with robust IC enhance stakeholder relationships, fostering financial stability and profitability (Ulum, 2008). Effective stakeholder management contributes to financial sustainability and reduces excessive reliance on debt.

H9: The components of Intellectual Capital, namely Human Capital Efficiency (HCE) have a positive and significant effect on Financial Leverage (DAR).

H10: The components of Intellectual Capital, namely Structural Capital Efficiency (SCE) have a positive and significant effect on Financial Leverage (DAR).

H11: The components of Intellectual Capital, namely Relational Capital Efficiency (RCE) have a positive and significant effect on Financial Leverage (DAR).

H12: The components of Intellectual Capital, namely Capital Employee Efficiency (CEE) have a positive and significant effect on Financial Leverage (DAR).

A combination of Resource-Based Theory (RBT) and Pecking Order Theory (POT) explains that firms with strong Intellectual Capital can generate higher profitability, which in turn reduces their financial leverage. This relationship highlights the mediating role of Firm Profitability in the link between Intellectual Capital and Financial Leverage.

H4: Firm Profitability (ROA) significantly mediates the relationship between Intellectual Capital (MVAIC) and Financial Leverage (DAR).

H13: Firm Profitability (ROA) significantly mediates the relationship between the components of Intellectual Capital, namely Human Capital Efficiency (HCE) and Financial Leverage (DAR).

H14: Firm Profitability (ROA) significantly mediates the relationship between the components of Intellectual Capital, namely Structural Capital Efficiency (SCE) and Financial Leverage (DAR).

H15: Firm Profitability (ROA) significantly mediates the relationship between the components of Intellectual Capital, namely Relational Capital Efficiency (RCE) and Financial Leverage (DAR).

H16: Firm Profitability (ROA) significantly mediates the relationship between the components of Intellectual Capital, namely Capital Employee Efficiency (CEE) and Financial Leverage (DAR).

This study includes one independent variable, one dependent variable, one mediating variable, and one control variable. Based on the sixteen hypotheses, the conceptual framework is as follows, describing the relationship between each Variable:

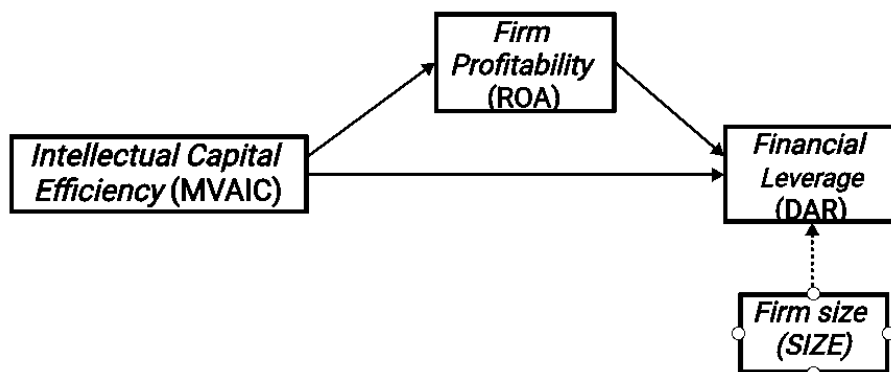


Figure 1. Conceptual Framework Intellectual Capital - Firm Profitability - Financial Leverage

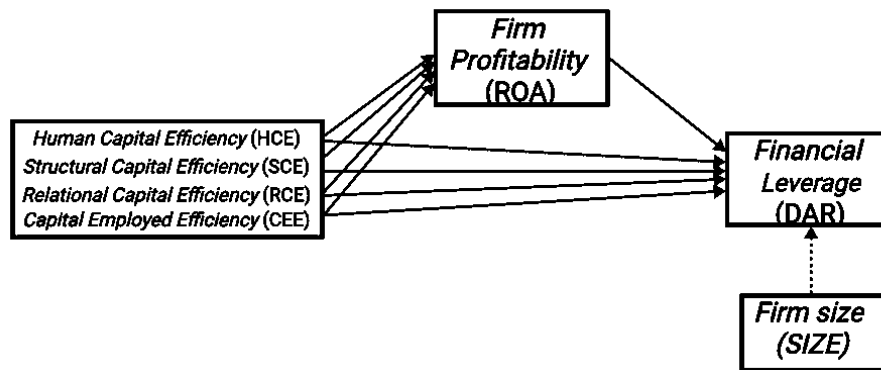


Figure 2. Conceptual Framework The Components of Intellectual Capital - Firm Profitability - Financial Leverage.

METHODOLOGY

This study employs a quantitative approach using secondary data from the annual reports of 75 ASEAN telecommunications firms between 2019 and 2023. A purposive sampling method was applied, narrowing the sample to 24 firms over five years (120 firm-year observations). Data were collected from official stock exchange websites and company reports.

Panel regression analysis was used to examine the impact of IC on financial leverage, with firm profitability as a mediating variable. The analysis was conducted using EViews-13 and Microsoft Excel to calculate MVAIC, firm

profitability (ROA), financial leverage (DAR), and the Sobel test for mediation analysis.

The methodology consists of:

1. Descriptive Analysis: Summarizing key statistics such as mean, standard deviation, and distribution of IC components (SCE, HCE, RCE, CEE), ROA, DAR, and firm size.
2. Panel Data Regression Analysis: Estimating multiple regression models to test the hypotheses, with model selection determined using the Chow, Hausman, and Lagrange Multiplier tests to choose between Common Effect, Fixed Effect, or Random Effect models.
3. Classical Assumption Tests: Including normality, multicollinearity, and heteroscedasticity tests to ensure robust regression estimates. If the selected model is the Random Effect Model (REM), which is estimated using the Generalized Least Squares (EGLS) method, other classical assumption tests – aside from the normality test – are not necessary, as EGLS automatically addresses these issues (Gujarati and Porter, 2009).
4. Hypothesis Testing (t-Test): Evaluating the significance of independent variables on dependent variables.
5. Mediation Analysis (Sobel Test): Assessing whether firm profitability significantly mediates the relationship between IC and financial leverage.

RESULTS

1. Descriptive Statistics

The study summarizes key financial indicators, including IC efficiency scores, profitability ratios, and leverage ratios across ASEAN telecommunications firms.

Overall, Malaysia and Indonesia stand out as the most effective in managing intellectual capital and its components, while Vietnam excels in profitability and debt management. However, each country faces its own unique challenges and advantages, reflecting different business strategies and the diverse conditions of the telecommunications industry across the ASEAN region.

2. Panel Data Regression Analysis

In this study, a model selection test was conducted for each equation. The results of the model selection for each equation are as follows:

Table 1. Model Selection Test Results for Equations I, II, III, IV, and V

Equation	Chow Test	Hausman Test	Selected Model
Equation 1	0,0000	0,1047	Random Effect
Equation 2	0,0000	0,2601	Random Effect
Equation 3	0,0000	0,6738	Random Effect
Equation 4	0,0000	0,0130	Fixed Effect

The table above shows that for Equations I to IV, the selected model is the Random Effect Model (REM), while for Equation V, the Fixed Effect Model (FEM) was chosen.

3. Classical Assumption Tests

In this research, the selected model for Equations 1–3 is the Random Effect Model (REM); therefore, classical assumption tests are not required, except for the normality test. Meanwhile, for Equation IV, the selected model is the Fixed Effect Model (FEM), which will be estimated using the EGLS method (FEM EGLS). Consequently, similar to REM, FEM estimated with EGLS also does not require other classical assumption tests besides the normality test (Gujarati and Porter, 2009).

Normality Test

In this study, the normality test of the residuals was conducted using the Jarque-Bera (J-B) test. The significance level used was $\alpha = 0.05$.

Table 2. Normality Test Results

Equation	Result
Equation 1	0,316400
Equation 2	0,469483
Equation 3	0,974678
Equation 4	0,263175

Table 2 shows that the Jarque-Bera probability values for all five equations are greater than 0.05. Therefore, based on the Jarque-Bera analysis, the data is normally distributed.

4. Hypothesis Testing

1. t-Test

The hypothesis testing for all variable and equation summary can find in table 4 below:

Table 3: Hypothesis Testing Summary

No	Hypothesis	Regression Coefficient	P-value	T Statistic	Conclusion
1.	Intellectual Capital (MVAIC) positively and significantly influences Firm Profitability (ROA)	0,003	0,003	2,957	H1. Accepted
2.	Intellectual Capital (MVAIC) positively and significantly influences Financial Leverage (DAR)	0.019	0.0002	3.802	H3. Accepted
3.	Firm Profitability (ROA) negatively and significantly influences	-0. 817	0.001	-4,093	H2. Accepted

	Financial Leverage (DAR)				
4.	Firm Profitability (ROA) significantly mediates the relationship between Intellectual Capital (MVAIC) and Financial Leverage (DAR)	-1.251	0.00001	-4.540	H4. Accepted
5.	The components of Intellectual Capital, namely Human Capital Efficiency (HCE) have a positive and significant effect on Firm Profitability (ROA)	-0,001	0,7977	-0,257	H5. Rejected
6.	The components of Intellectual Capital, namely Structural Capital Efficiency (SCE) have a positive and significant effect on Firm Profitability (ROA)	0,0432	0,3900	0,863	H6. Rejected
7.	The components of Intellectual Capital, namely Relational Capital Efficiency (RCE) have a positive and significant effect on Firm Profitability (ROA)	-0,087	0,0895	-1,713	H7. Rejected
8.	The components of Intellectual	0,022	0,0000	6,228	H8. Accepted

	Capital, namely Capital Employee Efficiency (CEE) have a positive and significant effect on Firm Profitability (ROA)				
9.	The components of Intellectual Capital, namely Human Capital Efficiency (HCE) have a positive and significant effect on Financial Leverage (DAR).	0.016	0.006	2.783	H9. Accepted
10.	The components of Intellectual Capital, namely Structural Capital Efficiency (SCE) have a positive and significant effect on Financial Leverage (DAR).	-0.066	0.483	-0.704	H10. Rejected
11.	The components of Intellectual Capital, namely Relational Capital Efficiency (RCE) have a positive and significant effect on Financial Leverage (DAR).	0.035	0.699	0.392	H11. Rejected
12.	The components of Intellectual Capital, namely Capital Employee Efficiency (CEE) have a positive and significant effect on	0.057	0.0003	3.742	H12. Accepted

	Financial Leverage (DAR).				
13.	Firm Profitability (ROA) significantly mediates the relationship between the components of Intellectual Capital, namely Human Capital Efficiency (HCE) and Financial Leverage (DAR)	0,016	0,0066	2,7824	H13. Accepted
14.	Firm Profitability (ROA) significantly mediates the relationship between the components of Intellectual Capital, namely Structural Capital Efficiency (SCE) and Financial Leverage (DAR)	-0.23032	0.2191	-1.2375	H14. Rejected
15.	Firm Profitability (ROA) significantly mediates the relationship between the components of Intellectual Capital, namely Relational Capital Efficiency (RCE) and Financial Leverage (DAR).	0,035	0,696	0,035	H15. Rejected
16.	Firm Profitability (ROA)	0,057	0,0003	3,742	H16. Accepted

	significantly mediates the relationship between the components of Intellectual Capital, namely Capital Employee Efficiency (CEE) and Financial Leverage (DAR).				
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Findings and Theoretical Implications

1. MVAIC positively influences ROA, indicating that better Intellectual Capital management in ASEAN’s telecommunications industry enhances profitability, supporting the Resource-Based Theory (RBT).
2. MVAIC positively influences DAR, suggesting Intellectual Capital contributes to shaping a firm's financial structure. This supports the Stakeholder Theory, which argues that strong IC boosts investor and creditor confidence.
3. ROA negatively influences DAR, meaning higher profitability reduces financial leverage, aligning with the Pecking Order Theory (POT), where more profitable firms prefer internal funding over debt.
4. ROA mediates the relationship between MVAIC and DAR, reinforcing the idea that higher profitability reduces debt reliance, aligning with Pecking Order Theory.
5. Among Intellectual Capital components, only CEE significantly influences ROA, while HCE and CEE significantly influence DAR. This suggests that capital employed efficiency plays a critical role in firm performance and financial leverage decisions.

2. Mediation Analysis (Sobel Test)

Table 4: Sobel Test for Mediation Analysis

Track	a	b	SEa	SEb	Sobel Test	Result
MVAICT → ROA → DAR	0,004308	- 1,250504	0,001457	0,275446	- 2,477508	Significant
SCE → ROA → DAR	0,043211	- 1,309522	0,050071	0,344592	- 0,841567	Not Significant
HCE → ROA → DAR	- 0,000537	- 1,309522	0,002089	0,344592	0,256475	Not Significant
RCE → ROA → DAR	- 0,086871	- 1,309522	0,050721	0,344592	1,561464	Not Significant
CEE → ROA → DAR	0,022056	- 1,309522	0,003542	0,344592	- 3,243849	Significant

Summary of Mediation Effects:

1. MVAIC → ROA → DAR is significant, confirming that ROA mediates the relationship between Intellectual Capital and Financial Leverage.
2. SCE → ROA → DAR is not significant, meaning Structural Capital Efficiency does not significantly influence leverage through profitability.
3. HCE → ROA → DAR is not significant, implying that while human capital is vital for innovation, it does not directly impact financial leverage via profitability.
4. RCE → ROA → DAR is not significant, indicating that strong external relationships do not necessarily lead to financial leverage changes.
5. CEE → ROA → DAR is significant, showing that Capital Employed Efficiency improves profitability, which in turn influences leverage decisions, supporting Stakeholder Theory.

These results emphasize the critical role of Intellectual Capital and its components in financial performance and capital structure decisions in ASEAN's telecommunications industry.

DISCUSSION

The findings highlight the significant impact of Intellectual Capital (IC) on firm profitability (ROA) and financial leverage (DAR). The positive correlation between MVAIC and ROA supports the Resource-Based Theory (RBT), emphasizing the competitive advantage of intangible assets. Additionally, the negative relationship between ROA and DAR aligns with the Pecking Order Theory (POT), suggesting that more profitable firms rely less on external debt. While Human Capital Efficiency (HCE) and Capital Employee Efficiency (CEE) significantly influence financial leverage, Structural Capital Efficiency (SCE) and Relational Capital Efficiency (RCE) do not exhibit a strong effect. The mediation analysis confirms that firm profitability partially mediates the relationship between IC components and financial leverage.

CONCLUSIONS AND RECOMMENDATIONS

The study concludes that Intellectual Capital, especially Capital Employed Efficiency, plays a crucial role in shaping financial performance and leverage decisions. Firms should focus on optimizing Intellectual Capital management to improve profitability and ensure financial stability. Policymakers and industry leaders should encourage investments in human capital and innovation to strengthen competitive advantages.

FURTHER STUDY

Future research could explore how industry-specific factors influence the relationship between Intellectual Capital and financial leverage across different sectors. Additionally, incorporating qualitative insights could provide a deeper understanding of how firms strategically manage Intellectual Capital.

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REFERENCES

- ASEAN. (2019). ASEAN ICT Masterplan 2020. ASEAN Secretariat
- D'Amato, A. (2021). The pecking order theory and financing decisions: Evidence from European firms. *Journal of Corporate Finance*, 67, 101876. <https://doi.org/10.xxxx/yyyy>
- Guangchun, Y., Zhang, X., & Li, H. (2022). Intellectual capital investment and financial leverage: A paradoxical relationship? *Journal of Business Research*, 139, 125-138. <https://doi.org/10.xxxx/yyyy>
- Gujarati, Damodar N. *Basic Econometrics*, 5th Edition, 2009, McGraw-Hill Education. ISBN: 978-0-07-337577-9
- Matsoma, T. (2022). Liquidity and firm profitability: The case of telecommunications firms. *Economic Research Journal*, 45(3), 332-350.
- Myers, S. C. (1984). The capital structure puzzle. *Journal of Finance*, 39(3), 575-592.
- Singtel. (2021). Annual report 2021. Singapore Telecommunications Ltd.
- Sigit Hermawan, I., Wahyudi, S., & Suhadak. (2020). Resource-based theory and intellectual capital: Implications for competitive advantage and firm performance. *Journal of Strategy and Management*, 13(4), 515-530.
- Tasneem, S., Gupta, R., & Kumar, V. (2022). Profitability and leverage adjustments in Indian telecommunications firms. *Financial Management Review*, 56(2), 210-228.
- Ulum, I. (2008). Intellectual capital and firm financial performance: An empirical study of stakeholder theory in practice. *Journal of Accounting and Finance*, 10(2), 55-68.