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The Effect of Intellectual Capital, Business Size, and NPL on Conventional Banking Profitability on the Indonesia Stock Exchange (IDX) 2020-2024 Periode

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Abstract

This study aims to analyze the effect of intellectual capital, firm size, and Non-Performing Loan (NPL) on the profitability of conventional banks listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. Profitability is measured using Return on Assets (ROA), intellectual capital is measured using the Value Added Intellectual Coefficient (VAIC) method, firm size is proxied by the natural logarithm of total assets, and NPL is measured by the ratio of non-performing loans. This study employs a quantitative approach using secondary data obtained from annual financial reports, with samples selected through purposive sampling, resulting in 8 banks as research objects. The data analysis method used is multiple linear regression with the assistance of SPSS. The results show that partially, intellectual capital has a positive and significant effect on profitability, while firm size has a positive but insignificant effect and Non-Performing Loan (NPL) has a negative but insignificant effect. Simultaneously, all independent variables have a significant effect on profitability. The coefficient of determination indicates that 62.9% of the variation in profitability can be explained by the model, while the remaining is influenced by other factors outside the model. This study highlights the importance of intellectual capital management in improving banking profitability.

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1. Introduction

The banking sector plays a strategic role in the economy by performing financial intermediation, particularly through mobilizing funds from surplus economic units and reallocating them to households and businesses in the form of loans and other productive financing. An efficient banking system can facilitate capital formation, support productive investment, stimulate business activities, and ultimately contribute to economic growth. Empirical evidence from Indonesia confirms that banking development and financial intermediation are closely associated with economic growth in both the short and long run, demonstrating the importance of maintaining a sound and resilient banking system (Aryati et al., 2023). More recent evidence also indicates that banking profitability and liquidity constitute important components through which banking performance may contribute to broader economic dynamics (Rahmatullah & Kartini, 2025).

Given its central role in financial intermediation, the ability of a bank to maintain sustainable financial performance is essential for preserving depositor confidence, supporting lending activities, and ensuring long-term institutional resilience. Profitability represents one of the most important indicators of banking performance because it reflects a bank's ability to efficiently utilize its resources and generate earnings from its assets and operational activities. Return on Assets (ROA) is frequently employed as a profitability indicator because it captures the efficiency with which bank management transforms available assets into earnings (Febriani et al., 2026; Maulana et al., 2026). Effective financial resource management is therefore particularly important in the banking industry, where operational efficiency and the appropriate utilization of capital may

determine the institution's capacity to remain competitive and financially sustainable (Huda & Alwi, 2023).

Bank profitability is influenced by a combination of tangible and intangible resources as well as the bank's capacity to manage financial risks. One increasingly important intangible resource is intellectual capital, which encompasses knowledge, employee competencies, organizational processes, relationships, technological capabilities, and other knowledge-based resources that enable an organization to create economic value. In knowledge-intensive industries such as banking, intellectual capital is particularly important because banking operations depend heavily on employee expertise, information systems, customer relationships, organizational routines, and managerial capabilities rather than exclusively on physical assets (Berhe, 2025). Intellectual capital is commonly operationalized through the Value Added Intellectual Coefficient (VAIC) framework, which evaluates how efficiently human capital, structural capital, and capital employed contribute to organizational value creation (Berhe, 2025).

Empirical evidence generally supports the relevance of intellectual capital to banking performance, although the magnitude of its effects may differ according to the components examined and the performance indicators employed. Evidence from Indonesian banks shows that the effective management of intellectual capital can enhance profitability by improving the utilization of both assets and equity (Hatane et al., 2024). Recent evidence from Indonesian commercial banks further demonstrates that intellectual capital contributes positively to financial sustainability and that profitability represents an important mechanism through which intellectual resources are converted into sustainable financial outcomes (Erri et al., 2026). These findings suggest that knowledge-based resources can provide banks with strategic advantages by improving operational capabilities, supporting innovation, and strengthening the efficiency of resource utilization. In addition to intellectual capital, firm size or bank size is frequently considered an important determinant of profitability. Bank size is generally represented by the natural logarithm of total assets and reflects the scale of financial resources controlled by a banking institution. Larger banks may benefit from economies of scale, broader customer networks, greater opportunities for income diversification, stronger technological infrastructure, and wider access to funding sources, which can improve profitability. Recent evidence from Indonesian banking companies listed on the Indonesia Stock Exchange indicates that firm size has a significant positive effect on profitability, suggesting that a larger asset base can support stronger financial performance (Febriani et al., 2026; Maulana et al., 2026). Supporting evidence from corporate financial-performance research also demonstrates that the relationship between firm size and financial performance remains an important empirical issue because the effect is not necessarily uniform across companies and industries (Sari et al., 2026).

Nevertheless, a larger asset base does not automatically produce greater profitability because organizational complexity, administrative costs, risk exposure, and inefficient resource allocation may offset economies-of-scale advantages. Evidence from Indonesian banks during the COVID-19 period indicates that bank size had a significant negative relationship with profitability, as larger banking institutions faced additional operational and reputational-management costs (Utari & Viverita, 2024). In contrast, other evidence reports a significant positive relationship between bank size and profitability among Indonesian listed banks, while several studies have found no statistically significant effect of bank size on profitability (Febriani et al., 2026; Supiyadi & Novita, 2023). These contradictory findings indicate that the effect of bank size on profitability remains context-dependent and warrants further examination.

Another important determinant of banking profitability is credit risk, which is commonly represented by the Non-Performing Loan (NPL) ratio. NPL represents the proportion of problematic loans relative to the total credit portfolio and therefore reflects the quality of a bank's earning assets. A high level of NPL can reduce interest income, increase impairment and loan-loss provisioning expenses, restrict the bank's capacity to extend new credit, and ultimately weaken profitability. Recent empirical evidence involving banking companies listed on the Indonesia Stock Exchange for the 2020–2024 period demonstrates that NPL has a significant

negative effect on profitability, confirming that deterioration in credit quality places considerable pressure on banking earnings (Febriani et al., 2026). Similar evidence shows that the NPL ratio negatively affects banking profitability and emphasizes the importance of effective credit-risk management in maintaining sustainable financial performance (Maulana et al., 2026).

However, empirical evidence regarding the effect of NPL on profitability has not been entirely consistent. Some studies find that higher NPL significantly reduces profitability, whereas other recent research on Indonesian conventional commercial banks reports that NPL does not independently have a statistically significant effect on ROA during particular observation periods (Rizky et al., 2025). Such differences may arise from variations in sample composition, observation periods, provisioning policies, capital adequacy, loan restructuring practices, macroeconomic conditions, and differences in banks' capacity to manage problematic credit. These inconsistencies strengthen the argument that credit risk should be analyzed simultaneously with other bank-specific characteristics rather than being evaluated in isolation.

From the resource-based perspective, intellectual capital represents a strategic intangible resource capable of generating competitive advantages when valuable knowledge, competencies, organizational systems, and relationships are effectively converted into economic value. Firm size, meanwhile, reflects the scale of tangible and financial resources available to support banking operations, whereas NPL represents the risk associated with the allocation of those resources through lending activities. Consequently, profitability can be viewed as the financial outcome of the interaction between knowledge-based resources, organizational scale, and credit-risk management. Recent evidence from Indonesian banks reinforces the importance of integrating intellectual resources, profitability, and risk-management mechanisms when evaluating the sustainability of banking institutions (Erri et al., 2026).

The 2020–2024 period provides a particularly relevant setting for examining these relationships because Indonesian banks operated through substantial economic and institutional adjustments following the COVID-19 disruption, accelerated digital transformation, changes in customer behavior, and continuing pressures to maintain asset quality and operating efficiency. These conditions potentially altered the manner in which intellectual resources, organizational scale, and credit risk influenced bank profitability. Studies using recent Indonesian banking data continue to report different effects of bank size and credit risk on profitability, indicating that the determinants of banking performance remain sensitive to institutional conditions and research periods (Febriani et al., 2026; Maulana et al., 2026; Utari & Viverita, 2024). Research on Indonesian banking companies also demonstrates that profitability continues to play an important role in explaining corporate financial outcomes, reinforcing its relevance as a central measure of banking performance (Febrianti & Widhiastuti, 2025).

Accordingly, the existing literature reveals a substantive research gap concerning the effects of intellectual capital, firm size, and Non-Performing Loans on banking profitability. Although recent studies generally suggest that intellectual capital contributes positively to banking performance, empirical findings concerning firm size and credit risk remain inconsistent across samples, periods, and analytical models (Berhe, 2025; Erri et al., 2026; Febriani et al., 2026; Utari & Viverita, 2024). Furthermore, relatively limited empirical research has simultaneously incorporated intellectual capital, firm size, and NPL within a single explanatory model focusing specifically on conventional banks listed on the Indonesia Stock Exchange during the 2020–2024 period. Therefore, this study aims to analyze the effects of intellectual capital, firm size, and Non-Performing Loans (NPL) on the profitability of conventional banking companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The study is expected to extend the literature on banking profitability by integrating knowledge-based resources, organizational characteristics, and credit risk within a unified empirical framework.

2. Literature Review

2.1 Theoretical Foundation: Resource-Based View

This study is grounded in the Resource-Based View (RBV), which explains that differences in firm performance and competitive advantage are largely determined

by the resources and capabilities controlled by the firm. From the RBV perspective, organizational resources become strategically important when they enable a company to create value, improve efficiency, respond to competitive pressures, and develop capabilities that are difficult for competitors to replicate. Contemporary studies continue to employ RBV to explain the relationship between knowledge-based resources and financial performance, particularly because intellectual resources may generate sustainable economic benefits when they are effectively managed and integrated into organizational activities (Suciati et al., 2024).

Within the banking industry, RBV is particularly relevant because banks rely heavily on intangible resources, including employee knowledge, managerial competence, information systems, organizational procedures, customer relationships, and technological capabilities. Unlike industries that depend predominantly on physical assets, banking services require the continuous utilization of information and knowledge to evaluate risks, develop financial products, manage customers, and maintain operational efficiency. Therefore, intellectual capital can be regarded as a strategic organizational resource that facilitates value creation and strengthens financial sustainability (Erri et al., 2026).

RBV also provides a conceptual foundation for linking intellectual capital, firm size, and credit risk with profitability. Intellectual capital represents knowledge-based resources, firm size reflects the scale of resources controlled by the bank, while Non-Performing Loans represent the effectiveness with which financial resources are allocated and managed. Accordingly, profitability can be interpreted as an outcome of a bank's ability to efficiently combine intangible resources, organizational scale, and risk-management capabilities to generate financial returns (Erri et al., 2026; Shiue, 2026).

2.2 Profitability

Profitability represents a firm's ability to generate earnings from the resources employed in its business activities and is widely regarded as an important indicator of financial performance. In banking research, profitability reflects the effectiveness of management in utilizing available financial resources to produce sustainable earnings. Strong profitability also provides banks with greater capacity to strengthen capital, expand lending activities, absorb unexpected losses, and support future business development (Munawar et al., 2026).

In this study, profitability is measured using Return on Assets (ROA), which represents the ability of a bank to generate earnings from its total assets. ROA is particularly appropriate for banking research because banks operate primarily by managing financial assets, including loans, securities, and other earning assets. A higher ROA indicates that management is more effective in converting the bank's asset base into earnings, whereas a lower ROA may indicate inefficiencies in asset utilization or increased financial and operational risks (Febriani et al., 2026; Munawar et al., 2026).

Profitability is also important from the perspective of investors and other stakeholders because it provides information about a firm's financial condition and its capacity to create economic value. In the Indonesian banking sector, empirical evidence demonstrates that profitability plays an important role in explaining corporate financial outcomes and may influence investors' assessment of firm value and future business prospects (Febrianti & Widhiastuti, 2025). Thus, profitability not only reflects current operational performance but also provides an indication of the bank's ability to maintain financial sustainability.

Bank profitability is influenced by various internal characteristics associated with resource efficiency, organizational capacity, and risk exposure. Recent studies on Indonesian banks indicate that profitability may be affected by intellectual capital, asset size, operational efficiency, liquidity, capital adequacy, and credit risk, although the direction and magnitude of these relationships vary across different samples and periods (Febriani et al., 2026; Maharanie et al., 2026). In accordance with the research model, this study focuses on intellectual capital, firm size, and Non-Performing Loans as potential determinants of bank profitability.

2.3 Intellectual Capital

Intellectual capital refers to intangible organizational resources associated with knowledge, competencies, information, experience, organizational systems, innovation, and relationships that contribute to value creation. These resources are particularly relevant in knowledge-intensive industries because organizational performance

increasingly depends on the ability to acquire, develop, integrate, and utilize knowledge rather than relying exclusively on tangible assets. Recent literature confirms that intellectual capital has become an important determinant of organizational and financial performance within the RBV framework (Suciati et al., 2024).

Intellectual capital generally comprises several interconnected dimensions, particularly human capital, structural capital, and relational capital. Human capital relates to employee knowledge, competence, skills, and experience, while structural capital refers to organizational systems, procedures, databases, technologies, and institutional knowledge that remain within the organization. Relational capital represents the value derived from relationships with customers and other stakeholders. The interaction among these dimensions enables organizations to improve innovation, service quality, operational efficiency, and competitive positioning (Erri et al., 2026).

In banking research, intellectual capital is frequently measured using the Value Added Intellectual Coefficient (VAIC) approach and its extended variants. VAIC evaluates the efficiency with which organizational resources contribute to value creation, particularly through human capital efficiency, structural capital efficiency, and capital employed efficiency. More recent extensions of VAIC also incorporate innovation and relational capital to provide a broader assessment of knowledge-based resources. Evidence from publicly listed Indonesian banks demonstrates that intellectual capital components may influence profitability and other dimensions of bank performance, although their effects may differ depending on the measurement specification employed (Shiue, 2026).

The strategic importance of intellectual capital is particularly evident in modern banking because digitalization, financial innovation, credit assessment, customer management, and risk control depend substantially on employee expertise and organizational knowledge. Empirical evidence from Indonesian banks indicates that effective intellectual capital management can contribute to profitability and long-term financial sustainability by enabling banks to transform intangible resources into measurable financial outcomes (Hatane et al., 2024; Erri et al., 2026). Therefore, banks that manage their intellectual resources efficiently are expected to achieve stronger operational and financial performance.

2.4 Firm Size

Firm size represents the scale of a company's economic resources and operational activities. It can be reflected by several indicators, including assets, sales, equity, or market capitalization; however, banking studies commonly measure firm size using the natural logarithm of total assets because assets constitute the principal resources employed in banking operations. This approach also reduces substantial differences in absolute asset values among banks and facilitates statistical comparison across institutions (Febriani et al., 2026).

A larger bank generally possesses a broader resource base, greater financing capacity, more extensive customer networks, and greater opportunities for business diversification. Large banks may also benefit from economies of scale because fixed technological, administrative, and infrastructure costs can be distributed across a larger volume of banking activities. Consequently, an increase in organizational scale may improve operational efficiency and enhance profitability when assets are managed productively (Maharanie et al., 2026).

Nevertheless, greater firm size does not necessarily guarantee superior financial performance. Increasing organizational scale may generate additional administrative complexity, agency costs, coordination problems, and operational inefficiencies, particularly when asset expansion is not accompanied by effective resource management. Evidence from Journal Social Society indicates that firm size does not necessarily have a statistically significant effect on financial performance measured using ROA, suggesting that the quantity of organizational resources alone may be insufficient to determine profitability (Sari et al., 2026).

The empirical relationship between firm size and banking profitability therefore remains inconclusive. Recent evidence from Indonesian conventional banks indicates that bank size can positively affect profitability, suggesting the presence of scale advantages in larger banking institutions (Febriani et al., 2026; Maharanie et al., 2026). In contrast, other recent studies have reported that firm size does not significantly influence banking financial performance, indicating that

resource-management efficiency may be more important than asset scale itself (Tampubolon et al., 2026). These contrasting findings provide an empirical justification for re-examining the effect of firm size on profitability.

2.5 Non-Performing Loans

Non-Performing Loans (NPL) represent credit risk arising when borrowers experience difficulties in fulfilling their loan repayment obligations. The NPL ratio is commonly used to assess the quality of a bank's loan portfolio and reflects the proportion of problematic loans relative to the credit extended by the bank. Because lending represents one of the principal income-generating activities of commercial banks, deterioration in loan quality can directly affect the bank's financial performance (Watiningsih, 2026).

A high NPL ratio indicates greater credit risk and can reduce profitability through several mechanisms. Problematic loans reduce the interest income that banks are expected to receive, increase impairment and loan-loss provisioning expenses, and restrict the amount of funds available for productive lending. Consequently, persistent deterioration in asset quality may reduce the efficiency with which a bank employs its assets and may eventually lower ROA (Febriani et al., 2026; Maharanie et al., 2026).

Effective credit-risk management is therefore critical to maintaining sustainable bank profitability. Banks are required to conduct appropriate borrower assessment, portfolio monitoring, loan classification, provisioning, and restructuring to minimize potential losses associated with problematic credit. Recent evidence from Indonesian state-owned banks shows that NPL has a significant negative influence on ROA, indicating that higher levels of problematic lending substantially reduce the ability of banks to generate returns from their assets (Watiningsih, 2026). Nevertheless, the empirical impact of NPL on profitability has not been entirely uniform. While several recent studies report a significant negative relationship between NPL and banking profitability, other research finds that NPL does not independently exert a statistically significant effect on bank performance (Rizky et al., 2025). These differences may result from variations in credit-risk management practices, provisioning policies, bank characteristics, research periods, and the ability of banks to compensate for credit losses through other sources of income.

2.6 Previous Studies and Hypothesis Development

Previous empirical studies have examined the relationship between intellectual capital and banking performance with varying results. Evidence from Indonesian banks demonstrates that intellectual capital can contribute positively to profitability because effective management of knowledge-based resources increases organizational capabilities and resource efficiency (Hatane et al., 2024). More recent evidence involving Indonesian commercial banks during 2017–2024 also shows that intellectual capital is positively associated with financial sustainability and that profitability provides a significant pathway through which intellectual capital contributes to sustainable financial outcomes (Erri et al., 2026).

However, more detailed analysis demonstrates that the relationship between intellectual capital and banking performance may depend on the measurement model and specific intellectual capital components. Research on 47 publicly listed Indonesian banks found that extended VAIC had a significant positive association with bank performance, while conventional VAIC produced different results across individual components and performance measures (Shiue, 2026). This evidence indicates that intellectual capital remains an important strategic resource but that its financial contribution depends on how knowledge-based capabilities are transformed into operational value.

Based on RBV, banks possessing stronger knowledge, human resources, organizational systems, and intellectual capabilities should be better positioned to generate value from their asset base. Effective intellectual capital management can strengthen decision-making, innovation, operational efficiency, customer relationships, and risk assessment, which ultimately support profitability. Therefore, the first hypothesis is formulated as follows:

H1: Intellectual capital has a positive effect on bank profitability.

Previous studies also report conflicting findings regarding the relationship between firm size and profitability. Evidence from Indonesian banks listed on the IDX during 2020–2024 indicates that firm size positively affects profitability, suggesting that larger

banking institutions may benefit from economies of scale and broader resource availability (Febriani et al., 2026). Similar evidence shows that bank size positively affects the financial performance of conventional banks, indicating that larger resource capacity can support stronger profitability when assets are efficiently managed (Maharanie et al., 2026).

In contrast, recent studies have found that firm size does not significantly affect financial performance. Evidence from Indonesian banking companies during 2022–2025 indicates that firm size has no statistically significant effect on financial performance measured using ROA, suggesting that asset expansion does not automatically increase profitability (Tampubolon et al., 2026). Supporting evidence from Journal Social Society similarly indicates that firm size may not directly determine financial performance, demonstrating the importance of managerial effectiveness and resource utilization rather than organizational scale alone (Sari et al., 2026). Based on these inconsistent findings, the second hypothesis is formulated as follows:

H2: Firm size has an effect on bank profitability.

The relationship between NPL and bank profitability also remains empirically important. Several recent studies consistently report a negative association between credit risk and banking profitability. Research examining banks listed on the IDX during 2020–2024 finds that NPL significantly reduces profitability, demonstrating that deterioration in credit quality increases financial burdens and reduces bank earnings (Febriani et al., 2026). Similarly, evidence from state-owned Indonesian banks during 2018–2024 indicates that NPL has a statistically significant negative effect on ROA (Watiningsih, 2026).

Nevertheless, other empirical findings demonstrate that NPL does not always have a statistically significant direct effect on profitability. Research on Indonesian commercial banks reports that NPL may become insignificant after other internal financial indicators are incorporated into the model, suggesting that the financial consequences of problematic credit may depend on operational efficiency, capital structure, income diversification, and other bank-specific factors (Rizky et al., 2025). Such inconsistencies reinforce the need for additional empirical investigation using recent observations from conventional banks.

Theoretically, an increase in NPL indicates deterioration in credit quality, which reduces expected interest income and increases loan-loss provisioning and credit-management costs. Consequently, banks with higher NPL ratios are expected to experience lower profitability because a larger portion of their productive assets fails to generate the expected financial returns. Therefore, the third hypothesis is formulated as follows:

H3: Non-Performing Loans have a negative effect on bank profitability.

Overall, previous literature reveals persistent inconsistencies concerning the effects of intellectual capital, firm size, and NPL on banking profitability. Intellectual capital is generally expected to enhance profitability, but the effects of individual intellectual capital components remain heterogeneous, while empirical findings concerning firm size and NPL differ across institutions and research periods (Erri et al., 2026; Rizky et al., 2025; Shiue, 2026). These differences indicate a continuing research gap regarding how intangible resources, organizational scale, and credit risk jointly determine the profitability of conventional banks.

Furthermore, empirical research simultaneously integrating intellectual capital, firm size, and NPL within a single model for Indonesian conventional banks remains relatively limited, particularly for the 2020–2024 observation period. This period is relevant because it encompasses the pandemic disruption and the subsequent adjustment of Indonesian banks toward accelerated digitalization, changing credit-risk conditions, and post-pandemic operational restructuring. Therefore, re-examining these variables within a recent sample of conventional banking companies listed on the Indonesia Stock Exchange is expected to provide updated evidence regarding the determinants of banking profitability.

3. Research Method

The research method describes the research design, scope or object of the study, data sources, data collection techniques, operational definitions of research variables, and data analysis techniques. This study employs a quantitative approach because the variables are measured numerically and analyzed statistically to examine the effects of intellectual capital, firm size, and Non-

Performing Loans (NPL) on banking profitability. Quantitative approaches using secondary financial data and regression analysis have been widely applied in recent studies examining banking profitability and corporate financial performance (Febriani et al., 2026; Sari et al., 2026).

3.1 Research Scope

This study employs a quantitative method to analyze the effects of intellectual capital, firm size, and NPL on profitability. The research focuses on conventional banking companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The study uses secondary data obtained from annual financial statements, annual reports, and other relevant corporate documents. The use of secondary financial data is appropriate for examining banking profitability because financial ratios and firm-specific characteristics can be objectively derived from published financial statements (Febriani et al., 2026; Watiningsih, 2026).

3.2 Population and Sample

The population of this study consists of all conventional banking companies listed on the Indonesia Stock Exchange during the 2020–2024 research period, comprising 42 conventional banks. Recent research on Indonesian banking companies has similarly used listed banks as the research population because their financial information is publicly available and comparable across observation periods (Febriani et al., 2026).

The sample was selected using the purposive sampling method. Purposive sampling is a non-probability sampling technique in which research units are deliberately selected based on predetermined criteria relevant to the objectives of the study (Zrineh, 2026).

The sample selection criteria were as follows:

Conventional banking companies consistently listed on the Indonesia Stock Exchange during the 2020–2024 period.

Conventional banks classified under Core Capital-Based Bank Grouping Categories 3 and 4 (Kelompok Bank berdasarkan Modal Inti, KBMI 3 and KBMI 4). These groups were selected because they represent relatively large banks with substantial assets and more complex operational activities, making intellectual capital, firm size, and NPL particularly relevant to profitability analysis.

Banks that were listed on the IDX and published complete annual financial statements during the 2020–2024 period.

Table 1. Sample Selection Criteria

Description	Number
Population of conventional banks	42 banks
Banks not meeting the KBMI 3 and KBMI 4 criteria	(34 banks)
Banks without complete financial statements	(0 banks)
Final sample	8 banks

Based on these criteria, eight conventional banks were selected as the research sample. Since the observation period covers five years from 2020 to 2024, the study produces a total of 40 bank-year observations.

3.3 Types and Sources of Data

This study employs a quantitative research approach using secondary data as the primary source of analysis. The data are numerical and obtained from publicly available external sources. Secondary financial data are commonly used in banking studies because variables such as profitability, credit risk, asset size, and intellectual capital can be measured directly from published financial reports (Shiue, 2026; Watiningsih, 2026).

The data sources include:

a. Annual reports and financial statements of conventional banks;
b. The official website of the Indonesia Stock Exchange (IDX);
c. The official websites of the respective banking companies and other reliable sources; and
d. The official website and publications of the Financial Services Authority of Indonesia.

The use of financial statements from publicly listed companies as secondary research data has also been applied in recent studies published in Journal Social Society and Income Journal of Economics Development (Febrianti & Widhiastuti, 2025; Sari et al., 2026).

3.4 Data Collection Technique

The data collection technique employed in this study is the documentation method. This method involves systematically collecting, identifying, recording, and examining relevant information contained in annual reports, financial statements, and other official documents.

To ensure the validity and accuracy of the research data, all financial information was obtained from official and verifiable sources, including the Indonesia Stock Exchange and

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the official electronic portals of the sampled banks. Documentation techniques based on published annual and financial reports have been widely applied in recent quantitative research using listed companies as research objects (Sari et al., 2026).

3.5 Operational Definition of Variables

The study consists of one dependent variable, namely profitability, and three independent variables, namely intellectual capital, firm size, and Non-Performing Loans.

Table 2. Operational Definition of Research Variables

Variable	Operational Definition	Indicator
Profitability (Y)	The ability of a bank to generate profit from its total assets.	ROA = Net Income / Total Assets × 100%
Intellectual Capital (X1)	The value added generated through the efficient utilization of a company's intellectual resources, measured using the Value-Added Intellectual Coefficient (VAIC).	VAIC = VACA + VAHU + STVA; VACA = VA / CE; VAHU = VA / HC; STVA = SC / VA
Firm Size (X2)	The size of a bank based on the total assets under its control.	SIZE = ln (Total Assets)
Non-Performing Loan (X3)	The ratio representing problematic loans relative to the total credit extended by the bank.	NPL = (Non-Performing Loans / Total Loans) × 100%

Profitability is measured using Return on Assets (ROA), which indicates the ability of a bank to generate earnings from the assets under its management. ROA continues to be widely employed as an indicator of profitability in contemporary banking research (Febriani et al., 2026; Watiningsih, 2026).

Intellectual capital is measured using the Value-Added Intellectual Coefficient (VAIC), which consists of Value-Added Capital Employed (VACA), Value Added Human Capital (VAHU), and Structural Capital Value Added (STVA). Contemporary research on Indonesian banking continues to employ conventional and extended VAIC approaches to evaluate the contribution of intellectual resources to bank performance (Shiue, 2026).

Firm size is measured using the natural logarithm of total assets. This measure is commonly employed in banking studies because total assets reflect the economic scale and resources controlled by the bank (Febriani et al., 2026).

NPL is measured as the proportion of problematic loans to total loans extended by the bank. The ratio represents the level of credit risk faced by banking institutions and is frequently examined as a determinant of bank profitability (Watiningsih, 2026).

3.6 Data Analysis Techniques

3.6.1 Descriptive Statistical Analysis

Descriptive statistical analysis is used to provide a systematic overview of the characteristics of the research data without making broader statistical generalizations. The analysis describes the minimum, maximum, mean, and standard deviation values of intellectual capital, firm size, NPL, and profitability. Descriptive statistical analysis is commonly conducted before regression analysis to provide an initial description of the distribution and characteristics of research variables (Sari et al., 2026).

3.6.2 Classical Assumption Tests

Classical assumption tests are conducted to ensure that the multiple linear regression model satisfies the statistical assumptions required for reliable estimation. The tests consist of normality, multicollinearity, and heteroskedasticity tests.

Normality Test. The normality test is used to determine whether the regression residuals are normally distributed. The residuals are considered normally distributed when the significance value is greater than 0.05. Conversely, a significance value below 0.05 indicates that the normality assumption is not satisfied.

Multicollinearity Test. Multicollinearity is examined using the Tolerance and Variance Inflation Factor (VIF) values. A regression model is considered free from serious multicollinearity when the Tolerance value is greater than 0.10 and the VIF value is less than 10.

Heteroskedasticity Test. Heteroskedasticity is examined by observing the distribution of residual points on a scatterplot. The model is considered free from heteroskedasticity when the points are randomly distributed above and below zero without forming a specific pattern. Conversely, systematic patterns such as narrowing, widening, or clustering may indicate heteroskedasticity.

Classical assumption testing prior to multiple regression analysis is also commonly applied in recent quantitative studies using financial statement data (Sari et al., 2026).

3.7 Multiple Linear Regression Analysis

Multiple linear regression analysis is employed to examine the effects of several independent variables simultaneously and partially on one dependent variable. Recent studies examining the determinants of banking profitability have similarly employed multiple linear regression analysis to evaluate the effects of bank-specific variables on profitability (Febriani et al., 2026; Watiningsih, 2026).

The multiple linear regression equation used in this study is formulated as follows:

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

where:

Y = Banking Profitability
α = Constant
β_1–β_3 = Regression Coefficients
X_1 = Intellectual Capital
X_2 = Firm Size
X_3 = Non-Performing Loan
e = Error Term

The regression model is used to determine the extent to which changes in intellectual capital, firm size, and NPL explain changes in the profitability of conventional banks during the 2020–2024 period.

3.8 Hypothesis Testing

3.8.1 F-Test

The F-test is used to determine whether intellectual capital, firm size, and NPL simultaneously have a significant effect on banking profitability. The regression model is considered statistically significant when the calculated F-value exceeds the critical F-value and the significance value is below 0.05.

If the significance value is less than 0.05, the alternative hypothesis is accepted, indicating that the independent variables simultaneously affect profitability. Conversely, when the significance value is greater than 0.05, the null hypothesis is not rejected.

3.8.2 t-Test

The t-test is employed to examine the partial effect of each independent variable on banking profitability. At a significance level of α = 0.05, an independent variable is considered to have a statistically significant effect when the p-value is less than 0.05.

Conversely, a p-value greater than 0.05 indicates that the independent variable does not have a statistically significant partial effect on profitability. Partial and simultaneous significance tests have been widely employed in recent banking profitability research using multiple linear regression models (Febriani et al., 2026; Watiningsih, 2026).

3.8.3 Coefficient of Determination

The coefficient of determination (R^2) is used to measure the proportion of variation in banking profitability that can be explained by intellectual capital, firm size, and NPL. The R^2 value ranges from 0 to 1. A value approaching 1 indicates that the independent variables explain a larger proportion of the variation in the dependent variable, whereas a value approaching 0 indicates lower explanatory power.

The coefficient of determination is commonly reported together with the F-test and t-test to evaluate the explanatory capability of regression models examining banking profitability (Febriani et al., 2026; Watiningsih, 2026).

4. Result and Discussion

4.1 Overview of the Research Object

The population of this study consists of conventional banking companies listed on the Indonesia Stock Exchange (IDX). The study uses secondary data obtained from the financial statements and annual reports of the selected banking companies. Based on the sampling criteria, eight conventional banks were selected and observed over the 2020–2024 period, resulting in 40 bank-year observations.

4.2 Descriptive Statistical Analysis

Descriptive statistical analysis was conducted to provide an overview of the characteristics of the research variables. The statistics examined include the minimum, maximum, mean, and standard deviation values.

Table 3. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Intellectual Capital (IC)	40	1.91	5.57	3.4110	1.02276
Firm Size (FS)	40	19.07	21.61	20.2045	0.93944
NPL	40	0.97	4.30	2.6348	0.74159
ROA	40	0.36	3.78	1.6597	0.91222
Valid N (listwise)	40				

The results show that intellectual capital ranges from 1.91 to 5.57, with a mean of 3.4110 and a standard deviation of 1.02276. Firm size ranges from 19.07 to 21.61, with an average value of 20.2045. NPL has a minimum value of 0.97 and a maximum value of 4.30,

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with a mean of 2.6348. Meanwhile, ROA ranges from 0.36 to 3.78, with an average of 1.6597.

4.3 Classical Assumption Tests

4.3.1 Normality Test

Table 4. One-Sample Kolmogorov–Smirnov Test

Indicator	Unstandardized Residual
N	40
Mean	0.0000000
Std. Deviation	0.55539190
Test Statistic	0.125
Asymp. Sig. (2-tailed)	0.115

The Kolmogorov–Smirnov test produced a test statistic of 0.125 with a significance value of 0.115. Since the significance value is greater than 0.05, the regression residuals are considered normally distributed. Therefore, the regression model satisfies the normality assumption.

4.3.2 Multicollinearity Test

Table 5. Multicollinearity Test

Variable	Tolerance	VIF
IC	0.436	2.296
FS	0.612	1.634
NPL	0.634	1.578

The results show that all independent variables have tolerance values greater than 0.10 and VIF values below 10. Therefore, no multicollinearity problem exists among the independent variables included in the regression model.

4.3.3 Heteroskedasticity Test

The heteroskedasticity test was conducted by examining the distribution of residuals in the scatterplot. The regression model can be considered free from heteroskedasticity when the residual points are randomly distributed above and below zero without forming a specific pattern.

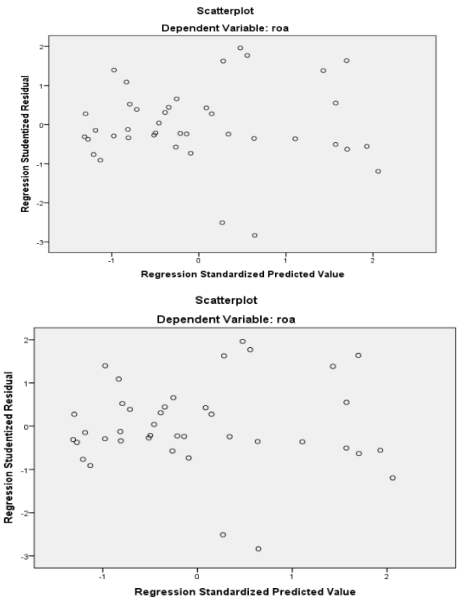

Figure 1. Heteroskedasticity Test

Based on the scatterplot, the residual points are randomly distributed above and below the zero line and do not form a specific pattern, such as a funnel, wave, or systematic clustering. Therefore, the regression model does not indicate heteroskedasticity and satisfies the homoskedasticity assumption.

4.4 Multiple Linear Regression Analysis

The results of the multiple linear regression analysis are presented in the following table.

Table 6. Multiple Linear Regression Results

Variable	B	Std. Error	Beta	t	Sig.
Constant	-3.752	2.360	–	-1.590	0.121
IC	0.448	0.137	0.503	3.270	0.002
FS	0.223	0.126	0.230	1.770	0.085
NPL	-0.236	0.157	-0.192	-1.504	0.141

Based on the regression results, the following equation is obtained:

$$ROA = -3.752 + 0.448\,IC + 0.223\,FS - 0.236\,NPL + e$$

The coefficient of intellectual capital is 0.448, indicating that an increase of one unit in intellectual capital is associated with an increase of 0.448 units in ROA, assuming that other variables remain constant. Firm size has a positive coefficient of 0.223, whereas NPL has a negative coefficient of −0.236.

4.5 Hypothesis Testing

4.5.1 Simultaneous F-Test

Table 7. F-Test Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	20.424	3	6.808	20.373	0.000
Residual	12.030	36	0.334		
Total	32.454	39			

The simultaneous test produces an F-value of 20.373 with a significance value of 0.000. Since the significance value is lower than 0.05, intellectual capital, firm size, and NPL simultaneously have a statistically significant effect on the profitability of conventional banks.

4.5.2 Partial t-Test

Table 8. t-Test Results

Variable	B	Std. Error	Beta	t	Sig.
Constant	-3.752	2.360	–	-1.590	0.121
IC	0.448	0.137	0.503	3.270	0.002
FS	0.223	0.126	0.230	1.770	0.085
NPL	-0.236	0.157	-0.192	-1.504	0.141

The partial test indicates that intellectual capital has a positive and statistically significant effect on ROA, with a coefficient of 0.448, a t-value of 3.270, and a significance value of 0.002 (< 0.05). Thus, the hypothesis stating that intellectual capital positively affects profitability is supported. Firm size has

a positive coefficient of 0.223, but its significance value of 0.085 is greater than 0.05. Therefore, firm size does not have a statistically significant effect on ROA. NPL has a negative coefficient of −0.236, with a t-value of −1.504 and a significance value of 0.141 (> 0.05). Thus, although the direction of the relationship is negative, NPL does not have a statistically significant effect on ROA. Overall, intellectual capital is the only independent variable that has a statistically significant partial effect on banking profitability, while firm size and NPL do not show statistically significant effects.

4.6 Discussion

4.6.1 The Effect of Intellectual Capital on the Profitability of Conventional Banks

The results show that Intellectual Capital (IC) has a positive regression coefficient of 0.448 with a significance value of 0.002 (< 0.05). This indicates that IC has a positive and statistically significant effect on Return on Assets (ROA). Therefore, the first hypothesis (H1) is accepted. This finding indicates that a higher level of intellectual capital is associated with higher banking profitability. Intellectual capital reflects a bank's ability to manage knowledge, human resources, organizational systems, and innovation to create added value, improve operational efficiency, and strengthen competitiveness. Recent evidence from conventional banks listed on the Indonesia Stock Exchange during 2020–2024 similarly shows that intellectual capital has a positive and significant effect on financial performance (Triyono et al., 2026).

The finding is also consistent with recent research employing the VAIC approach in Indonesian banking companies. Human capital efficiency and structural capital efficiency have been found to positively and significantly affect ROA, demonstrating that employee competencies and organizational systems play an important role in improving banking financial performance (Virnindhita & Sulistyowati, 2026). From the Resource-Based View (RBV) perspective, the result suggests that intangible resources can create competitive advantages when they are valuable, strategically managed, and difficult for competitors to replicate. Intellectual capital represents strategic resources in the form of knowledge, skills, organizational capabilities, and internal systems that can improve a firm's ability to generate financial returns. Recent evidence from Indonesia's financial sector also supports the RBV argument that effective management of intellectual capital contributes positively to financial performance (Shara et al., 2025).

Therefore, the positive effect of intellectual capital on ROA implies that conventional banks should not rely exclusively on financial and physical resources. Investment in human capital, organizational knowledge, information systems, innovation, and other knowledge-based capabilities is also important for strengthening profitability and sustainable competitiveness. The strategic importance of profitability in banking companies has also been emphasized in research examining financial decisions and corporate value among banks listed on the Indonesia Stock Exchange (Febrianti & Widhiastuti, 2025).

4.6.2 The Effect of Firm Size on ROA

The regression results show that Firm Size has a positive coefficient of 0.223 with a significance value of 0.085 (> 0.05). This indicates that Firm Size does not have a statistically significant effect on ROA. Therefore, the second hypothesis (H2) is rejected.

This finding indicates that the size of a bank does not directly determine its profitability as measured by ROA. Theoretically, banks with larger assets are expected to have greater capacity to mobilize funds, expand their operations, develop broader customer networks, and generate higher income. However, a larger asset base does not necessarily result in higher profitability because profitability depends on how efficiently those assets are managed and utilized.

This result is consistent with recent evidence from Indonesian banking companies listed on the IDX during the 2020–2024 period, which indicates that firm size, as an independent variable, does not have a significant effect on ROA (Fathihani et al., 2025). Similar evidence from banking companies listed on the IDX during 2019–2022 also shows that firm size does not have a significant partial effect on financial performance measured by ROA (Bellen et al., 2025).

The finding is also supported by recent evidence published in Journal Social Society, which reports that firm size does not significantly affect financial performance measured using ROA. Although the study was

conducted outside the banking sector, the finding reinforces the argument that a larger asset base does not automatically translate into superior financial performance (Sari et al., 2026).

From the Resource-Based View perspective, this finding suggests that competitive advantage and financial performance are not determined solely by the quantity of tangible resources owned by a firm. Instead, organizational performance depends on how effectively available resources are combined, managed, and transformed into productive capabilities. Thus, the possession of substantial assets alone may not be sufficient to generate higher profitability when those resources are not efficiently utilized.

Accordingly, a large bank that cannot manage its assets efficiently may not necessarily achieve higher profitability. Conversely, a relatively smaller bank with competent human resources, effective management systems, innovative technology, and efficient operations may achieve better financial performance. This reinforces the RBV perspective that organizational capabilities and effective resource utilization are more important than resource scale alone in generating competitive advantage.

Therefore, the insignificant effect of Firm Size found in this study indicates that bank size is not the primary determinant of profitability. Instead, the quality of resource management, operational efficiency, and internal organizational capabilities may play more substantial roles in determining ROA.

4.6.3 The Effect of Non-Performing Loans (NPL) on ROA

The results show that NPL has a negative regression coefficient of −0.236 with a significance value of 0.141 (> 0.05). This indicates that NPL does not have a statistically significant effect on ROA. Therefore, the third hypothesis (H3) is rejected. The negative coefficient indicates that an increase in NPL tends to be associated with a reduction in profitability. Theoretically, higher NPL levels can reduce interest income, increase loan-loss provisions, and generate additional credit-management costs. Nevertheless, the statistical results indicate that variations in NPL during the observation period were insufficient to produce a significant direct effect on ROA.

This result is consistent with empirical evidence from Indonesian commercial banks showing that NPL has a negative but insignificant effect on ROA. This suggests that an increase in problematic loans does not necessarily produce an immediate statistically significant reduction in banking profitability when banks are able to manage credit losses and maintain other sources of financial performance (Setiawan et al., 2024). Similar findings from Indonesian banking companies show that NPL negatively affects ROA but that the relationship is statistically insignificant (Hidayat et al., 2025).

More recent evidence from conventional banks listed on the Indonesia Stock Exchange during 2020–2024 also demonstrates that credit risk does not significantly affect financial performance, supporting the results obtained in this study (Triyono et al., 2026). However, this finding differs from evidence from Indonesian state-owned banks, where NPL was found to have a significant negative effect on ROA, indicating that the impact of credit risk may vary depending on bank characteristics, observation periods, and risk-management capacity (Watiningsih, 2026).

From the Resource-Based View perspective, the insignificant effect of NPL may be explained by differences in banks' internal capabilities to manage credit risk. Banks with effective risk-management systems, prudent lending strategies, competent human resources, adequate provisioning, and strong monitoring mechanisms may be better able to mitigate the adverse effects of problematic loans on profitability. Therefore, similar levels of credit risk may produce different financial consequences depending on the quality of each bank's organizational resources and capabilities.

Furthermore, the descriptive results of this study show that NPL ranges from 0.97% to 4.30%, with an average of 2.63%. Thus, the NPL levels observed in the sample were relatively contained throughout the research period. This condition may partially explain why variations in NPL did not generate a statistically significant effect on profitability. Accordingly, the insignificant effect of NPL on profitability indicates that profitability is not determined solely by the level of problematic loans. The ability of banks to manage credit risk, maintain operational efficiency, optimize intellectual resources, and generate income from various banking activities may mitigate the financial consequences of NPL. This finding reinforces the RBV perspective that organizational resources and internal

capabilities play an important role in determining financial performance.

5. Conclusion

This study examined the effects of Intellectual Capital, Firm Size, and Non-Performing Loans (NPL) on the profitability of conventional banks. The findings show that Intellectual Capital has a positive and significant effect on profitability, indicating that the effective utilization of knowledge, employee competencies, organizational capabilities, and innovation can enhance banking financial performance. This finding supports the Resource-Based View (RBV), which emphasizes the strategic role of valuable and well-managed internal resources in creating competitive advantage. In contrast, Firm Size does not have a significant effect on profitability, suggesting that a larger asset base does not automatically generate higher returns. The result implies that the efficiency and effectiveness of resource utilization are more important than organizational scale alone. NPL also does not significantly affect profitability. This may be related to the relatively controlled NPL levels of the sampled banks, which remained below 5%, as well as the banks' ability to manage credit risk and maintain alternative income sources.

The findings have practical implications for bank management, particularly in strengthening intellectual capital through human resource development, organizational knowledge, innovation, and effective risk-management systems. However, this study is limited by its focus on eight conventional banks and a five-year observation period from 2020 to 2024, as well as by the inclusion of only three explanatory variables. Future research is therefore recommended to expand the sample, extend the observation period, and incorporate additional determinants of banking performance, such as digital banking services, operational efficiency, capital adequacy, liquidity, corporate governance, and other relevant financial or social variables. These extensions are expected to provide a more comprehensive understanding of the factors influencing banking profitability.

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