E-ISSN : 2549-3280 P-ISSN : 2549-5933
INTEGRATED JOURNAL OF BUSINESS AND ECONOMICS
Email: ijbe.feubb@gmail.com
http://ojs.ijbe-research.com/index.php/IJBE/index

Determinants of Technology Adoption and Financial Ratios on Banking Performance in Indonesia Through Net Interest Margin as Mediation

Endah Suci Damayanti[a*], Adler Haymans Manurung[a], Yayan Hendayana[a], Wastam Wahyu Hidayat[a]
[a]*Universitas Bhayangkara Jakarta Raya*
endahsuci2505@gmail.com

Abstract
The purpose of this study is to explore the relationship between technology adoption, financial ratios that can affect banking performance in Indonesia through the mediation of Net Interest Margin. The research approach is Explanatory Research with purposive sampling technique obtained 35 go pubic banks selected with 9 years of financial statement data from 2015 to 2023 so as to obtain 315 observations. The research findings show that BOPO strongly influences the NIM variable, giving rise to direct and indirect effects. All direct effects are the largest affecting ROA. Company management must manage Technology Adoption, NPL, LDR, Quality of Earning Assets (QEA) and BOPO to influence Banking Performance. Company management must manage these ratios to provide high ROA so that investors are interested in buying banking stocks. The efficiency of the company represented by BOPO needs to be managed so that NIM increases and can be limited to the maximum.

Article Info
- ***Received*** : 14th August 2025
- ***Revised*** : 30th September 2025
- ***Published*** : 15th November 2025
- ***Pages*** : 520-540
- ***DOI*** : *http://dx.doi.org/10.33019/ijbe.v9i4.1334*
- ***JEL*** : G21, O14, L25
- ***Keywords*** : *Banking Performance, Technology Adoption, NIM, NPL, LDR, BOPO, Asset Quality*

1. Introduction

Banks function as financial institutions that carry out activities to collect funds, channel them back to the community in order to improve people's lives (Sarmigi & Putra, 2022) and (Prananda et al., 2022) . Banks must be able to maintain good financial performance, especially the level of profitability (Sagala et al., 2019). Profitability used is measured by Return on Asset (ROA). The greater the ROA shows the better the bank's financial performance, because the greater the rate of *return* (Nuryanto et al., 2020) . Payment of principal and interest on loans can directly reduce bank performance and cause banks to be inefficient (Febriani & Yuniarti, 2022) and (Guicheldy & Sukartaatmadja, 2021).

The next factor is the *Loan to Deposit Ratio* (LDR), which is a financial ratio of banking companies related to liquidity aspects to measure the ratio between a bank's ability to extend credit to the public (Haq & Harto, 2019) and is based on the amount of credit extended to the public (Kasmir, 2019) . *Loan to Deposit Ratio* (LDR) must be maintained at a level that is not too large to provide credit if it does not have solid financial support and will affect the costs that must be borne by the bank (Fadli, 2019).

Return On Asset (ROA) is a ratio that describes the bank's ability to generate profits from total assets (Widhiati, 2021). The effect of *e-banking* technology adoption has a complex relationship with *market share*, customer behaviour and bank financial performance. The use of *e-banking* technology (such as *mobile* banking applications, *internet banking*, ATMs, etc.) can improve operational efficiency and employee productivity (Baker et al., 2023). The use of automation software can reduce errors and increase effectiveness in decision making (Dadoukis et al., 2021) has a positive impact on financial performance (Fraihat et al., 2023).

The last factor is Operating Expenses to Operating Income (BOPO). One of the ratios commonly used to measure the level of bank efficiency is the ratio of operating costs to operating income (Rahmani, 2022) and (Syafrizal et al., 2023 . Some previous studies still have different research results, such as the results of research Brastama and Yadnya (2020) mention CAR has a positive effect on ROA, the results of research from Liyana and Indrayani (2020) mention that CAR has an effect on ROA, but the results of research Ikhsan et al. (2022) states that CAR has a positive and insignificant effect on ROA. The results of research from Mulyaningsih and Hidajat (2022) state that KAP has an effect on ROA and KAP has a positive and insignificant effect on CAR.

The results of research from Liyana & Indrayani (2020) states that NIM has an effect on ROA. Simbolon and Simanjuntak (2020) states that NPL and CAR have an effect on ROA. Sukmadewi (2020) states that CAR, NPL and NIM have an effect on ROA. Arisma (2022) states that NPL and LDR have an effect on ROA. Liyana and Indrayani (2020) mention that CAR mediates NPL on ROA, but CAR does not mediate NIM and LDR on ROA. Widhiati, (2021) also states that KAP has an effect on ROA. Findings Different research results from Brastama and Yadnya (2020) and Ikhsan et al. (2022) states that NPL has a negative effect on ROA and Liyana and Indrayani (2020) states that NPL has no effect on ROA, Hartini et al. (2022) states that CAR has no effect on ROA, Liyana and Indrayani (2020) states that

LDR has no effect on ROA and CAR and Lisa and Arinta (2023) states that KAP has no effect on ROA.

This study has novelty, namely the adoption of technology that is included as an independent variable has a different measurement from previous studies such as Simorangkir (2025). Second, the quality of earning assets is very limited as an independent variable, *Net Interest Margin* as a mediating variable. The existence of mediating variables makes this study contribute in seeing the direct and indirect effects on banking performance. This study explores the relationship between technology adoption, financial ratios, *Net Interest Margin* and is expected to provide a deeper understanding of the internal and external dynamics that affect banking performance in Indonesia as well as enrich the literature related to the role of technology in the financial sector and provide a theoretical basis for future studies related to banking performance.

2. Literature Review

Financial Performance

Good financial performance stability is an attraction for investors and creditors (Ariyani and Putri,2023) and reflects the success of management in achieving strategic goals (Metyopandi et al., 2023) and Horo *et al*. (2023). Financial performance measurement is the process of assessing the effectiveness of the organisation's operations that have been determined (Dawu and Manane,2020) and (Cashmere (2019) . This study only uses one type of ratio, namely the profitability ratio with *Return On Asset* (ROA). Profitability ratio is the bank's ability to generate or earn profits effectively and efficiently (Niu & Wokas, 2021) . The greater the ROA shows the better *financial performance of* the bank, because the greater the rate of *return* (Rohmandika et al., 2023).

Profitability Theory

The assessment of profitability is very crucial because it serves as the main indicator in measuring the company's financial performance. To measure profitability, several financial ratios are used, including the net profit margin ratio, *Return On Assets* (ROA) and *Return On Equity* (ROE) ((Pervan & Mlikota, 2013) and can measure the effectiveness of using assets and capital in generating income (Sasmiharti, 2024). Factors that affect profitability include revenue generated, operating costs, cost structure, and pricing policies applied by companies tend to have higher profit margins (Darkwah, 2019).

Technology Adoption

Technology adoption refers to a process in which individuals get to know, accept, and finally apply an innovation in decision making, either to accept or reject it (Rohmah et al., 2022) and explains behaviour in the use of technology (Ispriandina & Sutisna, 2019) to support user or consumer activities (Hidayat et al., 2020) . The use of *e-banking* technology such as *mobile* banking applications, *internet banking*, ATMs and other has a significant impact on customer behaviour. (Salman, 2023) and innovation attracts customers from competing banks that focus less on technology (Sabila et al., 2023) . Technology adoption has a significant influence on business financial performance and increases operational efficiency and

employee productivity (Baker et al., 2023) and reduces errors, as well as increases the effectiveness of decision making (Dadoukis et al., 2021) and positively affects financial performance (Fraihat et al., 2023) . The adoption of *e-banking* technology began using electronic banking services for customer financial activities (OJK, 2015; Sumiyati et al., 2023: Mulianita & Triandi, 2019)) and reflects the strongest adoption rate (Mulianita & Triandi, 2019; Purwanti, 2021; Safitri et al., 2021) .

Non Performing Loan

Non Performing Loan (NPL) is a rate of return on credit that shows the level of bad credit at the bank. NPL is calculated by comparing Non-Current Financing to Total Financing (Nurhasanah & Maryono, 2021) . According to Kasmir (2019) , one of the risks that arise due to the increasing complexity of banking activities is the increase in NPLs which reflect the inability of banks or the unwillingness of borrowers to fulfil their financial commitments, which can cause major financial impacts for banks (Khan et al., 2020); (Ozili, 2019a) and(Mohmad Napi et al., 2024; Qi, 2024)(Mohmad Napi et al., 2024; Qi, 2024)(Mohmad Napi et al., 2024; Qi, 2024)(Mohmad Napi et al., 2024; Qi, 2024) . Therefore, continuous monitoring and management of NPLs is critical to maintain the stability and profitability of financial institutions in an evolving economic landscape (Kusuma et al., 2023; Singh et al., 2021) .

Net Interest Margin

A higher NIM ratio reflects an increase in interest income on productive assets managed by the bank, so the risk of the bank experiencing problems tends to be smaller (Purwanti, 2021) .NIM is used to assess the profitability and efficiency of banks in managing their financial assets (Angori et al., 2019). This difference is then expressed as a percentage of total productive assets (Endri et al., 2020). This efficiency is crucial to maintain profitability amidst intense competition in the banking industry, where margins tend to be thin (Homaidi et al., 2020). Banks with higher NIM tend to have better resilience to economic fluctuations Nugroho and Muharam (2023), (Hanzlík & Teplý, 2022) as well as maximising income from core activities (Jayasena et al., 2023) in order to generate net interest income (Murdiyanto, 2020) .

Loan to Deposit Ratio

Loan to Deposit Ratio (LDR) is a financial ratio that measures the liquidity aspect in the banking industry (Haq & Harto, 2019) . Therefore, maintaining a balanced LDR is a top priority in bank liquidity management. According to Fadli (2019), the ideal LDR level should be achieved with prudence. If banks are too aggressive in providing credit without solid funding support, liquidity risk may increase. Conversely, if the LDR is too low, it will become a cost burden for the bank. LDR is the ratio between the amount of credit provided and the amount of funding sources derived from public funds such as demand deposits, savings and time deposits (Rerung, 2022) .

Productive Asset Quality (KAP)

The Earning Asset Quality (KAP) ratio is a key indicator of asset health that reflects how effectively banks manage their earning assets while mitigating the risk of customer default

(Lisa & Arinta, 2023). A lower KAP ratio signals better financial performance because it indicates that fewer assets are classified as problematic (APYD), allowing the bank to maximize total earning assets and thereby increase revenue and profitability. Effective management of this ratio not only strengthens a bank's balance sheet through reduced provisioning needs but also enhances investor confidence, since asset quality is closely tied to profitability indicators such as Return on Assets (ROA), Return on Equity (ROE), and ultimately market valuation through Price-to-Book Value (PBV). Moreover, maintaining a healthy KAP ratio demonstrates prudent risk management and compliance with regulatory expectations, which is crucial for systemic stability in the banking sector. In practice, banks can improve their KAP ratio by strengthening credit assessment, monitoring loan performance, and leveraging technological innovations such as big data and AI to detect early warning signals of default. As global and domestic economic fluctuations continue to affect customer repayment capacity, proactive management of earning assets becomes essential for resilience. Thus, the KAP ratio is not merely a technical measure but a strategic indicator that influences operational decisions, investor perceptions, and long-term sustainability of banking performance.

Operating Expenses to Operating Income (BOPO)

Increased competition requires banks to manage their business efficiently. Efficiency is an important factor to maintain business. Polii et al. (2020)) revealed that efficiency is the relationship between inputs and outputs produced with the resources used to carry out operational activities. Banks will be able to operate efficiently if the management of input and output operations is carried out properly (Daulay et al., 2022). According to Rahmani (2022) , BOPO is used to measure the level of efficiency and ability of banks in supporting operational activities (Luayyi et al. ;2023) (Astuti, 2022) and (Rufaidah et al., 2021) .

Hypothesis Development

Technology adoption in financial institutions is becoming increasingly important to improve operational efficiency and ultimately impact financial performance metrics such as *Net Interest Margin* (Jayasena et al., 2023). According to the Technology Acceptance Model (TAM), adoption occurs when users perceive new technologies as useful and easy to use, which in the banking context translates into systems that simplify operations, enhance decision-making, and support strategic goals. Extending this perspective, the Diffusion of Innovations (DOI) theory highlights that financial institutions adopting innovations such as big data analytics, automation, and digital banking gain competitive advantages by reducing operational costs and credit risk, which are critical components in determining NIM (Hariyanti et al., 2022). Moreover, with technology enabling more accurate credit assessments, real-time risk monitoring, and efficient fund management, banks can set competitive lending rates without compromising profitability. Thus, integrating technology adoption theory helps explain why some financial institutions achieve stronger financial performance: successful adoption not only reflects managerial readiness and cultural openness to innovation but also creates measurable impacts on profitability, market positioning, and long-term sustainability.

H1 : Technology Adoption has a positive effect on NIM

Non-performing loans (NPLs) are an important indicator of the credit risk faced by banks, representing the percentage of loans in the portfolio that are delinquent or in default (Asiama & Amoah, 2019). When NPL rates are high, banks are required to set aside more reserves in anticipation of losses, which in turn can reduce net interest income derived from interest (Lestari & Setianegara, 2020). This scenario can put pressure on *Net Interest Margin* (NIM) as banks cannot maximise interest income from their loan portfolio due to the presence of non-performing loans that do not generate interest (Asiama & Amoah, 2019) and (Pinasti & Mustikawati, 2018) .

H2 : NPL has a negative effect on NIM

Loan to Deposit Ratio (LDR) is a key metric to evaluate the efficiency of banks in utilising funds from customers to generate interest income through lending activities (Hariyanti et al., 2022). A high LDR may indicate that the bank is more aggressive in lending, thus potentially increasing interest income and *Net Interest Margin* (Hariyanti et al., 2022) . However, this approach may lead to higher risk if loans are not managed effectively, which may negatively impact NIM (Hariyanti et al., 2022). In addition, a high LDR may indicate that banks are maximising the use of funds for financing, which could potentially increase profitability through a wider spread between lending rates and funding costs (Pinasti & Mustikawati, 2018) and (Lestari & Setianegara, 2020).

H3 : LDR has a positive effect on NIM

High-quality productive assets, such as loans that have low credit risk, tend to generate stable and reliable interest income, thus potentially increasing NIM (Saputra & Angriani, 2023). Conversely, the deteriorating quality of earning assets often requires more intensive risk management interventions, which increases the operational burden for banks (Susilawati & Nurulrahmatiah, 2021) and (Ishak et al., 2022) . This relationship can be explained through the Earning Asset Quality (EAQ) theory, which emphasizes that the soundness of a bank's asset portfolio is a primary determinant of its profitability and long-term stability. According to this theory, banks with a higher proportion of classified earning assets (APYD) face greater credit risk, higher provisioning costs, and lower returns, while banks maintaining strong asset quality are better positioned to optimize resource allocation, reduce risk exposure, and achieve sustainable earnings. In practice, maintaining healthy earning asset quality requires effective credit appraisal systems, continuous monitoring, and portfolio diversification to prevent concentration risks. Thus, the EAQ theory underscores that profitability is not only a result of revenue generation but also of disciplined risk management and prudent asset allocation, making asset quality a central driver of both operational efficiency and financial performance.

H4 : Earning Asset Quality negatively affects NIM

Operating expenses operating income is an important factor in influencing the financial performance of banks, which impacts metrics such as net interest margin (NIM) (Hanzlík & Teplý, 2022) . However, if these costs increase without being offset by a proportional increase in interest income, it has the potential to reduce NIM by reducing net income from operating activities (Pinasti & Mustikawati, 2018) The level of operating expenses operating income can be an indicator of the strategic intentions of financial institutions, such as the expansion

of market share or the introduction of new products that require extensive promotional efforts (Pratiwi & Wiagustini, 2015).

H5 : BOPO has a negative effect on NIM

By utilising these technologies, companies can not only reduce marketing costs but also increase campaign effectiveness and achieve economies of scale (Khin & Ho, 2019) . This reduction in operating costs directly contributes to an increase in net income, subsequently improving the *Return On Assets* (ROA) metric, which measures a company's efficiency in generating profits from its assets (Khin & Ho, 2019). Advanced marketing technologies can enhance their ability to attract and retain customers and drive sales growth (Davenport et al., 2020). Increased revenue can augment productivity and ultimately increase their ROA (Davenport et al., 2020). Therefore, the specific hypothesis that can be tested is whether the implementation of marketing technology significantly improves return on assets by increasing operational efficiency and optimising the use of assets within the firm.

H6 : Technology Adoption has a positive effect on Banking Performance

The ratio of total loans to total assets (loan ratio) is considered an indicator of liquidity. Lestari et al., (2017) found a positive relationship between liquidity and profitability causing a negative effect on profitability (Pratama et al., 2024) . However, high loan volume growth can also lead to a decrease in credit quality, which will reduce profitability. (Rohmandika et al., 2023) . Hastuti and Ghozali (2019) examining banks in Portugal, Spain, France and Germany revealed a positive relationship between loan ratios and profitability. (Fanny et al., 2020) found that higher loan ratios negatively affect profitability and financial losses occur which have an impact on reducing bank performance (Rohmandika et al., 2023).

H7 : NPL has a negative effect on Banking Performance

Hamenda and Manengkey (2022) state that profitability growth is in line with credit growth, the more credit provided will generate greater interest income so that profitability will increase. High liquid assets will have implications in reducing profitability (Pradnyaswari & Dana, 2022). The level of internal liquidity of the bank is one of the determinants of profitability. Research by Budhathoki and Rai (2020) has shown that one component of *Loan to Deposit Ratio* (LDR), can significantly affect the financial performance of banks. High LDR levels, which indicate lower liquidity, have been associated with negative *Return on Asset* (ROA) and reduced liquid funds, thus affecting bank profitability (Budhathoki & Rai, 2020).

H8 : LDR has a positive effect on Banking Performance

High-quality earning assets, such as sound credit or profitable investments, are essential to ensure stable and reliable cash flows, which directly affect a company's net profit. (Tegambwage & Kasoga, 2022) . When net profit increases, so does the ROA to generate profit (Tegambwage & Kasoga, 2022) . Conversely, a decline in the quality of earning assets and leads to an increase in costs, such as provisions for credit losses (Al-Homaidi et al., 2018) which ultimately negatively impacts the firm's financial performance and ROA (Al-Homaidi et al., 2018) . Therefore, a specific hypothesis that can be tested is the negative effect of asset quality deterioration on *Return on Assets*, which is associated with an increased risk of loss

and decreased earnings from the affected assets. Research has shown that asset quality is closely related to a firm's profitability and financial performance (Kirimi et al., 2022).

H9 : Earning Asset Quality has a positive effect on Banking Performance

Operating expenses operating income is an important factor in the financial performance of the company, including costs associated with promotional activities, advertising campaigns, and other marketing efforts aimed at increasing sales and market share (Goodell, 2020) and increasing net profits can have a positive impact on ROA (Martiasih et al., 2024) . Conversely, if operating expenses of operating income increase excessively without a corresponding increase in sales or revenue, it may lead to a decrease in net profit, thereby depressing ROA (Prihatin, 2024) , affecting financial performance (Kartika et al., 2023 and (Gautam & Bangshi, 2024). Operating costs, especially the ratio of operating expenses to operating income (BOPO), can significantly affect ROA (Astuti & Kabib, 2021) and there is a positive correlation between BOPO and ROA (Awalia et al., 2023) and (Febrianti & Setyowati, 2024)(Febrianti & Setyowati, 2024).

H10 : BOPO has a negative effect on Banking Performance

Net Interest Margin (NIM) shows the ability of bank management to manage its productive assets to generate net interest income. The greater the NIM ratio, the higher the interest income on productive assets managed by the bank so that the possibility of a bank in problematic conditions is smaller (Saputra & Angriani, 2023) . If the NIM ratio increases, banks will generate increased profits as well. Indrawan and Dewi (2020) found that NIM has a significant positive effect on ROA. Rina and Rofiuddin (2021) also stated that the higher the NIM, the greater the bank's profitability. Rembet & Baramuli (2020) and Khabibah et al., (2020) found that NIM has a positive effect on ROA and ROE.

H11: NIM has a positive effect on Banking Performance

Studies by Brastama and Yadnya (2020) and Ikhsan et al. (2022) show that NPL has a negative effect on ROA and can be mediated by other variables such as CAR, while Mulyaningsih and Hidajat (2022) confirmed a significant negative effect of NPL on ROA. However, research by Sari et al.(2020) actually found that NIM does not mediate the relationship between NPL and ROA, showing the inconsistency of NIM's role. The gap in these studies is that they have not taken into account how technological efficiency and digital transformation can affect the relationship. Therefore, this study re-examines the mediating role of NIM in a more modern context that is adaptive to credit risk arising from NPLs.

H12 : NPL mediated by NIM has a negative effect on Banking Performance

Too high *Loan to Deposit Ratio* (LDR) without stable funding support increases liquidity risk and suppresses efficiency. NIM acts as a transmission channel in linking the bank's intermediation strategy with financial results, because the interest margin reflects the real results of lending against interest costs. Research by Liyana and Indrayani (2020) found that LDR does not significantly affect ROA directly and CAR as a mediator also does not mediate the LDR - ROA relationship. Meanwhile, Arisma(2022) states that LDR has a significant effect on ROA and Endri et al. (2020) confirmed that LDR has an effect on NIM. However, there is no study that specifically examines the role of NIM as a mediator of the relationship

between LDR and ROA. This research is here to bridge the gap, by highlighting the importance of optimising LDR that is managed efficiently through NIM, especially in the digital banking era that demands high efficiency and adaptive risk management.

H13 : LDR mediated by NIM has a positive effect on Banking Performance

Earning Asset Quality (KAP) is an important indicator of a bank's effectiveness in managing its income-producing assets. Low KAP indicates high quality earning assets, which minimise the risk of loss and support the stability of interest income. Research by Mulyaningsih and Hidajat (2022) and Widhiati (2021) shows that KAP has a significant positive effect on ROA. However, studies such as Khairiyah et al. (2022) and Lisa and Arinta (2023) do not explicitly discuss NIM mediation. Even Mulyaningsih and Hidajat(2022) mostly highlight the effect of KAP on CAR, without exploring the efficiency path of interest income through NIM. Thus, there is a research gap to explore the mediating role of NIM as an important mechanism in linking asset quality and banking performance, which will be empirically tested in the context of digital system transformation and asset risk management.

H14 : Earning Asset Quality mediated by NIM has a positive effect on Banking Performance

Operating Expenses to Operating Income (BOPO) is an indicator of bank operational efficiency. Therefore, *Net Interest Margin* (NIM) is a key point that represents the efficiency of banks in generating profits from intermediation activities. Good BOPO efficiency increases the potential for NIM improvement and strengthens financial performance through *Return on Assets* (ROA). Research Astuti(2022) and Sukmadewi (2020) show that BOPO has a significant negative effect on ROA and affects NIM simultaneously. Dwitanto et al. (2023) also supports that BOPO affects net interest margin. However, there are not many studies that discuss the role of NIM as a mediator in the relationship between BOPO and ROA. This gap indicates the need for research that evaluates how NIM as a result of interest efficiency can bridge the relationship between operating costs and profitability, especially in the era of digital transformation that should improve the overall operational efficiency of banks.

H15: BOPO mediated by NIM has a positive effect on Banking Performance

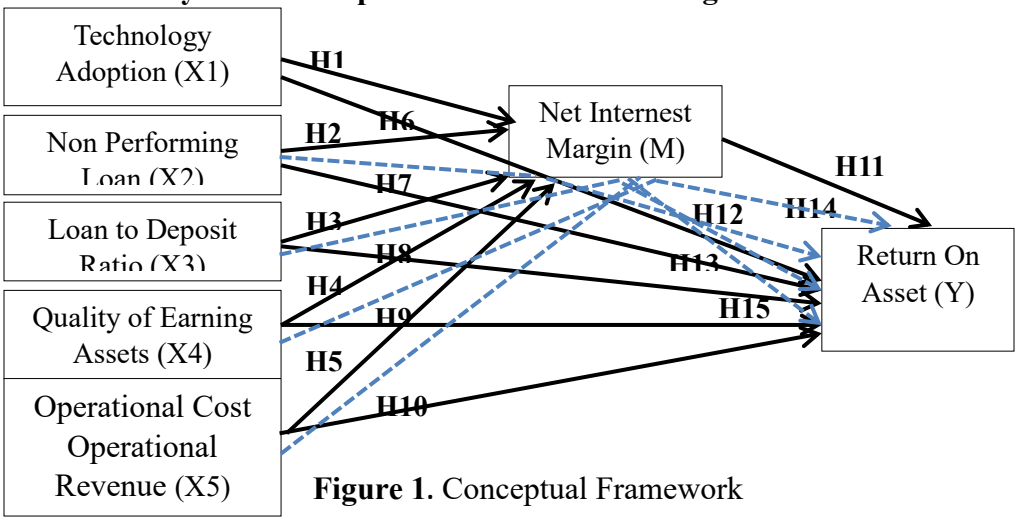

Figure 1. Conceptual Framework

3. Research Methods

The research approach used in this research is a quantitative approach and the type of research is *Explanatory Research.* The population of this study are banks listed on the Indonesia Stock Exchange, which have published their complete financial statements for the period 2015-2023, be it government-owned, private or foreign banks. Sample selection is used using *purposive sampling* method with banking criteria that have complete financial report publications every year and are listed on the IDX in 2015 - 2023. There are 35 banks listed on the IDX according to the research limitation criteria and make it a population. A number of members of the population also became research samples and were used as units of analysis, so the research was carried out by means of a census. During the time span of 9 years of financial reports from 2015 to 2023, 315 data objects were obtained for observation. This type of research data is secondary data in the form of financial reports and company annual reports obtained from the Indonesia Stock Exchange website , (*Indonesian Capital Market Directory*), and www.finance.yahoo.com. The data used in the study are *time series* and *cross section* data. The data analysis technique uses the panel data regression analysis method to test the effect of the independent variable on the dependent variable. The dependent variable in this study is Banking Performance, the independent variables are Technology Adoption, *Non Performing Loan* (NPL), *Loan to Deposit Ratio* (LDR), Earning Asset Quality, Operating Expenses Operating Income (BOPO), with the mediating variable is *Net Interest Margin* (NIM). This research model is as follows:

$$NIM_{i,t} = \beta_0 + \beta_1 TA_{i,t} + \beta_2 NPL_{i,t} + \beta_3 LDR_{i,t} + \beta_4 QEA_{i,t} + \beta_5 BOPO + \varepsilon_{i,t}$$

$$ROA_{i,t} = \beta_0 + \beta_1 TA_{i,t} + \beta_2 NPL_{i,t} + \beta_3 LDR_{i,t} + \beta_4 QEA_{i,t} + \beta_5 BOPO + \beta_6 NIM + \varepsilon_{i,t}$$

$$ROA_{i,t} = \beta_0 + \beta_1 MNPL_{i,t} + \beta_3 MLDR_{i,t} + \beta_4 MQEA_{i,t} + \beta_5 MOCOR + \varepsilon_{i,t}$$

Where:

ROA	= *Return On Asset* company i year t
NIM	= *Net Interest Margin* of company i in year t
NPL	= *Non Performing Loan of* company i in year t
LDR	= *Loan to Deposit Ratio of* company i in year t
QEA	= *Quality of Earning Assets of* company i in year t
BOPO	= Operational Cost Operational Revenue company i year t
AT	= Technology Adoption company i year t
MNPL	= NPL Mediation Variable
MLDR	= LDR Mediation Variable
MQEA	= QEA Mediation Variable
MOCOR	= OCOR Mediation Variable
i	= sample company (i = 1, 2, 3, 4 ...)
t	= year 2015-2023
α	= constant
$\beta_{(1)-\beta(5)}$	= slope
ε	= error component

4. Results

Descriptive

Based on the results of descriptive analysis presented in Table.1 illustrates that all variables in the study show normally distributed data. Technology Adoption (X1) has an average of 4

with a standard deviation of 1.0785732. The minimum value of 2 indicates that there are still banks that are low in technology adoption. The Swekness value of 0.9259134 shows that the distribution of Technology Adoption data tends to lean right, indicating that most banks have a relatively high level of Technology Adoption. *Non-performing loan* (X2) has an average of 1.9543 with a standard deviation of 1.3304. The minimum value of 0.0100 indicates that there are banks with a very low level of non-performing loans. The maximum value of 9.9200 indicates that some banks experience high levels of NPLs. *Loan to Deposit Ratio* (X3) has an average of 85.0392 with a standard deviation of 24.6150. The minimum value of 29.6700 indicates that there are banks with a relatively low level of lending compared to the funds raised. The maximum value of 390,1200 indicates that there are banks that have loan disbursements far exceeding the average.

Earning Asset Quality (X4) has an average of 2.4268 with a standard deviation of 1.5461. The minimum value of 0.0000 indicates that the bank may not have productive asset quality assets, while the maximum value of 8.8400 in the year indicates that there are banks that have high quality assets. Operating Expenses Operating Income (X5) has an average of 88.6368 with a standard deviation of 26.2543. The minimum value of 28,3000 indicates that the bank has the smallest cost among existing banks. The maximum value of 261,1000 indicates that there is the highest value far from the average.

Return on Asset (Y) has an average of 2.0745 with a standard deviation of 2.1837. The minimum value is 0.0100 and the maximum value is 15.8900, indicating considerable variation in profitability between banks. Skewness of 2.9604 indicates that the data distribution is skewed to the right and kurtosis of 11.7721 indicates that the data is more pointed than the normal distribution. Both of these indicate that there are some banks with much higher ROA than the majority of other banks.

Net Interest Margin (M) has an average of 4.9758 with a standard deviation of 2.3711. The minimum value of 0.2200 indicates that there are banks that have very low interest margins. The maximum value of 18.3900 indicates that there are banks that are able to obtain a very high net interest margin. Skewness of 1.8998 indicates that the data distribution is skewed to the right, while kurtosis of 8.4603 indicates that the data variation is very high.

Table. 1 Descriptive Statistics of Research Variables

	AT	NPL	LDR	QEA	BOPO	ROA	NIM
Minimum	2	0.0100	29.6700	0.0000	28.3000	0.0100	0.2200
Maximum	8	9.9200	390.1200	8.8400	261.1000	15.8900	18.3900
Average	4	1.9543	85.0392	2.4268	88.6368	2.0745	4.9758
Standard Deviation	1.0785	1.3304	24.6150	1.5461	26.2543	2.1837	2.3711
Skewness	0.9259	1.3140	6.2802	1.2979	2.6966	2.9604	1.8998
Kurtosis	1.8800	3.7840	75.2702	1.8686	14.0833	11.7721	8.4603
Jarque Bera	61.4724	98.7089	70622.2457	105.2340	1994.0499	1470.0683	580.8083

Source: Research data, processed (2025)

Panel Data Regression Results

The Chow test results show that the FEM model is better to use. Furthermore, the Hausman Test results also obtained a probability value smaller than 0.05 indicating that FEM is more appropriate, while if it is greater than 0.05, then REM is better to use. The correlation coefficient value between variables has a range from -0.3468 to 0.5923. This correlation coefficient value also states that there is no correlation coefficient that falls into the strong group. This means that the regression model used in this research model is assumed to have no multicollinearity and this is fulfilled for further analysis.

Based on the data in Table 2. it can be seen the direct effect of independent variables on ROA and PBV variables. In ROA, it is shown that all independent variables show that the direct effect is greater than the indirect effect. There is something quite interesting in the Earning Asset Quality (KAP) variable that the direct effect is positive and the indirect effect is negative. While the non-independent variable PBV gives quite diverse results, there is a greater direct effect and there is also a greater indirect effect. On the variables of Technology Adoption, *Non Performing Loan* (NPL) and *Loan to Deposits Ratio* (LDR) that the indirect effect is greater than the direct effect. The independent variables of KAP, BOPO and Risk have a greater direct effect than the indirect effect. In the ROA model, policy makers do not need to pay attention to indirect effects because there is not much influence. While in PBV, policy makers need to pay attention to the indirect effects of Technology Adoption, *Non Performing Loan (NPL) and Loan to Deposits Ratio* (LDR), while the KAP, BOPO and Risk variables do not need to pay attention to indirect effects.

Table 2. Direct and Indirect Effects

Variable	Direct	Indirect	Total
Related with ROA			
Net Interest Margin	0.3128		0.3128
Technology Adoption	-0.0239	-0.0025	-0.0264
BOPO	-0.0381	-0.0081	-0.0462
LDR	-0.0077	-0.0014	-0.0092
QEA	0.0613	-0.0006	0.0607
NPL	-0.1526	-0.0129	-0.1655

Source: Processed by the author (2025)

Discussion

The ROA model is one of the models for banking performance and this ratio is a fundamental bank ratio to analyse bank performance. This study found that Technology Adoption significantly affects ROA. In this study, the measurement of Technology Adoption used is a new measurement, namely the many technological features offered by banks to customers in improving services and bank customers. This study states that the measurement of Technology Adoption is somewhat different from previous research, where Raharjo, (2021) uses the amount of costs incurred for technology in order to serve its customers. Bank management must pay attention to the Technology Adoption used by the bank concerned. The use of technology is increasingly in demand by bank customers, so bank management must improve the technological features used in serving its customers. Another finding in

this study is that BOPO affects ROA with a significant negative relationship. This result states that an increase in BOPO will result in a decrease in ROA. This result also states that an increase in BOPO does not directly increase ROA because BOPO provides the concept that Operating Expenses are divided by Operating Income. The increase in BOPO depends on the increase in operating costs and operating income remains or decreases. Therefore, bank management must reduce operating costs or increase operating income. It is very interesting that bank management must pay attention to or manage BOPO in increasing the Bank's ROA. This research supports previous research, namely (Daulay et al., 2022; Feinberg and Zanardi, 2022; Polii et al., 2020; Sunarmie, 2022) .

This study also found that the LDR ratio negatively affects ROA. The increase in LDR can be done by increasing the *Loan* and *Deposit* which is fixed or proportionally up or down. An increase in LDR will make a small ROA. Therefore, ROA can increase if bank managers manage Loans and Third Party Funds for the benefit of ROA. This research supports previous research (Manurung and Kartika, 2020; Kartika et al., 2023; Manurung et al., 2020; Wirawan et al., 2020) . NIM has a positive effect on ROA. NIM increase will increase ROA. Therefore, bank management must manage the NIM so that ROA increases and improves the performance of the bank concerned. NIM management starts with the amount of NIM that the bank must charge to its customers and good customer selection is very necessary so that NIM can really be accepted by the bank. This research supports previous research, namely (Angori et al., 2019; Baqir et al., 2023; Endri et al., 2020; Purwanti, 2021; Sukmadewi, 2020) . From a broader perspective, these findings reinforce the concept of profitability as the bank's ability to generate earnings relative to its assets, equity, and resources. Profitability ratios such as ROA and NIM are not only indicators of operational success but also serve as benchmarks for managerial efficiency, investor confidence, and long-term sustainability. Therefore, careful management of lending, deposits, and interest margins is essential for enhancing overall profitability and securing competitive advantage in the banking sector.

The effect of NPL on ROA is negative. If NPL increases, ROA decreases. NPL management is very important for Bank management in order to improve Bank performance. Selection of customers who are willing to pay credit and do good business so that loans to banks are needed. Bank management must pay close attention to bank customers to get small NPLs. This study supports previous research (Harris et al., 2018; Napi et al., 2024; Ozili, 2019b; Qi, 2024).

5. Conclusion and Suggestion

This study found that the correlation between variables is very weak, indicating minimal multicollinearity. The BOPO variable has the strongest influence on NIM, which in turn shows both direct and indirect effects on banking performance. For ROA, direct effects are dominant, with LDR and Earning Asset Quality emerging as significant variables in both the ROA and PBV models. These findings imply that banks must improve efficiency, manage loan quality, and optimize liquidity to enhance profitability and market value. For investors, attention to these key ratios offers valuable signals in stock selection, while for policymakers the results underscore the importance of promoting technological adoption and prudent risk management to strengthen the banking sector. Future research should broaden the scope by

including non-listed banks and exploring additional mediating variables to capture the complexity of banking performance.

Reference

1. Achmad Agus Yasin Fadli. (2019). Pengaruh On Assets (Roa), Liquidity Funding Ratio (LDR), Non Performing Loan (Npl), Dan Capital Adequacy Ratio (Car) Terhadap Penyaluran Kredit Pada Bank Bumn Yang Terdaftar Di Bei Periode Tahun 2013–2017. *Business Management Analysis Journal (BMAJ)*, *2*(2), 1–14.
2. Ahmad Rasyid Daulay, Widya Astuti, & Irfan. (2022). Pengaruh Return on Asset (ROA), Biaya Operasional Pendapatan Operasional (BOPO), dan Capital Adequacy Ratio (CAR) Terhadap Bagi Hasil Deposito Mudharabah Pada Bank UMUM Syariah di Indonesia. *JRAK (Jurnal Riset Akuntansi Dan Bisnis)*, *8*(2), 174–184. https://doi.org/10.38204/jrak.v8i2.980
3. Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H. S., & Almaqtari, F. A. (2018). Bank-specific and macro-economic determinants of profitability of Indian commercial banks: A panel data approach. *Cogent Economics and Finance*, *6*(1), 1–26. https://doi.org/10.1080/23322039.2018.1548072
4. Aldy Syafrizal, Rico Nur Ilham, Darmawati Muchtar, & Wardhiah. (2023). Effect of capital adequacy ratio, non performing financing, financing to deposit ratio, operating expenses and operational income on profitability At Pt. Bank Aceh Syariah. *Journal of Accounting Research, Utility Finance and Digital Assets*, *1*(4), 312–322. https://doi.org/10.54443/jaruda.v1i4.51
5. Angori, G., Aristei, D., & Gallo, M. (2019). Determinants of Banks' Net Interest Margin: Evidence from the Euro Area during the Crisis and Post-Crisis Period. *Sustainability*, *11*(14), 3785. https://doi.org/10.3390/su11143785
6. Arisma, N. (2022). The Effect of NPL and LDR on Profitability with CAR as a Mediation Variable at PT BPR Dana Mandiri Bogor. *EasyChair Preprint*, 1059–1070.
7. Ariyani, O. A., & Putri, E. (2023). Pengaruh Pengungkapan Akuntansi Lingkungan dan Mekanisme Good Corporate Goverence terhadap Kinerja Keuangan Perusahaan: Studi Empiris Perusahaan Pertambangan dan Consumer Non Cylicals yang terdaftar di Bursa Efek Indonesia Periode 2018-2022. *El-Mal: Jurnal Kajian Ekonomi & Bisnis Islam*, *5*(1), 1003–1020. https://doi.org/10.47467/elmal.v5i1.5164
8. Asiama, R. K., & Amoah, A. (2019). Non-performing loans and monetary policy dynamics in Ghana. *African Journal of Economic and Management Studies*, *10*(2), 169–184. https://doi.org/10.1108/AJEMS-04-2018-0103
9. Astuti, I. D., & Kabib, N. (2021). Faktor-faktor yang Mempengaruhi Profitabilitas Bank Syariah Indonesia dan Malaysia. *Jurnal Ilmiah Ekonomi Islam*, *7*(2). https://doi.org/10.29040/jiei.v7i2.2534
10. Astuti, R. P. (2022). Pengaruh CAR, FDR, NPF, Dan BOPO Terhadap Profitabilitas Perbankan Syariah. *Jurnal Ilmiah Ekonomi Islam*, *8*(3), 3213. https://doi.org/10.29040/jiei.v8i3.6100
11. Awalia, A., Silvia, R., Sandriyani, S., & Putra, B. R. (2023). *The Effect of Risk Management Implementation on Financial Performance During the Covid-19 Pandemic (Case Study of Multifinance Companies Registered on the IDX)* (pp. 259–271). https://doi.org/10.2991/978-94-6463-226-2_23
12. Baker, H., Kaddumi, T. A., Nassar, M. D., & Muqattash, R. S. (2023). Impact of Financial Technology on Improvement of Banks' Financial Performance. *Journal of Risk and Financial Management*, *16*(4). https://doi.org/10.3390/jrfm16040230
13. Baqir, M., Azikri, M. R., & Mangkurat, U. L. (2023). *Pengaruh Pemberlakuan Ekonomi Islam Terhadap Tingkat Persentase Bunga Bank. Religion*. *1*(2023), 706–718.
14. Bi Rahmani, N. A. (2022). Analisis Pengaruh Non Performing Loan, Loan To Deposit Ratio,

Biaya Operasional Terhadap Pendapatan Operasional Terhadap Kinerja Keuangan Pada Bank Umum Syariah. *Dinamika Akuntansi Keuangan Dan Perbankan*, *11*(1), 22–30. https://doi.org/10.35315/dakp.v11i1.8950
15. Bob Feinberg, & Maurizio Zanardi. (2022). Analysis of the Influence of Operational Costs on Increasing the Financial Performance of American Public Helath Corporation. *MEDALION JOURNAL: Medical Research, Nursing, Health and Midwife Participation*, *3*(2), 44–57. https://doi.org/10.59733/medalion.v3i2.18
16. Budhathoki, P. B., & Rai, C. K. (2020). The Mediating Role of NIM on Market Structure and Bank Performance: Empirical Confirmation from Listed Nepalese CBs. *International Journal of Finance & Banking Studies (2147-4486)*, *9*(3), 28–38. https://doi.org/10.20525/ijfbs.v9i3.776
17. Dadoukis, A., Fiaschetti, M., & Fusi, G. (2021). IT adoption and bank performance during the Covid-19 pandemic. *Economics Letters*, *204*, 109904. https://doi.org/10.1016/j.econlet.2021.109904
18. Darkwah, K. (2019). *Examining the Receptivity of Foreign Guests: A Study of Economic Community of West African States (Ecowas) Students in Higher Educational Institutions in Accra, Ghana*. Kennesaw State University.
19. Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. *Journal of the Academy of Marketing Science*, *48*(1), 24–42. https://doi.org/10.1007/s11747-019-00696-0
20. Dawu, L., & Manane, D. R. (2020). Analisis Kinerja Keuangan Pada Perusahaan Daerah Air Minum (Pdam) Tirta Lontar Kabupaten Kupang. *Inspirasi Ekonomi : Jurnal Ekonomi Manajemen*, *2*(3), 1–11. https://doi.org/10.32938/jie.v2i3.693
21. Dwitanto, A. R., Manurung, A. H., & Machdar, N. M. (2023). Determinants of Net Interest Margin in Indonesian Banking Industry: The Moderating Role of Central Bank Interest Rate. *Journal of Business, Management, and Social Studies*, *3*(2), 66–78. https://doi.org/10.53748/jbms.v3i2.59
22. Endri, E., Marlina, A., & Hurriyaturrohman. (2020). Impact of internal and external factors on the net interest margin of banks in Indonesia. *Banks and Bank Systems*, *15*(4), 99–107. https://doi.org/10.21511/bbs.15(4).2020.09
23. Fanny, F., Wijaya, W., Indahwati, I., Silcya, M., Wijaya, V. C., & Ginting, W. A. (2020). Analisis Pengaruh NPL, NIM, LDR, Dan CAR Terhadap Profitabilitas (ROA) Pada Bank Pemerintah Konvensional Yang Terdaftar Di BEI. *Jurnal Profita*, *13*(1), 112. https://doi.org/10.22441/profita.2020.v13.01.009
24. Farras Brastama, R., & Yadnya, I. P. (2020). The Effect of Capital Adequacy Ratio and Non Performing Loan on Banking Stock Prices with Profitability as Intervening Variable. *American Journal of Humanities and Social Sciences Research*, *43–49*(12), 43–49.
25. Febriani, D., & Yuniarti, R. D. (2022). Pengaruh Kredit Macet Dan Indikasi Fraudulent Financial Reporting Terhadap Stabilitas Keuangan Perbankan Pada Masa Pandemi Covid-19. *Jurnal Riset Akuntansi Dan Keuangan*, *10*(3), 503–518. https://doi.org/10.17509/jrak.v10i3.46957
26. Febrianti, B. A., & Setyowati, E. (2024). *Analysis Influence Ratio Finance to Profitability Return On Assets (ROA) at Commercial Banks in Indonesia* (pp. 36–47). https://doi.org/10.2991/978-94-6463-204-0_5
27. Fraihat, B. A. M., Ahmad, A. Y. A. B., Alaa, A. A., Alhawamdeh, A. M., Soumadi, M. M., Aln'emi, E. A. S., & Alkhawaldeh, B. Y. S. (2023). Evaluating Technology Improvement in Sustainable Development Goals by Analysing Financial Development and Energy Consumption in Jordan. *International Journal of Energy Economics and Policy*, *13*(4), 348–355. https://doi.org/10.32479/ijeep.14438
28. Gautam, N., & Bangshi, A. (2024). Effect of Leverage, Assets Growth, Market Capitalization and Firm Age on Profitability of Nepalese Commercial Banks. *The Harvest*, *3*(1), 57–78.

https://doi.org/10.3126/harvest.v3i1.64184
29. Goodell, J. W. (2020). COVID-19 and finance: Agendas for future research. *Finance Research Letters*, *35*, 101512. https://doi.org/10.1016/j.frl.2020.101512
30. Guicheldy, A., & Sukartaatmadja, I. (2021). Pengaruh Capital Adequacy Ratio, Non Performing Loan, Biaya Operasional Dan Pendapatan Operasional Terhadap Pertumbuhan Laba Bank. *Jurnal Ilmiah Manajemen Kesatuan*, *9*(1), 131–140. https://doi.org/10.37641/jimkes.v9i1.496
31. Hamenda, M., & Manengkey, J. (2022). Pengaruh Likuiditas Dan Kredit Macet Terhadap Profitabilitas Pada Perusahaan Perbankan Yang Terdaftar Di Bursa Efek Indonesia. *Jurnal Akuntansi Manado (JAIM)*, *3*(3), 434–444. https://doi.org/10.53682/jaim.vi.3839
32. Hanzlík, P., & Teplý, P. (2022). Key factors of the net interest margin of European and US banks in a low interest rate environment. *International Journal of Finance & Economics*, *27*(3), 2795–2818. https://doi.org/10.1002/ijfe.2299
33. Haq, H. I., & Harto, P. (2019). Pengaruh Tingkat Kesehatan Bank Berbasis RGEC Terhadap Financial Distress (Studi pada Perusahaan perbankan yang terdaftar di BEI tahun 2015-2017). *Diponegoro Journal of Accounting*, *8*(1), 1–12.
34. Hariyanti, D., Soeharjoto, S., & Tribudhi, D. (2022). Exchange Rates and Financial Performance Effect on Conventional Bank Third Party Funds in Indonesia. *Proceedings of the First Lekantara Annual Conference on Public Administration, Literature, Social Sciences, Humanities, and Education, LePALISSHE 2021, August 3, 2021, Malang, Indonesia*. https://doi.org/10.4108/eai.3-8-2021.2315092
35. Harris, T. S., Khan, U., & Nissim, D. (2018). The Expected Rate of Credit Losses on Banks' Loan Portfolios. *The Accounting Review*, *93*(5), 245–271. https://doi.org/10.2308/accr-52012
36. Hartini, T., Astaginy, N., & Jayanto, I. (2022). Role of Third-Party Funds'Growth in the Relationship Between Credit Risk, Financial Performance, and Capital Adequacy. *Jurnal Ekonomi*, *11*(02), 1533–1537.
37. Hastuti, S. P., & Ghozali, I. (2019). Analisis Faktor-Faktor yang mempengaruhi Profitabilitas Perbankan Go Public di Indonesia. *Diponegoro Journal of Accounting*, *8*(3), 1–10.
38. Haymans Manurung, A., & Rose Kartika, T. (2020). Loan Deposits Ratio of Indonesia Bank: Speed Adjustment? *International Journal of Advanced Science and Technology*, *29*(4), 6065–6074.
39. Hidayat, M. T., Aini, Q., & Fetrina, E. (2020). User Acceptance of E-Wallet Using UTAUT 2 – A Case Study. *Jurnal Nasional Teknik Elektro Dan Teknologi Informasi*, *9*(3), 239–247.
40. Homaidi, E. A. Al, Almaqtari, F. A., Yahya, A. T., & Khaled, A. S. D. (2020). Internal and external determinants of listed commercial banks' profitability in India: dynamic GMM approach. *International Journal of Monetary Economics and Finance*, *13*(1), 34. https://doi.org/10.1504/IJMEF.2020.105333
41. Ikhsan, M., Jumono, S., Munandar, A., & Abdurrahman, A. (2022). The Effect of Non Performing Loan (NPL), Independent Commissioner (KMI), and Capital Adequacy Ratio (CAR) on Firm Value (PBV) Mediated by Return on Asset (ROA). *Quantitative Economics and Management Studies*, *3*(5), 810–824. https://doi.org/10.35877/454ri.qems1063
42. Indrawan, B., & Kaniawati Dewi, R. (2020). Pengaruh Net Interest Margin (NIM) Terhadap Return on Asset (ROA) Pada PT Bank Pembangunan Daerah Jawa Barat Dan Banten Tbk Periode 2013-2017. *Jurnal E-Bis (Ekonomi-Bisnis)*, *4*(1), 78–87. https://doi.org/10.37339/e-bis.v4i1.239
43. Ishak, F., Dungga, M. F., & Amali, L. M. (2022). Pengaruh Kualitas Aktiva Produktif (KAP) Dan Net Interest Margin (NIM) Terhadap Profitabilitas Pada Bank Umum Swasta Nasional Devisa Yang Terdaftar Di BEI Periode 2016-2020. *JAMBURA: Jurnal Ilmiah Manajemen Dan Bisnis*, *5*(1), 89–97. https://doi.org/10.37479/jimb.v5i1.14246
44. Ispriandina, A., & Sutisna, M. (2019). Faktor-Faktor Penerimaan Teknologi Yang Memengaruhi

Intensi Kontinuitas Penggunaan Mobile Wallet Di Kota Bandung. *Prosiding Industrial Research Workshop and National Seminar*, *10*(1), 1046–1055.
45. Jayasena, D. M., Samaranayake, M. K. S. M., & Weerasinghe, A. M. (2023). *Impact of Bank-Specific and Macroeconomic Factors on the Net Interest Margin of Financial Institutions in Sri Lanka*. *14*(02), 20–32.
46. Kartika, A., Irsad, M., Setiawan, M., & Sudiyatno, B. (2023). The relationship between capital structure, firm performance and a firm's market competitiveness: Evidence from Indonesia. *Investment Management and Financial Innovations*, *20*(1), 88–98. https://doi.org/10.21511/imfi.20(1).2023.09
47. Kasmir. (2019). *Analisis Laporan Keuangan* (Rajawali Press (ed.)).
48. Khabibah, N. A., Sully Kemala Octisari, & Agustina Prativi Nugraheni. (2020). CASA, NIM, dan Profitabilitas Perbankan di Indonesia. *Jurnal Aplikasi Akuntansi*, *5*(1), 52–71. https://doi.org/10.29303/jaa.v5i1.90
49. Khairiyah, N. M., Sakti, D. T., & Ramli, R. (2022). Pengaruh Kualitas Aktiva Produktif (KAP), Non Performing Financing (NPF) dan Financing to Deposit Ratio (FDR) Terhadap Profitabilitas Bank Umum Swasta Syariah. *Fair Value: Jurnal Ilmiah Akuntansi Dan Keuangan*, *5*(2), 1095–1101. https://doi.org/10.32670/fairvalue.v5i2.2115
50. Khan, M. A., Siddique, A., & Sarwar, Z. (2020). Determinants of non-performing loans in the banking sector in developing state. *Asian Journal of Accounting Research*, *5*(1), 135–145. https://doi.org/10.1108/AJAR-10-2019-0080
51. Khin, S., & Ho, T. C. (2019). Digital technology, digital capability and organizational performance. *International Journal of Innovation Science*, *11*(2), 177–195. https://doi.org/10.1108/IJIS-08-2018-0083
52. Kirimi, P. N., Kariuki, S. N., & Ocharo, K. N. (2022). Financial soundness and performance: evidence from commercial banks in Kenya. *African Journal of Economic and Management Studies*, *13*(4), 651–667. https://doi.org/10.1108/AJEMS-11-2021-0499
53. Lestari, K. F., Tanuatmodjo, H., & Mayasari, M. (2017). Pengaruh Likuiditas Dan Profitabilitas Terhadap Kebijakan Dividen. *Journal of Business Management Education (JBME)*, *2*(1), 243–250. https://doi.org/10.17509/jbme.v4i1.2293
54. Lestari, W. D., & Setianegara, R. G. (2020). Analisis Pengaruh NIM, BOPO, LDR, DAN NPL Terhadap Profitabilitas (Studi Kasus Pada Bank Umum Yang Listed Di Bursa Efek Indonesia Periode 2014-2018). *Keunis*, *8*(1), 82. https://doi.org/10.32497/keunis.v8i1.2136
55. Lisa, L. F., & Yusvita Nena Arinta. (2023a). Pengaruh Capital Adequacy Ratio (CAR), Kualitas Aktiva Produktif (KAP), Dan Non Performing Financing (NPF) Terhadap Kinerja Keuangan Dengan Likuiditas Perusahaan Sebagai Variabel Intervening Pada Bank Umum Syariah Di Indonesia Periode 2017–2021. *Jurnal Manajemen Perbankan Keuangan Nitro*, *6*(1), 1–13. https://doi.org/10.56858/jmpkn.v6i1.88
56. Lisa, L. F., & Yusvita Nena Arinta. (2023b). Pengaruh Capital Adequacy Ratio (Car), Kualitas Aktiva Produktif (Kap), Dan Non Performing Financing (Npf) Terhadap Kinerja Keuangan Dengan Likuiditas Perusahaan Sebagai Variabel Intervening Pada Bank Umum Syariah Di Indonesia Periode 2017 – 2021. *Jurnal Manajemen Perbankan Keuangan Nitro*, *6*(1), 1–13. https://doi.org/10.56858/jmpkn.v6i1.88
57. Liyana, L., & Indrayani, E. (2020). The Effect of Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR) and Net Interest Margin (NIM) on Financial Performance (ROA) With Car as Intervening Variables on Go Public Commercial Banks in Indonesia and Listed on BEI Period 2014-2018. *Asian Journal of Social Science and Management Technology*, *2*(2), 2313–7410.
58. Luayyi, S., Fitri, N. S., & Awalina, P. (2023). Pengaruh Pendapatan Produk Sampingan, Biaya Kualitas Dan Biaya Operasional Terhadap Profitabilitas Perusahaan. *Jurnal Ilmiah Cendekia Akuntansi*, *8*(2), 36. https://doi.org/10.32503/cendekiaakuntansi.v8i2.3209

59. Manurung, A. H., Hutahayan, B., Deniswara, K., & Kartika, T. R. (2020). Determinant of Net Interest Margin in Indonesia Bank Moderated by Risk. *International Journal of Advanced Science and Technology*, *29*(5), 11317–11328.
60. Martiasih, P. M., Trimurti, C. P., Komalasari, Y., & Adinegara, G. N. J. (2024). Determinants Of Financial Performance In People's Credit Banks In Bali Province. *Journal of Entrepreneurial and Business Diversity*, *2*(1), 276–285. https://doi.org/10.38142/jebd.v2i1.150
61. Metyopandi, V., Sulistyorini, E., Firdaus Al-Asjim, R., & Miftachul Afifah, U. (2023). Perusahaan Healthcare dalam Bahaya: Pendekatan Analisis Risiko Keuangan Perusahaan. *Syntax Idea*, *5*(11), 2116–2129. https://doi.org/10.46799/syntax-idea.v5i11.2719
62. Mohmad Napi, M. B., Wan Razali, W. N. F. A. B., Nik Majuki, N. N. A. B., Mohd Nor, N. A. F., Bin Izham Zurie, M. A. N., & Zainoddin, A. I. (2024). Factors Influencing Non-Performing Loans: Empirical Evidence From Commercial Banks In Malaysia. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *14*(1). https://doi.org/10.6007/IJARAFMS/v14-i1/20995
63. Mulianita, A., & dan Triandi, S. (2019). Pengaruh Dewan Komisaris dan Komite Audit Terhadap Kinerja Keuangan Perbankan Syariah yang Terdaftar di Bank Indonesia. *Jurnal Ilmiah Akuntansi*, *7*(1), 219–223.
64. Mulyaningsih, M., & Hidajat, T. (2022). Kontribusi Kualitas Asset Produktif (KAP) dan Non Performing Loan (NPL) Bank Perkreditan Rakyat Konvensional (BPRK) Era Covid-19 terhadap Capital Adequacy Ratio (CAR) melalui Profitabilitas (ROA). (Studi Empiris pada BPR Konvensional di wilayah Kantor. *Magisma: Jurnal Ilmiah Ekonomi Dan Bisnis*, *10*(2), 140–150. https://doi.org/10.35829/magisma.v10i2.224
65. Murdiyanto, A. (2020). Pengaruh Loan to Deposit Ratio (LDR), Capital Adequacy Ratio (CAR), Net Interest Margin (NIM) dan Biaya Operasional Dibanding Pendapatan Operasional (BOPO) Terhadap Return On Asset (ROA) (Studi Bank Umum Konvensional tahun 2013 - 2019). *Dinamika Akuntansi, Keuangan Dan Perbankan*, *9*(1), 1–12.
66. Niu, F. A. L., & Wokas, H. R. N. (2021). Analisis Komparasi Rasio Profitabilitas Bank BUMN Sebelum dan Saat Adanya Pandemi Covid-19 Tahun 2019-2020. *Jurnal Riset Akuntansi Dan Auditing "GOODWILL," 12*(2), 447–463.
67. Nugroho, A. R., & Muharam, H. (2023). the Influence of Net Interest Margin, Bank Size, Bank Age, Non-Performing Loan, Ldr, and Gcg on the Risk of Misconduct With Real …. *SIBATIK JOURNAL: Jurnal …*, *2*(12), 3763–3784.
68. Nurhasanah, D., & Maryono, M. (2021). Nurhasanah, D., & Maryono, M. (2021). Analisa pengaruh rasio keuangan terhadap profitabilitas pada perusahaan perbankan periode 2016–2018. Keunis, 9(1), 85-95. *KEUNIS*, *9*(1), 85. https://doi.org/10.32497/keunis.v9i1.2317
69. Ozili, P. K. (2019a). Non-performing loans and financial development: new evidence. *The Journal of Risk Finance*, *20*(1), 59–81. https://doi.org/10.1108/JRF-07-2017-0112
70. Ozili, P. K. (2019b). Non-performing loans in European systemic and non-systemic banks. *Journal of Financial Economic Policy*, *12*(3), 409–424. https://doi.org/10.1108/JFEP-02-2019-0033
71. Panca Putra Kusuma, R., Widiyanti, M., Malinda, S., Malinda, S., & Adam, M. (2023). The Effect of Financial Performance on The Value of Companies in The Banking Sector: The Role of Good Corporate Governance as a Moderation Variable. *Interdiciplinary Journal and Hummanity (INJURITY)*, *2*(8), 680–687. https://doi.org/10.58631/injurity.v2i8.114
72. Pervan, M., & Mlikota, M. (2013). What determines the profitability of companies: Case of Croatian food and beverage industry. *Ekonomska Istrazivanja*, *26*(1), 277–286. https://doi.org/10.1080/1331677X.2013.11517602
73. Pinasti, W. F., & Mustikawati, R. I. (2018). Pengaruh Car, Bopo, Npl, Nim Dan Ldr Terhadap Profitabilitas Bank Umum Periode 2011-2015. *Nominal, Barometer Riset Akuntansi Dan*

Manajemen, *7*(1). https://doi.org/10.21831/nominal.v7i1.19365
74. Polii, I. R. A., Saerang, D. P. E., & Tangkuman, S. J. (2020). Analisis Pengukuran Kinerja Keuangan Pemerintah Provinsi Sulawesi Utara Berdasarkan Konsep Value for Money. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis, Dan Akuntansi*, *8*(4), 781–788.
75. Pradnyaswari, N. M. A. D., & Dana, I. M. (2022). Pengaruh Likuiditas, Struktur Modal, Ukuran Perusahaan, Dan Leverage Terhadap Profitabilitas Pada Perusahaan Sub Sektor Otomotif. *E-Jurnal Manajemen Universitas Udayana*, *11*(3), 505. https://doi.org/10.24843/ejmunud.2022.v11.i03.p05
76. Prananda, I. K. R. P., Sukadana, I. W., & Suarjana, I. W. (2022). Pengaruh Capital Adequacy Ratio (CAr), Return On Asset (Roa) Dan Non Performing Loan (Npl) Terhadap Penyaluran Kredit Modal Kerja Pada Bank Umum Yang Terdaftar Di Bursa Efek Indonesia. *Emas*, *3*(3), 163–175.
77. Pratama, M. F., Fadillah, R., Toni, Aryani, Y., & Sakuntala, D. (2024). *Indeks stablilitas sistem institusi keuangan dalam mendukung pencapaian sasaran akhir kebijakan moneter di indonesia*. *VI*.
78. Pratiwi, L. P. S. W., & Wiagustini, N. L. P. (2015). Pengaruh CAR, BOPO, NPL Dan LDR Terhadap Profitabilitas. *E-Jurnal Manajemen Universitas Udayana*, *5*(4), 2137–2166.
79. Prihatin, K. S. (2024). Pengaruh NPF dan BOPO Terhadap Profitabilitas pada Bank BJB Syariah Periode 2014-2021. *Progress: Jurnal Pendidikan, Akuntansi Dan Keuangan*, *7*(1), 36–46. https://doi.org/10.47080/progress.v7i1.3026
80. Purwanti, P. (2021). Pengaruh ROA, ROE, dan NIM terhadap Harga Saham pada Perusahaan Sektor Perbankan yang Terdaftar di BEI Periode 2015-2019. *Jurnal Aplikasi Manajemen, Ekonomi Dan Bisnis*, *5*(1), 75–84. https://doi.org/10.51263/jameb.v5i1.115
81. Qi, B. (2024). Analysis and Prediction of the Causes of Non-Performing Loans: A Case Study of China. *Highlights in Science, Engineering and Technology*, *88*, 1063–1074. https://doi.org/10.54097/a0196c82
82. Raharjo, B. (2021). Fintech Teknologi Finansial Perbankan Digital. In Penerbit Yayasan Prima Agus Teknik (Ed.), *Sustainability (Switzerland)* (Vol. 11, Issue 1).
83. Rembet, W. E. C., & Baramuli, D. N. (2020). Pengaruh Car, Npl, Nim, Bopo, Ldr Terhadap Return on Asset (Roa) (Studi Pada Bank Umum Swasta Nasional Devisa Yang Terdaftar Di Bei). *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, *8*(3), 342–352.
84. Rerung, A. (2022). Analisis Pengaruh Capital Adequacy Ratio (Car), Operational Efficiency (Bopo), Dan Loan To Deposit Ratio (Ldr) Terhadap Return on Asset (Roa), (Studi Kasus Pada Bpr Di Kota Jayapura). *Jurnal Ekonomi Dan Bisnis*, *13*(2), 16–28. https://doi.org/10.55049/jeb.v13i2.94
85. Rina, R., & Rofiuddin, M. (2021). Faktor-faktor yang mempengaruhi profitabilitas pada Bank Umum Syariah. *Journal of Accounting and Digital Finance*, *1*(1), 25–35. https://doi.org/10.53088/jadfi.v1i1.7
86. Rohmah, A., Abiyyu, K. Y., Elisa, C., Nurasimah, Pasapan, N. L., Safika, Firdaus, M. N., & Permatasari, N. R. (2022). Adopsi Inovasi Layanan Online di Dinas Kependudukan dan Pencatatan Sipil Kota Samarinda. *Jurnal Komunikasi Pembangunan*, *20*(01), 47–60. https://doi.org/10.46937/20202239408
87. Rufaidah, I. K., Djuwarsa, T., & Danisworo, D. S. (2021). Pengaruh DPK, CAR, BOPO, dan NPF terhadap Likuiditas pada Bank Umum Syariah. *Journal of Applied Islamic Economics and Finance*, *2*(1), 187–197. https://doi.org/10.35313/jaief.v2i1.2912
88. Sabila, M. R., Aulia, N., Mayasari, K., & Nasikhah, M. (2023). *Studi perbandingan rencana strategis bank yang terdaftar pada Bursa Efek Indonesia (BEI)*. *1*(6), 590–607.
89. Safitri, E., Rani, F., & Yanti, D. (2021). Perbedaan Tingkat Kesehatan Bank Umum Konvensional Dan Bank Umum Syariah Yang Terdaftar Di Bursa Efek Indonesia (BEI). *Journal*

of Applied Business Administration, *5*(1), 44–54. https://doi.org/10.30871/jaba.v5i1.2221
90. Sagala, L., Silitonga, C., Situmorang, S., & Tambunan, T. S. (2019). Pengaruh Car, Npl, Dan Bopo Terhadap Roa Pada Bank Daerah Yang Terdaftar Di Bursa Efek Indonesia. *Jurnal Manajemen*, *5*(2), 249–260.
91. Salman, M. (2023). Analisis Faktor-Faktor yang Mempengaruhi Minat Nasabah dalam Menggunakan Layanan Mobile Banking pada Bank Syariah. *Persya: Jurnal Perbankan Syariah*, *1*(2), 31–37. https://doi.org/10.62070/persya.v1i2.11
92. Saputra, A. J., & Angriani, R. (2023). Pengaruh Capital Adequacy Ratio (CAR), Non Performing Loan (NPL), Net Interest Margin (NIM), Loan To Deposit Ratio (LDR) Dan Biaya Operasional Pendapatan Operasional (BOPO) Terhadap Return On Asset (ROA) Pada Bank Perkreditan Rakyat (BPR) di Kota Batam. *Akuntansi Dan Manajemen*, *18*(1), 93–115. https://doi.org/10.30630/jam.v18i1.210
93. Sari, L., Limakrisna, N., & Septiano, R. (2020). *Determinant Of Government Bank Performance Through Nim As Intervening*. *1*(4), 358–372. https://doi.org/10.38035/DIJEFA
94. Sarmigi, E., & Putra, D. E. (2022). *Analisis Laporan Keuangan Perbankan Syariah* (Penerbit Adab (ed.)).
95. Sasmiharti, J. (2024). Analysis Of The Causes Of Bad Credit (Literature Review). *ECBIS: Economic and Business Journal*, *2*(4), 337–346.
96. Simbolon, M. R., & Simanjuntak, D. (2020). The Mediating Effect Of Capital Structure On The Relationship Between Current Ratio and Return On Equity. *Jurnal Terapan Ilmu Manajemen Dan Bisnis*, *3*(1), 220–226.
97. Singh, S. K., Basuki, B., & Setiawan, R. (2021). The Effect of Non-Performing Loan on Profitability: Empirical Evidence from Nepalese Commercial Banks. *Journal of Asian Finance, Economics and Business*, *8*(4), 709–716. https://doi.org/10.13106/jafeb.2021.vol8.no4.0709
98. Sukmadewi, R. (2020). The Effect of Capital Adequacy Ratio, Loan to Deposit Ratio, Operating-Income Ratio, Non Performing Loans, Net Interest Margin on Banking Financial Performance. *ECo-Buss*, *2*(2), 1–10. https://doi.org/10.32877/eb.v2i2.130
99. Sumiyati, S., Khairiansyah, K., Ridwan, M. Q., & Ikhlas, M. (2023). Readiness of Accountans in XBRL. *JURNAL AKUNTANSI, EKONOMI Dan MANAJEMEN BISNIS*, *11*(2), 211–219. https://doi.org/10.30871/jaemb.v11i2.6525
100. Sunarmie, S. (2022). Faktor Yang Mempengaruhi Net Profit Margin (Npm) Pada Bank Negara Indonesia (Bni) Persero Cabang Palangka Raya. *Al-KALAM : JURNAL KOMUNIKASI, BISNIS DAN MANAJEMEN*, *9*(2), 46. https://doi.org/10.31602/al-kalam.v9i2.7752
101. Susandra Rohmandika, M., Wahyu Hestya Budianto, E., & Dwi Tetria Dewi, N. (2023). Pemetaan Penelitian seputar Variabel Determinan Return On Asset pada Perbankan Syariah: Studi Bibliometrik VOSviewer dan Literature Review. *Eco-Iqtishodi : Jurnal Ilmiah Ekonomi Dan Keuangan Syariah*, *5*(1), 1–18. https://doi.org/10.32670/ecoiqtishodi.v5i1.3607
102. Susilawati, S., & Nurulrahmatiah, N. (2021). Pengaruh Non-Performing Loan (NPL) dan Loan to Deposit Ratio (LDR) terhadap Return on Asset (ROA) dengan Net Interest Margin (NIM) sebagai Variabel Mediasi pada Bank BUMN yang Terdaftar di BEI. *Jurnal Maksipreneur: Manajemen, Koperasi, Dan Entrepreneurship*, *11*(1), 69. https://doi.org/10.30588/jmp.v11i1.833
103. Tegambwage, A. G., & Kasoga, P. S. (2022). Antecedents of customer loyalty in Islamic banking: evidence from Tanzania. *Journal of Islamic Accounting and Business Research*, *13*(4), 701–713. https://doi.org/10.1108/JIABR-10-2021-0288
104. Uli Wildan Nuryanto, Anis Fuad Salam, Sari, R. P., & Suleman, D. (2020). Pengaruh Rasio Kecukupan Modal, Likuiditas, Risiko Kredit dan Efisiensi Biaya Terhadap Profitabilitas Pada Bank Go Public. *Jurnal Aktiva : Riset Akuntansi Dan Keuangan*, *7*(1), 1–9. https://doi.org/10.52005/aktiva.v2i2.67

105. Widhiati, I. N. (2021). Pengaruh Kualitas Aktiva Produktif Terhadap Profitabilitas Bank Umum Syariah. *Jurnal Ekonomika Dan Bisnis Islam*, *4*(2), 200–208. https://doi.org/10.26740/jekobi.v4n2.p200-208
106. Wirawan, A. W., Falah, L. J., Kusumadewi, L., Adhariani, D., & Djakman, C. D. (2020). The Effect of Corporate Social Responsibility on the Firm Value with Risk Management as a Moderating Variable. *Journal of Asia-Pacific Business*, *21*(2), 143–160. https://doi.org/10.1080/10599231.2020.1745051