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Operational Efficiency, Capital Adequacy, and Profitability: A Case Study of Central Java's Regional Development Bank

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ABSTRACT

This study aims to analyse the impact of BOPO (Operational Efficiency Ratio), LDR (Loan to Deposit Ratio), NPL (Non-Performing Loans), and KPMM (Capital Adequacy Ratio) on ROA (Return on Assets) in the Regional Development Bank of Central Java Province. Utilizing quarterly data published by the Financial Services Authority (OJK) from Q1 2017 to Q4 2024, the study employs a multiple regression approach to assess the relationships among variables. The empirical findings reveal that both BOPO and LDR exert a significant negative effect on ROA, indicating that higher operational inefficiencies and excessive lending relative to deposits diminish bank profitability. In contrast, KPMM shows a significant positive impact, suggesting that stronger capital adequacy enhances financial performance. NPL, however, is found to have no statistically significant effect on ROA. These results underline the importance of prudent cost management, balanced liquidity strategies, and robust capital buffers in improving bank profitability. The study recommends that policymakers strengthen regulations to enhance capital adequacy and promote operational efficiency, which in turn supports the resilience and growth of regional banking institutions. These insights contribute to the formulation of more effective economic policies in the regional banking sector, fostering financial stability and regional economic development.

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INTRODUCTION

Bank profitability is a key indicator in assessing the financial health and performance of financial institutions (Nuhiu, et al., 2017). Return on Assets (ROA) is often used as the main measure to assess the efficiency and effectiveness of a bank's operations in generating profits from the total assets owned. In the context of Regional Development Banks (BPD), such as the Regional Development Bank of Central Java Province, ROA not only reflects the internal performance of banks, but also their impact on regional economic development and financial inclusion.

Some of the factors that affect ROA include the ratio of BOPO (Operating Costs to Operating Income), LDR (Loan to Deposit Ratio), NPL (Non-Performing Loans), and KPMM (Minimum Capital Adequacy). Each of these ratios has a strategic role in determining the bank's profitability. BOPO reflects the operational efficiency of the bank; LDR indicates liquidity and credit disbursement strategy; NPLs describe the quality of assets and credit risks; while KPMM reflects the bank's capital resilience and ability to absorb losses (Akbar, 2023). Previous research has shown that high BOPO can lower ROA, due to increased operational costs that are not offset by increased operating income (Rajindra, et al., 2021; Adi & Panji, 2022). This is in line with the findings in a study by Witjaksono & Natakusumah (2021) which revealed that operational efficiency has a significant effect on bank profitability. In addition, LDRs that are too high can increase liquidity and credit risk, which in turn can lower ROA, as described in research by Ekadjaja, et al., (2021) and Ramadani (2024). Meanwhile, high NPLs indicate poor asset quality and the potential for greater losses, which can lower ROA, according to findings in a study by Eltweri, et al., (2024). However, some studies have also shown that the relationship between NPL and ROA can vary depending on the context and time period being analyzed (Widyatmoko & Risman, 2024).

KPMM, as an indicator of capital resilience, has an important role in maintaining bank stability. Banks with high KPMM are better able to absorb losses and maintain their operations, which can contribute positively to ROA. These findings are supported by research by [Author's Name, Year], which shows that capital adequacy has a positive effect on bank profitability.

In the context of BPD, which has a strategic role in regional economic development, a deep understanding of the factors that influence ROA is essential. Therefore, this study aims to analyze the influence of BOPO, LDR, NPL, and KPMM on ROA in the Regional Development Bank of Central Java Province. This research is expected to provide clearer insights into the factors that affect the profitability of BPD and provide policy recommendations that can improve the bank's financial performance and contribution to regional economic development.

This research makes an important contribution in expanding the literature related to the analysis of bank profitability determinants with a focus on regional development banks, which are still relatively rarely studied compared to national commercial banks. Using longitudinal data over eight years, this study provides theoretical insights on how financial ratio dynamics affect ROA in the context of BPD in Indonesia. The results of this research can be used as a basis for managerial considerations in strategic decision-making, especially in managing operational efficiency, distributing credit, mitigating credit risks, and strengthening capital structures. Banks and regulators can also use the results of this study as a reference for microprudential policies that are more targeted for the regional banking sector.

With an observation period from the first quarter of 2017 to the fourth quarter of 2024, this study captures the impact of various economic dynamics, including the crisis caused by the COVID-19 pandemic and the post-pandemic economic recovery, which have not been widely discussed in the context of BPD. The study not only relies on multiple regression but is also complemented by comprehensive diagnostic tests such as multicollinearity, autocorrelation, and heteroscedasticity, which improves the validity and reliability of the findings.

THEORETIC FRAMEWORK

Bank profitability is one of the main indicators in assessing the financial performance and stability of banking institutions. One of the most commonly used measures of profitability is Return on Assets (ROA), which reflects the extent to which a bank is able to generate a net profit from the assets it manages. According to Van Horne & Wachowicz (2005), ROA provides an overview of the efficiency of bank management in managing asset resources to generate profits. In the context of Regional Development Banks (BPD), such as the Regional Development Bank of Central Java Province, profitability measurement not only has commercial but also social value, considering its function as an agent of regional economic development.

Some of the key variables influencing ROA have been identified in previous literature (Dewi & Badjra, 2020; Yusuf & Surjaatmadja, 2018), namely BOPO (Operating Costs to Operating Income), LDR (Loan to Deposit Ratio), NPL (Non-Performing Loans), and KPMM (Minimum Capital Adequacy). These variables represent the bank's operational efficiency, liquidity, credit risk, and capital strength.

BOPO (Operating Costs to Operating Income)

BOPO is an indicator of operational efficiency that measures how much it costs a bank to generate operating income. The higher this ratio, the lower the efficiency and the potential for a decrease in the bank's profitability. Recent research by Wiadnyani & Artini (2023) confirms that BOPO has a significant negative influence on ROA in regional banks in Indonesia, as high operational costs that are not offset by adequate revenue tend to erode banks' net profits.

LDR (Loan to Deposit Ratio)

LDR describes the extent to which banks are able to channel the collected third-party funds into the form of credit. A high LDR can increase a bank's interest income (Kurniadi, 2012), but it also increases liquidity and credit risk. On the other hand, an LDR that is too low indicates underutilization of funds. Puspitasari, et al (2021) found that LDR had a significant influence on ROA in 27 banks listed on the Indonesia Stock Exchange (IDX) for the period 2015 to 2018.

NPL (Non-Performing Loans)

NPLs are indicators of asset quality and credit risks faced by banks. High NPLs indicate a large number of non-performing loans that do not generate revenue for banks (Purba, et al., 2016), and can cause losses because they have to form a reserve of impairment losses. A study by Tangngisalu, et al (2020) showed that NPL has a significant negative influence on ROA, in contrast to research conducted by Singh, et al (2021). The results of the study show that NPL has a positive influence on ROA.

KPMM (Minimum Capital Adequacy)

KPMM or Capital Adequacy Ratio reflects the level of capital adequacy of banks in facing risks. Sufficient capital can be used to absorb potential losses and provide a solid foundation for business expansion, thereby increasing ROA (Lotto, 2018). Modigliani and Miller's theory states that a sound capital structure is the foundation of a company's efficiency and profitability. In banking practice, Bank Indonesia and the Financial Services Authority (OJK) have established KPMM standards as a form of implementing banking prudence. Several empirical studies, including by Dao & Nguyen (2020), show a positive relationship between KPMM and ROA, showing that banks with strong capital tend to be more stable and profitable.

The term KPMM (Minimum Capital Provision Obligation) is used by the OJK (Financial Services Authority) to refer to the concept of Capital Adequacy Ratio (CAR) with adjustments according to the regulatory context in Indonesia. There are several reasons why OJK uses the term KPMM, namely the term "Minimum Capital Provision Obligation" is more in accordance with the language of Indonesian national laws and regulations. The use of this term reflects the bank's obligation to provide a certain minimum capital, as stipulated in the POJK (OJK Regulation), in accordance with Indonesian law. KPMM emphasizes that the provision of capital is an obligation regulated by regulators, not just technical ratios. This reflects the OJK's supervisory function to ensure that each bank has sufficient capital to bear the risks. In practice, KPMM at the OJK not only follows the conventional calculation of CAR (Capital / ATMR), but also pays attention to operational risks, market risks, and the applicable Basel approach. So, the term KPMM is used to encompass the entire broader framework of capital risk management.

From the description above, it can be synthesized that ROA is significantly influenced by the bank's internal variables that reflect operational efficiency (BOPO), liquidity strategy and risk (LDR), credit quality (NPL), and capital strength (Buchory, 2023; Susanti, et al., 2023). Efficiency theory, liquidity theory, risk management theory, and capital structure theory underlie the relationship between these variables and profitability.

RESEARCH METHODOLOGY

1. Research Approach

   This study uses a quantitative approach with multiple regression method to analyze the influence of bank financial variables on bank profitability as measured using Return on Assets (ROA). The OLS approach was chosen because OLS has a simple mathematical form and the results are easy to understand, such as regression coefficients that show the influence of independent variables on dependent variables. If classical assumptions are met (such as linearity, homocedasticity, absence of multicollinearity, etc.), OLS is the Best Linear Unbiased Estimator (BLUE) that provides the most efficient (smallest variance) and unbiased estimation. Multiple regression models were used to evaluate the simultaneous influence of several factors, such as BOPO, LDR, NPL, and KPMM, on ROA at the Regional Development Bank of Central Java Province. The analysis tool used to solve the regression of the OLS model is used EVIEW 10.
2. Research Design

   This study is designed as a descriptive and causal research that aims to describe the characteristics of the variables studied and test the cause-and-effect relationship between variables. The researcher will describe and measure the influence of BOPO, LDR, NPL, and KPMM on ROA empirically.
3. Sample and Population

The population in this study is the Central Java Provincial Regional Development Bank, which is one of the regional banks operating in Indonesia. The sample used is annual (quarterly) data from the Central Java Provincial Regional Development Bank for the period 2017 from the first quarter to the fourth quarter of 2024. The data used included 32 quarters of financial statements during the period, which was considered representative for regression analysis.

4. Data Source

The data used in this study are secondary data obtained from the annual financial statements of the Regional Development Bank of Central Java Province published by the Financial Services Authority (OJK) and financial statements published by the bank. The data used includes the following financial variables:

a. BOPO (Operating Costs to Operating Income)
b. LDR (Loan to Deposit Ratio)
c. NPL (Non-Performing Loans)
d. MOE (Minimum Capital Adequacy)
e. ROA (Return on Assets)

5. Research Variables

a. Dependent Variable: ROA (Return on Assets) – Measures the bank's profitability level calculated as the ratio between net profit and total assets.
b. Independent Variables:
   1) BOPO (Operating Costs to Operating Income) – Measures the operational efficiency of a bank.
   2) LDR (Loan to Deposit Ratio) – Measures the liquidity and credit disbursement ratio of banks.
   3) NPL (Non-Performing Loans) – Measures the quality of assets or the level of non-performing loans that a bank has.
   4) KPMM (Minimum Capital Adequacy) – Measures the strength of the bank's capital in absorbing potential losses and risks.

6. Data Collection Techniques

The data used in this study is secondary data, obtained from financial statements issued by the Central Java Provincial Regional Development Bank and the Financial Services Authority (OJK). The data collected is annual (quarterly) data covering the period 2017 to 2024. This data is objective and trustworthy because it comes from a source that is recognized in the Indonesian banking industry.

7. Data Analysis Techniques

After the data is collected, the next step is to analyze the data using multiple regression (Basuki & Prawoto, 2019). Here are the steps of the analysis performed:

a. Descriptive Statistics: Before conducting regression analysis, the data will be analyzed descriptively to describe the characteristics of variables, such as mean, standard deviation, maximum values, and minimums.
b. Classical Assumption Test (Gujarati, 2021):
1) Multicollinearity test: To ensure there are no strong linear relationships between independent variables that could lead to bias in regression model estimation.
2) Autocorrelation Test: To test whether there is a correlation between residual values at different times.
3) Heteroscedasticity Test: To check if residual variance is constant across predictor values.

Multiple Regression: Multiple regression models are used to test the influence of BOPO, LDR, NPL, and KPMM variables on ROA. The multiple regression equations used are:

$$ROA_t = \alpha + \beta 1\ BOPO_t + \beta 2\ LDR_t + \beta 3 NPL_t + \beta 4 KPMM_t + \epsilon t$$

Where:

ROAt	= Return on Assets pada period t
BOPOt	= Operating Costs to Operating Income in the period t
LDRt	= Loan to Deposit Ratio in period t
NPLt	= Non-Performing Loans in period t

KPMMt = Minimum Capital Adequacy in the t period
α = Constant
β1, β2, β3, β4 = Coefficients of regression
ϵt = Error term

Results and Discussion

This study used quarterly data of 32 observations for each variable. Statistical descriptions of the analyzed variables, namely Return on Assets (ROA), Operating Costs to Operating Income (BOPO), Loan to Deposit Ratio (LDR), Non-Performing Loans (NPL), and Minimum Capital Adequacy (KPMM), are presented as follows:

Table 1. Descriptive Statistics

	ROA	BOPO	LDR	NPL	KPMM
Mean	2.750625	70.03188	82.11500	3.195625	20.16531
Median	2.905000	68.55000	82.12500	3.130000	19.62500
Maximum	3.360000	81.45000	95.74000	3.920000	23.41000
Minimum	1.580000	63.87000	74.67000	2.520000	18.33000
Std. Dev.	0.488731	5.297989	5.345858	0.413240	1.453392
Skewness	-0.779959	0.649159	0.515540	0.082777	0.441905
Kurtosis	2.629340	2.188757	2.717903	1.966126	1.897324
Jarque-Bera	3.427639	3.124990	1.523605	1.461738	2.662688
Probability	0.180176	0.209612	0.466824	0.481490	0.264122
Sum	88.02000	2241.020	2627.680	102.2600	645.2900
Sum Sq. Dev.	7.404588	870.1293	885.9242	5.293787	65.48280
Observations	32	32	32	32	32

Source: Dta Processed (2025)

In general, all five variables have a relatively near-normal distribution, indicated by non-extreme skewness and kurtosis values and a Jarque-Bera probability exceeding 0.05. The highest variability was found in BOPO and LDR, which showed fluctuations in operational efficiency and credit disbursement during the observation period. ROA as an indicator of profitability performance shows relatively good stability, with low deviation and symmetrical data distribution.

Table 2. Regression Results

Dependent Variable: ROA & Sample: 2017Q1 2024Q4

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOPO	-0.09264	0.00440	-21.04983	0.00000
LDR	-0.01212	0.00298	-4.07443	0.00040
NPL	0.01620	0.03913	0.41407	0.68210
KPMM	0.03166	0.01510	2.09647	0.04550
C	9.54349	0.19719	48.39812	0.00000
		Breusch-Godfrey Serial Correlation		
R-squared	0.98756	LM Test:		
Adjusted R-squared	0.98572	Obs*R-squared		2.623425
S.E. of regression	0.05840	Prob. Chi-Square (2)		0.2694
Sum squared resid	0.09209	Heteroskedasticity Test: ARCH		
F-statistic	535.96860	Obs*R-squared		2.93785
Prob(F-statistic)	0.00000	Prob. Chi-Square (5)		0.0865

Source: Data processed (2025)

This study analyzes the influence of BOPO, LDR, NPL, and KPMM on ROA at the Regional Development Bank of Central Java Province during the period 2017Q1 to 2024Q4.

Table 3. Interpretation of Regression Results

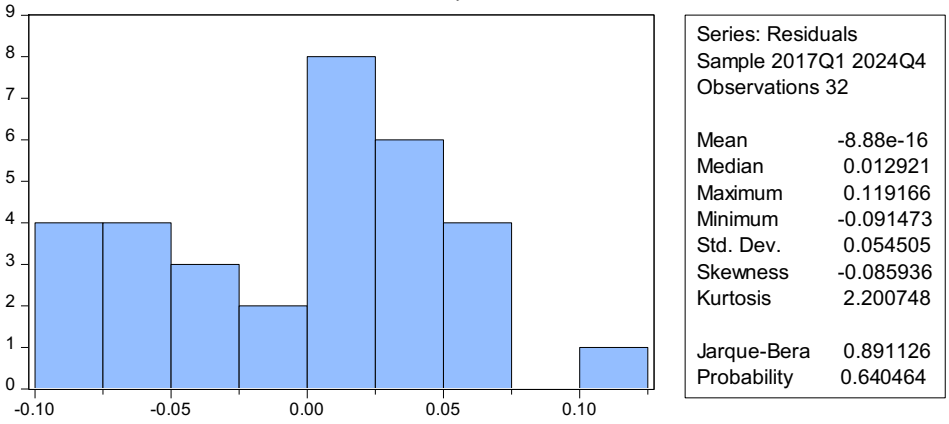
Variable	Koefisien	Makna Ekonomis	t-Statistik	Probabilitas	Kesimpulan
BOPO	-0.09264	Setiap kenaikan 1 persen BOPO menurunkan ROA sebesar 0.09264 persen, ceteris paribus	-21.050	0.00000	Signifikan negatif
LDR	-0.01212	Setiap kenaikan 1 persen LDR menurunkan ROA sebesar 0.01212 persen	-4.070	0.00040	Signifikan negatif
NPL	0.01620	Tidak signifikan secara statistik	0.410	0.68210	Tidak signifikan
KPMM	0.03166	Setiap kenaikan 1 persen KPMM meningkatkan ROA sebesar 0.03166 persen	2.100	0.04550	Signifikan positif
C (konstanta)	9.54349	ROA saat semua variabel independen bernilai nol	48.400	0.00000	-

Source: Data processed (2025)

Goodness of Fit (Kebaikan Model)

a. R-squared: 0.98756; The model can explain 98.76% of the variation in ROA, which means the model is very good at explaining the data.
b. Adjusted R-squared: 0.98572; After correcting the number of variables, the model is still very robust.
c. Standard Error: 0.0584; It shows that the rest (error) of the model's prediction is small enough, so the estimate can be considered accurate.
d. F-statistic: 535.97, Prob(F-statistic): 0.00000; The overall model is significant at a 99% confidence level.
e. Autocorrelation (Breusch-Godfrey LM Test); Prob. Chi-Square (2): 0.2694 > 0.05; There is no significant autocorrelation. The model passed this test.
f. Heteroscedasticity (ARCH Test); Prob. Chi-Square (5): 0.0865 > 0.05; There is no heteroscedasticity problem. The model passed this test as well.

Tabel 4. Uji Normalitas



Source: Data processed (2025)

Based on Table 4, the probability value for Jarque_Bera 0.640464 (above the value 0.05) means that the residual regression results are normally distributed, so that the regression results can be continued.

Table 5. Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
BOPO	0.00002	896.12250	4.94093
LDR	0.00001	562.32170	2.29936
NPL	0.00153	149.06040	2.37623
KPMM	0.00023	874.64030	4.37942
C	0.03888	364.78840	NA

Source: Data processed (2025)

All independent variables had a VIF value of < 5, which means there were no significant symptoms of multicollinearity in the model. Although BOPO and KPMM have VIF values close to 5, their values are still within safe and statistically tolerable limits. This suggests that while there may be correlations between some variables, the relationship is not strong enough to significantly affect the stability of the model estimates. LDRs and NPLs have a VIF below 3, which indicates a very low correlation rate with other variables—this is excellent in terms of model stability.

The BOPO variable has a regression coefficient of -0.09264 with a probability value of 0.0000, which means that it is statistically significant at a significance level of 1%. An interpretation of this coefficient shows that every 1 percent increase in the BOPO will decrease the ROA by 0.09264 percent, ceteris paribus. The negatively high t-statistical value (-21.05) further strengthens the conclusion that this variable is very significant.

BOPO (Operating Costs to Operating Income) is one of the important indicators in measuring the operational efficiency of a bank. This ratio describes how much the operating costs incurred by the bank are compared to the operating income generated. The higher the value of BOPO, the greater the proportion of operational costs to revenue, which indicates that banks are less efficient in carrying out their operational activities. This research is in accordance with the research conducted by Putranto (2019) with the title Faktor-Faktor yang Mempengaruhi Profitabilitas Bank Pembangunan Daerah di In-donesia Periode 2014-2018. The results of the study show that BOPO has a negative influence on ROA.

The relationship between BOPO and ROA was negative and significant, as shown in the regression results in this study. This means that when BOPO increases (operational costs are getting higher), ROA tends to decrease. This is because net profit, which is the main component in the calculation of ROA (Return on Assets = Net Profit / Total Assets), will decrease if the operating expenses are too large. In other words, poor operational efficiency will erode profits and ultimately reduce the bank's profitability.

For banks, especially regional development banks such as the Central Java Provincial BPD, keeping the BOPO ratio at a low level is very important because it reflects management that can control expenses, increase productivity, and maintain a healthy cost structure. Strategies to reduce BOPO can include digitizing services, optimizing the number of branches, reducing unproductive operational costs, and training human resources to improve work efficiency.

Overall, the lower the BOPO, the greater the potential for banks to increase ROA. Therefore, effective management of BOPO must be a priority for management to maintain and increase the bank's profitability.

Economically, this result is consistent with the bank's financial management theory which states that the larger the BOPO ratio, the less efficient the bank's operations. High BOPO reflects high operating costs compared to the operating income generated. This inefficiency directly lowers the bank's profitability, as more and more costs must be incurred to generate revenue. Therefore, managing operational efficiency must be the focus of bank management.

The recommended policies are increasing the digitalization of banking services, restructuring operations, and improving the efficiency of internal business processes. Regulators can encourage the application of financial technology (fintech) to cut the cost of traditional services, so that BOPO can be suppressed.

The LDR shows a regression coefficient of -0.01212 and a probability value of 0.00040, which is also significant at a significance level of 1%. This coefficient indicates that a 1 percent increase in LDR will decrease the ROA by 0.01212 percent, assuming the other variables are constant.

In theory, LDRs have a non-linear relationship with ROA (Return on Assets). At a certain level, an increase in LDR can increase ROA because the larger the credit disbursed, the greater the interest income earned by the bank. However, if the LDR is too high above the ideal limit (usually 80–90%), then the bank faces a higher liquidity risk, and this can lead to losses in the event of default or the bank lacks liquidity to meet its short-term obligations. In such cases, ROA will decrease due to increased credit risk and cost of funds.

The Financial Services Authority (OJK) stipulates that the normal LDR ratio for banks is between 78% and 92%, with a maximum limit of 94%. Above this figure, banks can be subject to adjustments to reserve requirements (Minimum Mandatory Current Account) as a liquidity penalty. As a regionally owned bank with a focus on local development, BPD tends to be more cautious in distributing credit and has a stable public fund base. Therefore, keeping the LDR around 80–90% helps ensure that liquidity remains safe without hindering productive credit disbursement. LDR below 80% can reflect less than optimal credit disbursement (under-lending), while above 90–92% indicates increased liquidity risk, especially if third-party funds (DPK) do not grow in balance with credit

The results of this study show that LDR has a significant negative effect on ROA (Rosdiana, 2019). This indicates that at the Central Java Provincial Regional Development Bank during the 2017-2024 period, the high LDR tends to reduce the bank's profitability. In other words, a credit distribution strategy that is too aggressive without being balanced with good credit risk management reduces efficiency and increases potential losses.

Banks need to maintain the LDR at a balanced level—not too low, so that funds do not go idle and lose potential income, and not too high, to maintain liquidity and avoid the risk of default. Good credit portfolio management, the application of prudential principles in lending, and proper liquidity management strategies are essential to maintain this balance.

Thus, the relationship between LDR and ROA is highly determined by the effectiveness of management in selectively disbursing credit, maintaining asset quality, and maintaining healthy liquidity. Imbalances in LDR management can have a direct impact on declining profitability, as reflected in ROA.

The policy implications of these findings are the need to implement a more selective credit disbursement policy and a conservative liquidity management strategy. Regulators can set stricter upper and lower LDR limits to maintain bank stability, while encouraging the development of a healthier and more productive credit portfolio.

The coefficient for NPLs is +0.01620 with a probability value of 0.68210, which means it is not statistically significant. In other words, quantitatively, changes in NPLs do not have a direct effect on ROA at the level of general significance (10%, 5%, or 1%).

This result is somewhat contradictory to much of the literature that states that an increase in NPLs tends to lower the bank's profitability. However, in the context of regional development banks, recorded NPLs may still be at the limit of risk tolerance that can be overcome through certain credit reserves or guarantees. In addition, because ROA is an indicator of short-term profitability, the impact of NPLs can be long-term and not immediately visible in the observed time.

Although not statistically significant, credit risk management remains an important area. A strong risk mitigation policy is required, including a comprehensive creditworthiness analysis and regular monitoring of asset quality.

In theory, NPLs have a negative relationship with ROA. This is because the increase in NPLs indicates a problem in the quality of the bank's credit portfolio, which can result in an increase in the burden of impairment loss (CKPN) reserves. As a result, the bank's net profit will decrease, which will ultimately lower the ROA. In addition, high NPLs also pose a risk to the bank's liquidity and operational stability because funds that should generate income become unproductive.

However, in this study, it was found that NPLs did not have a significant effect on ROA at the Central Java Provincial Regional Development Bank during the 2017–2024 period. This means that even though there are fluctuations in the NPL ratio, the change does not have a strong enough impact on the bank's return on assets. This result can occur due to several possibilities:

1. Effective Risk Management: Despite the increase in NPLs, banks are able to manage them well through credit risk mitigation strategies and the establishment of sufficient loss reserves.
2. Income Diversification: Banks may have other sources of income other than credit (such as fee-based income) that are able to cover the negative impact of NPLs.
3. Macroeconomic Stability: During the observation period, economic conditions were relatively stable, so that despite the existence of non-performing loans, the level of losses realized was not significant.

Nevertheless, banks must still pay close attention to the development of NPLs, because if allowed to increase without adequate management, it will ultimately have a negative impact on profitability and long-term financial stability. Strategies such as rigorous creditworthiness assessments, ongoing credit monitoring, and efficient credit restructuring processes should be implemented consistently.

The KPMM variable shows a coefficient of +0.03166 with a probability value of 0.04550, which means significant at a significance level of 5%. This positive coefficient shows that every 1 percent increase in KPMM will increase the ROA by 0.03166 percent, indicating that stronger capital contributes positively to profitability. A very high KPMM can indicate that the bank's capital is not being used optimally to generate income. The idle capital does not contribute directly to profits, thus reducing asset efficiency and having an impact on stagnant or even declining ROA. And high KPMM often reflects a conservative stance on credit expansion. Being too careful in disbursing credit can limit the potential of interest income, which is the main source of bank profits, so that ROA does not increase optimally. But it should also be remembered that banks with high CAR tend to be more trusted by customers, investors, and business partners because they are considered more stable and resistant to economic shocks. This trust can expand the third-party fund base (DPK) and increase business potential, leading to increased profits and ROA.

From the perspective of the Basel Accords and the prudential principle in banking, a high capital adequacy ratio provides a buffer against the risk of loss and increases market confidence in the health of banks. Strong capital also allows banks to take on greater expansion opportunities, such as new credit disbursements or business diversification, which ultimately drives increased ROA.

In the context of profitability, especially Return on Assets (ROA), KPMM plays a role as the main foundation that affects the stability and operational efficiency of banks. The results of this study show that KPMM has a positive and significant effect on ROA, which means that the higher the bank's capital adequacy, the higher the level of profitability. This can be explained through several theoretical and empirical arguments.

First, banks with high KPMM have a better ability to absorb risks, including credit and market risks. Sufficient capital makes banks more flexible in expanding their businesses, such as providing credit and investment, without sacrificing long-term financial health. With strong capital, banks are freer to carry out productive activities that generate income, thereby increasing net profit and ultimately enlarging ROA.

Second, sufficient capital also reflects regulators and market confidence in the stability of banks. This can have an impact on reducing the cost of funds, because customers and investors tend to feel safer to keep their funds in banks that are considered capital-sound. That way, operational efficiency can be improved, and profit margins are more optimal.

Third, in terms of supervision, the Financial Services Authority (OJK) requires banks in Indonesia to maintain KPMM at least 8%, but in practice banks that have KPMM above the minimum value will be considered more resilient to external pressures, including economic turmoil. In this study, the Central Java Provincial Regional Development Bank had an average KPMM of 20.16%—far above the minimum requirement—and this proved to have a positive impact on ROA.

This research is in line with a study by Nugrohowati (2019) which showed that banks with high KPMM levels tend to have better ROAs. They stated that capital adequacy is the main determinant in managing credit and operational risk effectively, especially in regional banks that have different business characteristics from national commercial banks.

Nonetheless, it is also important for banks to maintain a balance between capital adequacy and capital use efficiency. Capital that is too high but not used productively can cause underutilization and reduce financial efficiency. Therefore, optimizing the capital structure must be the main strategy so that KPMM continues to support increased profitability.

Thus, the relationship between KPMM and ROA shows that capital is not only a protector against risk, but also a strategic instrument to improve financial performance. Banks that can maintain capital adequacy at optimal levels will have a stronger position in generating profits, increasing stakeholder confidence, and maintaining long-term business sustainability.

The policy recommendation that can be taken is to maintain KPMM at an adequate level even exceeding the minimum limit of regulators. Incentives can be given to banks that have strong capital to expand access to productive financing, especially in the real sector that supports regional economic growth.

CONCLUSION

Based on the results of research conducted on the influence of BOPO, LDR, NPL, and KPMM on ROA at the Regional Development Bank of Central Java Province during the period 2017 to 2024, the results of the study can answer the research objectives, namely BOPO, LDR and KPMM have an influence on ROA, while NPL has no influence on ROA.

1. Effect of BOPO on ROA: The regression results show that BOPO (Operating Costs to Operating Income) has a significant negative influence on ROA. The higher the BOPO, the lower the bank's profitability. This shows that banks must strive to improve their operational efficiency to increase profitability.
2. Influence of LDR on ROA: LDR (Loan to Deposit Ratio) also has a negative influence on ROA. This indicates that the level of utilization of third-party funds to be disbursed in the form of credit that is too high can increase liquidity risks and reduce the bank's profitability. Banks need to maintain a balance between the level of credit disbursement and good liquidity management.
3. Effect of NPLs on ROA: NPLs (Non-Performing Loans) did not show a significant influence on ROA in this study. Although NPLs are an important indicator in assessing credit quality, these results show that during the period studied, asset quality did not have a strong direct impact on the bank's profitability in BPD Central Java.
4. The Influence of KPMM on ROA: KPMM (Minimum Capital Adequacy) has a significant positive influence on ROA. The higher the KPMM, the better the bank's capital position in dealing with risks and potential losses. This shows that banks that have good capital adequacy tend to be more stable and can generate higher profits.

Based on the results of this study, there are several recommendations that can be given for the Regional Development Bank of Central Java Province in improving its financial performance and profitability:

To increase ROA, banks need to reduce the BOPO ratio by 3-5% per year through operational cost efficiency, process digitalization, and increased employee productivity. Quarterly evaluation of the cost structure and technology utilization is the main step. In liquidity management, the LDR ratio is maintained in the range of 80–90% with credit scoring-based credit selection and exposure restrictions in high-risk sectors. Regular reviews of the credit portfolio ensure a balance between expansion and liquidity. Although NPLs have not significantly affected ROA, their control is still important. The gross NPL target is set below 3%, with the strengthening of the early warning system, supervision of non-performing debtors, and evaluation of credit reserve policies. For the capital structure, banks must maintain the KPMM ratio above 14% through periodic stress testing and diversification of capital sources such as subordinated bonds or rights issues. Strong capital not only strengthens risk resilience but also drives healthy and sustainable business expansion capacity.

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