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The Effect of Non-Performing Loans (NPL) and Operational Costs to Operating Income (BOPO) on Core Capital with Return on Assets (ROA) as a Mediating Variable in Rural Banks (BPR) in the East Bekasi Region for the Period of 2019-2024

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ABSTRACT

This study aims to analyze the effect of Non-Performing Loans (NPL) and Operational Costs to Operating Income (BOPO) on core capital, with Return on Assets (ROA) as a mediating variable in Rural Banks (*Bank Perkreditan Rakyat*/BPR) in the East Bekasi region for the period 2019–2024. This research employs a quantitative approach using secondary data obtained from the annual financial statements of 21 rural banks, which are structured as panel data and analyzed using the pooled data method. The analytical method applied is path analysis using a multiple linear regression approach with the assistance of SPSS version 25. The analysis is conducted through two structural models: the first model examines the effect of NPL and BOPO on ROA, while the second model examines the effect of NPL, BOPO, and ROA on core capital. The results indicate that NPL and BOPO have a negative and significant effect on core capital. NPL does not have a significant effect on ROA, whereas BOPO has a negative and significant effect on ROA. Furthermore, ROA is proven to have a positive and significant effect on core capital. The mediation test results show that ROA acts as a mediating variable in the relationship between NPL and BOPO and core capital, indicating that the impact of credit risk and operational efficiency on rural banks' capital does not occur solely through direct effects but is also transmitted through profitability performance.

KEYWORDS Non-Performing Loans, BOPO, Return on Assets, Core Capital, Rural Banks

INTRODUCTION

Banking is very important in strengthening the Indonesian economy. By providing loans, the banking sector encourages greater investment and stimulates economic progress (Majid et al., 2018). In this context, banks play an important role in providing financial support to small and medium-sized enterprises, which are significant economic assets for Indonesia. According to Law No. 10 of 1998, banks are grouped based on their type into two groups: Commercial Banks (Bank Umum) and People's Economy Banks (BPR). *Bank Perekonomian Rakyat* (hereinafter abbreviated as BPR) is a conventional bank that in its activities does not provide payment traffic services. ("POJK 7 of 2024 People's Economic Bank and Sharia People's Economic Bank," n.d.) The People's Economic Bank (BPR) is an important entity within the Indonesian banking framework, indicating that BPRs operate with a narrower focus compared to commercial banks. BPR mainly aims to meet the needs of people in rural and suburban areas, with a special emphasis on micro, small, and medium enterprises (MSMEs) (Aulia & Anwar, 2021).

The People's Economic Bank (BPR) has a strategic role in supporting regional economic growth, especially in distributing credit to micro, small, and medium enterprises (MSMEs) (Pramono et al., 2024). As a financial intermediation institution, BPRs are required

to maintain healthy financial performance, especially in terms of profitability and capital. One of the main indicators that reflects the strength of the bank's capital is Core Capital, which is the basis for the bank's resilience in the face of business risks and banking regulatory provisions (Linggadjaya et al., 2025).

Core Capital in BPR is greatly influenced by the bank's ability to generate profits sustainably (Saputri & Sitorus, 2024). Return on Assets (ROA) is used as the main indicator to assess the level of profitability of a bank, as this ratio shows the ability of management to manage all assets owned to generate profits (Assaf et al., 2021; Dewanti et al., 2022). The higher the ROA, the greater the potential for retained earnings which can strengthen BPR's Core Capital. However, the level of profitability of BPRs is inseparable from various internal factors, especially credit risk and operational efficiency (Siniţîn & Socol, 2020). Credit risk is reflected through the Non-Performing Loan (NPL) ratio, which shows the level of non-performing loans in a bank's credit portfolio. High NPLs will have an impact on increasing reserve costs, decreasing interest income, and declining profits, which can ultimately hinder Core Capital growth (Sutardiyanta & Nugraha, 2024).

In addition to credit risk, operational efficiency also plays an important role in determining BPR's financial performance. The Operating Cost to Operating Income (BOPO) ratio is used to measure the level of efficiency of banks in carrying out their operational activities (Ferly et al., 2023; Hidayat et al., 2022; Nurcahyaningtyas, 2015). High BOPO indicates operational inefficiencies, which has the potential to reduce profits and slow down Core Capital growth (Yuhasril, 2019).

The condition of BPRs in the East Bekasi region in the 2019–2024 period faces various challenges, including economic slowdowns, the impact of the COVID-19 pandemic, and increased competition between financial institutions. These conditions have the potential to affect credit quality, operational efficiency, and BPR's ability to generate profits and strengthen capital (Siregar et al., 2024). Therefore, a comprehensive empirical study is needed to analyze how NPL and BOPO affect Core Capital with ROA as a mediating variable in BPRs in the East Bekasi area (Putri & Dana, 2018). Based on this description, this study is important to provide empirical evidence regarding the mechanism of the influence of credit risk and operational efficiency on BPR Core Capital through profitability, so that the results of the research are expected to be considered for BPR management and stakeholders in strategic decision-making.

In addition, the growing advances in the banking sector and the demand from the public for diverse, convenient, and fast financial solutions, as well as the rapid evolution of information technology, have encouraged *Bank Perekonomian Rakyat* (BPR) to increase its offerings further to be competitive, where there is an increase in risks in BPR. Along with the increasing complexity of BPR products and operations and the increasing risks faced by BPRs, managing risk management strategies and maintaining the bank's health level requires BPRs to be stronger and larger in terms of capital (Kasmir, 2015). In accordance with the strategic objectives for BPR growth and institutional strengthening, as well as improving the position of the BPR industry, the goal is to build a financial sector that develops in a healthy

and sustainable manner, with strong and stable capital while maintaining a competitive advantage.

BPRs also face challenges in maintaining health levels and strengthening capital, one of which is related to credit performance and operational efficiency. The BPR health level is the result of an assessment of BPR conditions carried out on the risk profile, governance, profitability, and capital factors of BPR. The capital factor indicates the adequacy of capital to cover the bank's potential losses. BPR is required to provide a Minimum Capital Provision Obligation (KPMM) of at least 12% of Risk-Weighted Assets (ATMR), with a minimum ratio of BPR's core capital of 8% of ATMR. ("POJK 5. Obligation to Provide Minimum Capital of People's Credit Banks," n.d.) Core capital is an indicator that shows strong BPR and can compete in today's fast-growing banking industry, so that it can invest in several important pillars, such as information technology to maintain data security and banking transactions.

In accordance with the Financial Services Authority Regulation (POJK) Number 5/POJK.03/2015 concerning the Obligation to Provide Minimum Capital and Fulfill the Minimum Core Capital of People's Credit Banks, it is stated that BPR is obliged to provide core capital as referred to in Article 3 paragraph (1) letter a of at least 8% (eight percent) of ATMR, and stipulates that BPR/BPRS must meet the requirements of core capital of Rp6,000,000,000.00 (six billion rupiah) no later than December 31, 2024. ("POJK 5. Obligation to Provide Minimum Capital of People's Credit Banks," n.d.) However, currently the condition of BPRs in Indonesia is that around 5% of BPRs/BPRS still have core capital below Rp6,000,000,000.00 (six billion rupiah). Of the total number of BPRs that reached 1,500 BPRs, it was recorded that until December 2024 there were 16 BPRs that were bankrupt and closed by the OJK, automatically reducing the number of BPRs. Apart from mismanagement, the decline in financial performance has caused some of them not to be able to meet the minimum core capital of IDR 6,000,000,000.00 (six billion rupiah) until the end of 2024 (Khamisah et al., 2020).

The Financial Services Authority encourages consolidation for BPRs that are still short of capital, including mergers, acquisitions, and additional paid-up capital for the fulfillment of core capital, as the addition of core capital is an effort by regulators to strengthen capital resilience for BPRs. Without large and strong capital, BPR cannot compete with advances in the banking sector such as technology investment for data security and banking transactions. Market expansion is also limited, so that BPR is not optimally developed. The lack of core capital causes BPRs to become unhealthy, and if not increased, causes BPRs to be closed or their licenses revoked by the OJK.

Rahmawati and Mahfudz (2018) argue that the capital structure describes the extent to which the company utilizes debt to finance its operational activities. In line with this, Wibisono and Wahyuni (2019) contend that a bank's capital must be used effectively to maintain its operations. Potential losses are inherent in the fluctuations of a bank's assets because it acts as a financial intermediary. While there are various risks associated with the passive movement of these assets, it is crucial to increase the role of bank assets in generating profits.

Core capital is a very important component—the most stable and permanent form of capital. It is very important and affects the performance of BPRs, among others by playing a

role in determining the credit distribution capacity, which is the largest source of profit for BPRs, because the larger and stronger the core capital, the greater the limit of the ability to provide credit to the community. Core capital also supports the financial health of BPRs because strong and large core capital can cover and defend BPRs from non-performing loan losses and keep BPRs liquid and solvent.

Core capital is a key factor in building public trust in BPRs because it reflects the strength of the bank's capital structure and financial performance. Strong core capital increases BPR's competitiveness, expands business space, and supports network expansion, service diversification, technology adoption, and credit distribution. On the other hand, weak core capital can limit operational activities, reduce customer confidence, and have an impact on declining bank health. Therefore, understanding the relationship between NPL, BOPO, ROA, and core capital is very important to maintain the stability and sustainability of BPR, especially amid economic dynamics and increasingly stringent regulatory demands.

The urgency of this research is underscored by the current condition of the BPR sector in Indonesia. Data indicates that approximately 5% of BPRs still have core capital below the mandated IDR 6 billion threshold. Between 2020 and 2024, dozens of BPRs have faced license revocation by the Financial Services Authority (OJK), partly attributed to an inability to meet capital requirements due to deteriorating financial performance. In the East Bekasi region specifically, preliminary observations suggest that many BPRs are struggling with high NPLs and BOPO, alongside low ROA, putting pressure on their core capital and long-term viability.

The novelty of this research lies in its specific focus on the mediating role of ROA in the relationship between NPL, BOPO, and Core Capital within a defined regional sample of BPRs over a six-year period (2019–2024). By employing path analysis, this study moves beyond examining direct effects to uncover the indirect pathways through which credit risk and operational efficiency impact capital. This provides a more nuanced understanding of the financial dynamics at play and offers a clearer diagnostic framework for BPR management.

The primary purpose of this research is to empirically investigate the direct and indirect effects of NPL and BOPO on Core Capital, with ROA serving as a mediating variable, in BPRs located in the East Bekasi region. The contribution of this study is twofold: theoretically, it enriches the banking literature by validating a mediation model in the context of Indonesian rural banks; practically, it provides evidence-based insights for BPR management to formulate targeted strategies for improving efficiency, credit quality, and profitability, thereby strengthening core capital and ensuring regulatory compliance. The research objectives are to analyze the effect of NPL and BOPO on ROA, to analyze the direct effect of NPL, BOPO, and ROA on Core Capital, and to test the mediating role of ROA. The benefits of this research are intended for BPR management as a basis for strategic decision-making, for regulators as input for policy evaluation, and for academics as a foundation for future research.

BPR data in the East Bekasi region for the 2019–2024 period shows high NPLs and BOPO as well as low ROA, while the average core capital is still below the regulator's provisions. This condition underscores the importance of research to analyze the influence of

NPL and BOPO on core capital, both directly and indirectly through ROA as a mediation variable. This research is expected to make a theoretical contribution in the development of banking literature as well as practical recommendations for BPR management and regulators in formulating strategies to improve efficiency, credit quality, profitability, and core capital fulfillment in a sustainable manner.

METHOD

This study used a quantitative approach with an explanatory design aimed at testing the cause-and-effect relationships between variables through hypothesis testing. The variables analyzed included Non-Performing Loans (NPL) and Operating Costs to Operating Income (BOPO) as independent variables, Return on Assets (ROA) as a mediating variable, and Core Capital as the dependent variable.

This study also used panel data, which is a combination of time series data for the 2019–2024 period and cross-sectional data from several conventional BPRs in the East Bekasi area. The use of panel data allowed for a more comprehensive picture of the dynamics of BPR financial performance over time as well as the differences in characteristics between BPRs.

The population in this study comprised all conventional People's Economic Banks (BPR) operating in the East Bekasi area that were registered and supervised by the Financial Services Authority (OJK) during the 2019–2024 financial statement period.

The sample was determined using purposive sampling. The sample criteria included: (1) BPRs registered and under the supervision of the OJK; (2) operating in the East Bekasi area and its surroundings; (3) not in liquidation or subject to restrictions on business activities during the research period; (4) having consistently published financial statements to the OJK for the 2019–2024 period; and (5) having experienced a decrease in core capital or having not fully met core capital requirements. Based on these criteria, 22 BPRs were selected as the research sample.

The data used in this study were secondary quantitative data in the form of BPR annual financial statements sourced from the official website of the OJK, specifically the financial publication reports of conventional BPRs in the East Bekasi area for the 2019–2024 period. Data were collected through documentation, namely by downloading, recording, grouping, and processing published financial statement data. The data collected included the NPL, BOPO, and ROA ratios, as well as core capital values.

The data analysis technique used was path analysis with a multiple linear regression approach based on panel data to test the direct and indirect effects between variables. Prior to hypothesis testing, descriptive analysis was conducted to obtain an overview of the characteristics of the research variables. The analysis model consisted of two structural equations: the first tested the effect of NPL and BOPO on ROA as the mediating variable, while the second tested the effect of NPL, BOPO, and ROA on Core Capital as the dependent variable. Hypothesis testing was carried out using a partial test (t-test), a simultaneous test (F-test), and a coefficient of determination test, as well as an indirect effect test to examine the mediating role of ROA (Arnanto & Lutfi, 2025).

RESULT AND DISCUSSION

Overview of Research Data

This study uses panel-pool data derived from the annual financial statements of 22 conventional People's Economic Banks (BPR) operating in the East Bekasi BPR area during the 2019-2024 time period. The data analyzed includes the ratio of NPL, BOPO, ROA and Core Capital of Bank Perekonomian Rakyat in the East Bekasi region for the period 2019 – 2024.

Statistics Descriptive

Descriptive statistics are used to provide an overview of the characteristics of the research data, including minimum, maximum, mean, and standard deviation. The mean value reflects the average tendency of each variable during the observation period, while the standard deviation shows the degree of variation in data between BPRs and between study periods.

Table 1. Descriptive Statistics of Research Variables

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Hours of deviation
NPL	132	.05	50.23	14.4136	11.33083
BOPO	132	59.15	217.19	102.1346	32.73434
LENGTH	130	-23.66	7.83	.3302	4.92555
Core Capital	132	362774.00	14565350.50	6226824.3220	2472245.10445
Valid N (listwise)	130				

Descriptive Statistical Formulas

Number of Observations (N) $N =$ Jumlah seluruh data pengamatan

Minimum Score $\text{Minimum} = \min(X_1, X_2, \dots, X_n)$

Maximum Value $\text{Maksimum} = \max(X_1, X_2, \dots, X_n)$

Mean $\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$

Standard Deviation $SD = \sqrt{\frac{\sum_{i=1}^{n}(X_i - \bar{X})^2}{n-1}}$

Descriptive statistics are used to provide an overview of the characteristics of the research data which includes the minimum, maximum, mean, and standard deviation values of each variable studied, namely Non-Performing Loan (NPL), Operating Costs to Operating Income (BOPO), Return on Assets (ROA), and BPR Core Capital.

In general, the average value of each variable shows the condition of the financial performance of BPR in the East Bekasi area during the research period. The variation in the data is reflected in the standard deviation value which describes the difference in performance between BPRs and between periods.

Based on the results of data processing, the Non-Performing Loan (NPL) variable has a total of 132 data observations, with a minimum value of 0.05% and a maximum value of 50.23%. The average NPL value was recorded at 14.41% with a standard deviation of 11.33%. This shows that on average, the level of non-performing loans in BPRs in the East

Bekasi area is still relatively high and shows considerable variation between BPRs and between research periods. The high standard deviation indicates a significant difference in credit quality among the BPRs that are the object of the study.

The variable of Operating Costs to Operating Income (BOPO) also has 132 observations, with a minimum value of 59.15% and a maximum of 217.19%. The average value of BOPO is 102.13% with a standard deviation of 32.73%. The average value of BOPO which is above 100% shows that in general BPR's operational efficiency is still relatively low, where operational costs tend to be greater than operating income. The high variation in BOPO reflects the difference in operational efficiency levels between BPRs during the observation period.

For the Return on Assets (ROA) variable, the number of valid observations was recorded as many as 130 data, with a minimum value of -23.66% and a maximum value of 7.83%. The average ROA value is 0.33% with a standard deviation of 4.93%. The relatively low average ROA indicates that BPR's ability to generate profits from its assets is still limited. A negative minimum ROA value indicates a loss of BPRs in a given period, while a sizable standard deviation reflects fluctuations in profitability between BPRs.

Meanwhile, the Core Capital variable has 132 observations with a minimum value of IDR 362,774 and a maximum value of IDR 14,565,350.50. The average value of core capital was recorded at IDR 6,226,824.32 with a standard deviation of IDR 2,472,245.10. The magnitude of the standard deviation shows that there is a significant difference in capital scale between BPRs in the East Bekasi area, which reflects the heterogeneity of the size and capital capacity of banks.

Overall, the results of this descriptive statistics show that the financial performance of BPRs in the East Bekasi region during the 2019–2024 period is heterogeneous, both in terms of credit risk, operational efficiency, profitability, and capital. The high variation of data between variables supports the use of regression analysis and path analysis at the next stage to test the structural relationships between research variables.

Classic Assumption Test

1. Normality Test

The normality test aims to see if the data comes from a normally distributed population or is in a normal distribution. What is desired in a study is data that is distributed normally. In this study, the data obtained are data on the influence of NPL, BOPO, ROA on Core Capital with ROA as a mediating variable. Then the data obtained was analyzed for normality using the Kolmogorov Smirnov (K-S) test through the help of the SPSS release 25.0 program. The decision making in this test is that if the significance value is > 0.05, then the data is normally distributed. The results of the normality test analysis calculation can be seen as follows:

Table 2. Normality test analysis calculation results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		130
Normal Parameters[a,b]	Mean	0.000
	Hours of deviation	2230300.38
Most Extreme Differences	Absolute	0.089
	Positive	0.089

Negatives	-0.076
Test Statistic	0.089
Asymp. Sig. (2-tailed)	0.063c
a. Test distribution is Normal	
b. Calculated from data.	
c. Liliefors Significance correction.	

Based on the table above, the significance value of 0.063 is greater than 0.05 (p>0.05). Since the significance value is greater than 0.05 (p>0.05), it is concluded that the data is normally distributed.

2. Multicollinearity Test

The Multicollinearity Test was carried out by looking at the Tolerance and VIF values. The free variable does not experience multicollinearity if the Tolerance value is greater than 0.1 and the VIF value is less than 10. The results of the multicollinearity test showed that no correlation was found between independent variables so that in this study there was no multicollinearity. For more details, we can see the table of multicollinearity test results below:

Table 3. Multicollinearity test results

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)	-	-
NPL	0.800	1.250
BOPO	0.203	4.916
LENGTH	0.209	4.795
a. **Dependent Variable: Modal Inti**		

Based on the table above, it can be seen that all independent variables, namely the NPL variable (X1) has a tolerance value of 0.800 and a VIF value of 1,250, the BOPO variable (X2) has a tolerance value of 0.203 and VIF of 4,916, and the ROA variable (Z) has a tolerance value of 0.209 and VIF of 3,744. This means that the free variable does not show any symptoms of multicollinearity because it has a VIF value less than the maximum limit of 10 or a tolerance value greater than 0.1. Thus, there was no violation of the multicollinearity assumption in the regression equation model in this study.

3. Heteroskedastic Test

The heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from one residual observation to another. If the variance from the residual of one observation to another is fixed, then it is called homoscedasticity and if it is different it is called heteroscedasticity. The heteroskedasticity test was carried out by regressing the independent variable with the residual absolute value. If the free variable does not have a significant effect on the residual absolute, it means that there are no symptoms of heteroskedasticity. On the other hand, if the free variable has a significant effect on the residual absolute, it means experiencing symptoms of heteroskedasticity. A good regression model is one that is homogeneous or that does not have heteroscedasticity.

Table 4, Heteroskedasticity test results

Model	Unstandardized B	Std.Error Coefficients	Standarized Coefficient Beta	t	Sig.
Constant	1895643.10	914888.49	-	2.072	0.010
NPL	-36578.96	12538.97	-0.280	-1.917	0.064
BOPO	3036.79	8908.92	0.065	0.341	0.734
LENGTH	-48643.79	56555.47	-0.162	-0.860	0.391

a. Variable Dependent: Residual Absolute

Based on the table above, the NPL variable (X1) has a significance value of 0.063 greater than 0.05 (p>0.05), the BOPO variable has a significance value of 0.315 greater than 0.05 (p>0.05) and the ROA variable (Z) has a significance of 0.725 greater than 0.05 (p>0.05). Based on this, it can be concluded that all free variables have no significant effect on the Residual Absolute value, so it is concluded that all free variables do not experience symptoms of heteroskedasticity.

4. Autocorrelation Test

The Autocorrelation test was performed to test whether in the linear regression model there is a correlation between the disruptive error in period t and the error in the period t (previous). Conclusions were drawn by looking at the Durbin Watson value (Dw), dL value and dU value on the Durbin Watson table. If the value of du<d<4-du is then it is concluded that there is no autocorrelation.

Table 5. Results of autocorrelation tests

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.890a	0.791	0.788	2.266	1.942

a. Predictors: (Constant), ROA, NPL, BOPO

b. Dependent Variable: Modal Inti

The value of Durbin Watson (d) obtained was 1,942, the value of dL was 1,669 and the value of dU was 1,762. Value 4-du = 2.238. So that the value of du<d<4-du (1.762<1.942<2.238) with the conclusion that there is no autocorrelation.

A. Hypothesis Test

This analysis was chosen in order to study the dependence of a number of variables in the model. This analysis is a good method to explain when there is a large set of data to analyze and look for causal relationships. Regression analysis was carried out twice. The first regression analysis was to determine the strength of the relationship between independent variables and intervening variables. The second regression analysis is to determine the strength of the relationship between independent variables and dependent variables. To answer the hypotheses in this study, they will be described one by one as follows:

1. Structure Path Analysis 1

a. Direct Effect of NPL (X1) on ROA (Z)

The following is the result of the coefficient of direct influence of NPL (X1) on ROA (Z). For more details, we can see the table below:

Table. 6. Coefficient of direct influence of NPL (X1) on ROA (Z)

Coefficients					
Model	Unstandardized Coefficients		Standarized Coefficients		
	B	Std. Error	Beta	t	Say.
(Constant)	14.311	0.669	-	21.384	0.000
NPL	-0.014	0.020	-0.032	-0.709	0.480
a. Dependent Variable: ROA					

Based on the table above, it can be seen that the significance value of the NPL variable (X1) of 0.480 is greater than 0.05 (p>0.05). This means that H1 is rejected which means that it can be concluded that there is no direct influence of the NPL variable (X1) on ROA (Z). Based on the regression equation table, namely: Z= 14.311- 0.014 X1

Z = ROA

X1 = NPL

b. Direct Effect of BOPO (X2) on ROA (Z)

The following are the results of the coefficient of direct influence of BOPO (X2) on ROA (Z). For more details, we can see the table below:

Table. 7. Coefficient of direct influence of BOPO (X2) on ROA (Z)

Coefficients					
Model	Unstandardized Coefficients		Standarized Coefficients		
	B	Std. Error	Beta	t	Say.
(Constant)	14.311	0.669	-	21.384	0.000
BOPO	-0.136	0.007	-0.875	-19.352	0.000
a. Dependent Variable: ROA					

Based on the table above, it can be seen that the significance value of the BOPO variable (X2) of 0.000 is less than 0.05 (p<0.05). This means that H2 is accepted which means that it can be concluded that there is a direct influence of the BOPO variable (X2) on ROA (Z). The value of the coefficient of BOPO's influence on ROA (Z) of -0.136 is negative, which means that when BOPO increases, ROA decreases. Based on the regression equation table, namely:

Z= 14.311- 0.136 X2

Z = ROA

X2 = BOPO

c. Coefficient of Determination (r2), Simultaneous F-Test and Structure 1 pathway summary

Table 8. F test results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.890a	0.791	0.788	2.266

a) Predictors: (Constant), ROA, NPL, BOPO

The magnitude of the R2 or R Square contained in the Model Summary table is 0.791, this shows that the contribution or contribution of the influence of NPL(X1), BOPO (X2) on ROA (Z) is 79.1% while the remaining 20.9% is the contribution of other variables outside this study. e1=√(1-0.791) = 0.457

Table 9.

Model	Sum of Square	Df	Mean Square	F	Sig.
Regression	2477.00	2	1238.20	240.99	0.000b
Residual	652.68	127	5.139		
Total	3129.68	129			

a) Dependent Variable: ROA
b) Predictors: (Constant), BOPO, NPL

The following is the overall regression equation of the variables NPL (X1), BOPO (X2) against ROA (Z)

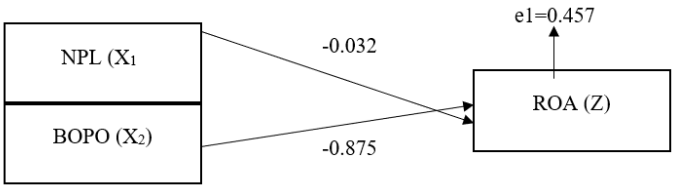
Z= 14.311 - 0.014 X1 -0.136 X2

Z = ROA

X1 = NPL

X2 = BOPO

The table above is a simultaneous test of the variables NPL (X1) and BOPO (X2) against ROA (Z). Based on the Anova table, the significance value of 0.000 is smaller than 0.05 (p<0.05) so that H3 is accepted and it is concluded jointly (simultaneously) that the variables NPL (X1) and BOPO (X2) have a significant effect on ROA (Z).



2. Structural Path Analysis 2

a. Direct Influence of NPL (X1) on Core Capital (Y)

The following are the results of the direct influence coefficient of NPL (X1) on Core Capital (Y). For more details, we can see the table below:

Table 10. Direct influence coefficients of NPLs (X1) on Core Capital (Y)

Coefficients					
Model	Unstandardized Coefficients		Standarized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	8475555.52	1428952.03	-	5.931	0.000
NPL	-28618.62	19584.43	-0.432	-4.461	0.000
a. Dependent Variable: Modal Inti					

Based on the table above, it can be seen that the significance value of the NPL variable (X1) of 0.000 is less than 0.05 (p<0.05). This means that H4 is accepted, which means that it can be concluded that there is a direct influence of the NPL variable (X1) on Core Capital (Y). The value of the influence coefficient of NPL (X1) on Core Capital (Y) of -28618.62 is negative, which means that when NPLs increase, Core Capital decreases. Based on the regression equation table, namely:

Y= 8475555.52-28618.62 X1

Y = Modal Inti

X1 = NPL

b. Direct Influence of BOPO (X2) on Core Capital (Y)

The following are the results of the direct influence coefficient of BOPO (X2) on Core Capital (Y). For more details, we can see the table below:

Table 11. Coefficient of direct influence of BOPO (X2) on Core Capital (Y)

Coefficients					
Model	Unstandardized Coefficients		Standarized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	8475555.52	1428952.03	-	5.931	0.000
BOPO	-26057.056	13914.708	-0.235	-2.873	0.010
a. Dependent Variable: Modal Inti					

Based on the table above, it can be seen that the significance value of the BOPO variable (X2) of 0.010 is less than 0.05 (p<0.05). This means that H5 is accepted, which means that it can be concluded that there is a direct influence of the BOPO variable (X2) on Core Capital (Y). The value of the coefficient of BOPO's influence on Core Capital (Y) of -26057,056 is negative, which means that when BOPO (X2) increases, the Core Capital decreases. Based on the regression equation table, namely:

Y= 8475555.52- 26057.06X2

Y = Modal Inti

X2 = BOPO

c. Direct Influence of ROA(Z) on Core Capital (Y)

The following are the results of the direct influence coefficient of ROA(Z) on Core Capital (Y). For more details, we can see the table below:

Table 12. Coefficient of direct influence of ROA (Z) on Core Capital (Y)

Coefficients					
Model	Unstandardized Coefficients		Standarized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	8475555.52	1428952.03	-	5.931	0.000
LENGTH	70549.078	88333.173	0.341	3.799	0.004
a. Dependent Variable: Modal Inti					

Based on the table above, it can be seen that the significance value of the ROA variable (Z) of 0.004 is smaller than 0.05 (p<0.05). This means that H6 is accepted which means that it can be concluded that there is a direct influence of the ROA variable (Z) on Core Capital. The value of the coefficient of influence of ROA(Z) on Core Capital (Y) of 70549.08 has a positive value, meaning that when ROA(Z) increases, the Core Capital (Y) increases. Based on the regression equation table, namely:

Y= 8475555.52+ 70549.08 Z

Y = Modal Inti

Z = ROA

d. Coefficient of Determination (r2), Simultaneous F-Test and Structure 1 pathway summary

The following is the overall regression equation of the NPL (X1), BOPO (X2) and ROA (Z) variables to Core Capital (Y)

Y= 8475555.52+28618.62 X1 -26057.06X2 +70549.08 Z

Y = Core Modal ; X1 = NPL; X2 = BO; Z = LENGTH

Table 13

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.423a	0.579	0.659	2256695.39

c) Predictors: (Constant), ROA, NPL, BOPO

The amount of R2 or R Square contained in the Model Summary table is 0.579, this shows that the contribution or contribution of the influence of NPL (X1), BOPO (X2) and ROA (Z) on Core Capital (Y) is 57.9% while the remaining 42.1% is the contribution of other variables outside this study. e2=√(1-0.579) = 0.649

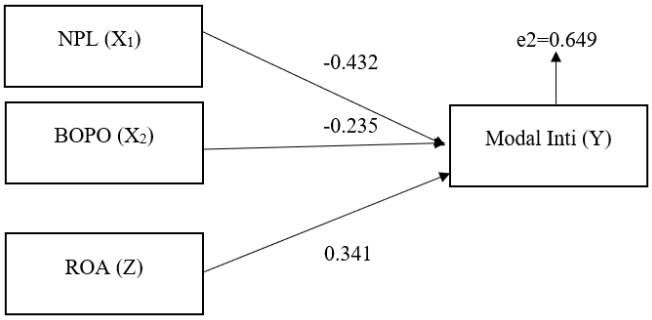
Table 14

Model	**Sum of Square**	**Df**	**Mean Square**	**F**	**Sig.**
Regression	139852642975568.00	3	46617547658523.0	106.09	0.000b
Residual	641676933830206.6	126	50926740788017.5		
Total	781529576805774.6	129			

c. Dependent Variable: Modal Inti

d. Predictors: (Constant), ROA, NPL, BOPO

The table above is a simultaneous test of the variables NPL (X1), BOPO (X2) and ROA (Z) against Core Capital (Y). Based on the Anova table, the significance value of 0.000 is less than 0.05 (p<0.05) so that H7 is accepted and concluded together (simultaneously) that the variables NPL (X1), BOPO (X2) and ROA (Z) have a significant effect on Core Capital (Y).



ROA MEDIATION TEST (SOBEL TEST)

1. Substructure Analysis 1 :

The Effect of NPL Literacy (X1) on Core Capital (Y) through ROA (Z).

The following is an analysis of the NPL (X1) moderation test on Core Capital (Y) through ROA (Z) as an intervening variable. This moderation test aims to determine the hypothesis that H8 ROA (Z) is able to be a mediating variable between NPL (X1) and Capital (Core) which is described in the form of the following substructure 1:

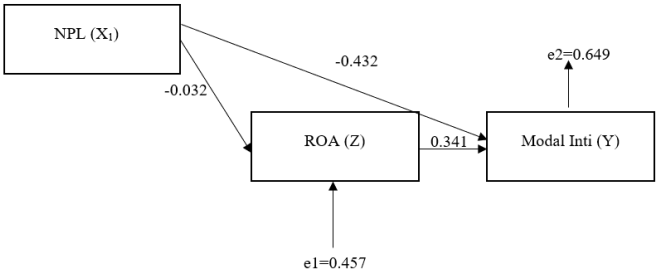


Image 1. Results of Sub Structure 1 Path

The effect of the NPL variable (X1) on Core Capital (Y) is as follows.

a. Direct effect of NPL (X1) on Core Capital (Y) = PyX1 (p1) = -0.432
b. Indirect influence of NPL (X1) on Core Capital (Y) through ROA (Z) PZX1 (p2) x PyZ (p3) = -0.032 x 0.341 = -0.373
c. Total influence = PyX1 + IE = -0.432 +(-0.373) = -0.805

So the direct influence given by NPL (X1) on Core Capital (Y) is -0.432. Meanwhile, the indirect influence of NPL (X1) on Core Capital (Y) through ROA (Z) was -0.373. So the total influence is -0.805. Thus, H8 is accepted, which can be interpreted as having an indirect influence of NPL on Core Capital through a ROA of -0.373.

2. Substructure Analysis 2 :

The Effect of BOPO Literacy (X2) on Core Capital (Y) through ROA (Z). The following is an analysis of the BOPO (X2) moderation test on Core Capital (Y) through ROA (Z) as an intervening variable. This moderation test aims to determine the hypothesis that H9 ROA (Z) can be a mediating variable between BOPO (X2) and Capital (Core) which is described in the form of the following substructure 2:

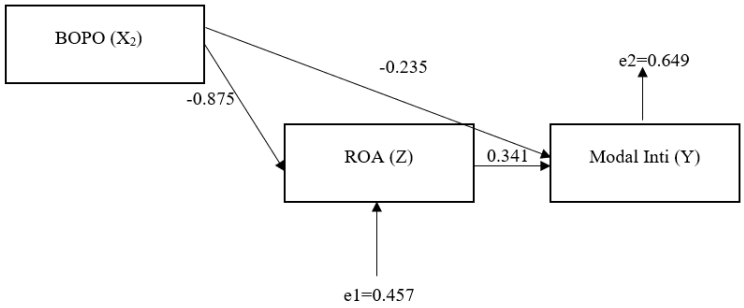


Image 2. Sub Structure 2 Path Results

The effect of the BOPO variable (X2) on Core Capital (Y) is as follows.

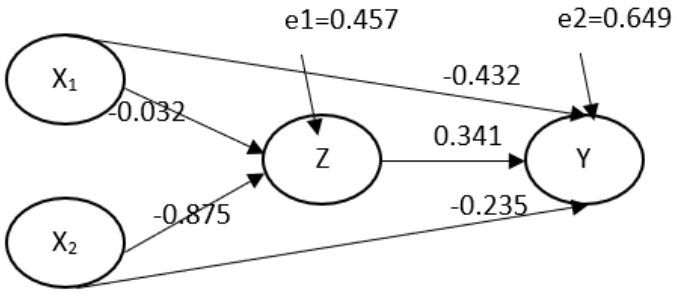
a. Direct effect of BOPO (X2) on Core Capital = PyX2 (p1) = -0.235
b. Indirect influence of BOPO (X2) on Core Capital (Y) through ROA (Z) PZX2 (p2) x PyZ (p3) = -0.875 x 0.341 = -0.298
c. Total influence = PyX2 + IE = -0.235 + (-0.298) = -0.533

So the direct influence given by BOPO (X2) on Core Capital (Y) is -0.235. Meanwhile, the indirect influence of BOPO (X2) on Core Capital (Y) through ROA (Z) is -0.298. So the total influence is -0.533. Thus, H9 is accepted, it can be interpreted that there is an indirect influence of BOPO on Core Capital through a ROA of -0.298.

Table 15 Hypothesis Test Results

No	Hypothesis	VIF	Indirect	Total	Significance	Remarks
1	X1 → Z	-0.032			0.480	H1 rejected
2	X2 → Z	-0.875			0.000	H2 accepted
3	X1 → Y	-0.432			0.000	H4 accepted
4	X2 → Y	-0.235			0.010	H5 accepted
5	Z → Y	0.341			0.004	H6 accepted
6	X1 → Z → Y		-0.373	-0.805		H8 accepted
7	X2 → Z → Y		-0.298	-0.533		H9 accepted

The following is the output of the complete model analysis results that can be seen in the analysis framework model as follows:



Results of Model 1 Regression Analysis

1. Direct Effect of NPL (X1) on ROA (Z)

Based on the results of the regression analysis, a constant value of 14.311 was obtained which shows that when the NPL value is zero, the ROA is estimated at 14.311 units. The

regression coefficient of the variable Non Performing Loan (NPL) is −0.014, which indicates the direction of the negative relationship between NPLs and ROAs. This means that an increase in NPLs tends to lower ROA, even if the decline is relatively small. However, the results of the partial test showed that the effect of NPL on ROA was not statistically significant, which was shown by a t-calculated value of −0.709 with a significance level of 0.480 (> 0.05). This indicates that empirically, NPL has not been able to explain the variation in ROA directly in BPRs in the East Bekasi area during the study period.

The insignificance of the influence of NPLs on ROA indicates that the impact of non-performing loans on BPR profitability does not occur directly, but is mediated by other factors, such as operational efficiency, reserve policies, or the bank's revenue structure. Therefore, although the direction of the relationship between NPLs and ROA is negative and in accordance with banking theory, statistically the influence is not strong enough to be declared significant.

2. Direct Effect of BOPO (X2) on ROA (Z)

Based on the results of the regression analysis, the regression coefficient of the variable Operating Costs to Operating Income (BOPO) showed a negative value, which indicated a negative relationship between BOPO and Return on Assets (ROA). This means that an increase in the BOPO ratio, which reflects higher operating costs compared to operating income, tends to lower the profitability level of BPR. The results of the partial test showed that the effect of BOPO on ROA was statistically significant, which was indicated by a t-count value greater than the t-table with a significance level less than 0.05. These findings indicate that empirically, operational efficiency has a very important role in determining the ability of BPRs to generate profits from assets owned during the study period.

The negative and significant influence of BOPO on ROA shows that the more inefficient the bank's operations, the more depressed the profit will be. In the context of BPR, this condition is particularly relevant given the relatively limited income structure and high dependence on interest income. Therefore, an increase in operating costs without being offset by an increase in revenue will directly reduce the bank's profitability. The results of this study are in line with the theory of banking efficiency which states that operational efficiency is the main determinant of bank profitability. These findings also support previous studies that found that BOPO has a negative and significant effect on ROA, especially in banks with small and medium-sized enterprises such as BPR. Thus, BOPO is proven to be a factor that directly and strongly affects the profitability performance of BPRs in the East Bekasi area.

3. Effect of NPL (X1) and BOPO (X2) on ROA (Z)

Based on the results of the model feasibility test (F test), an F-calculation value of 240.99 was obtained with a significance level of 0.000 (< 0.05). These results show that the regression model involving the variables of Non-Performing Loan (NPL) and Operating Costs to Operating Income (BOPO) simultaneously has a significant effect on Return on Assets (ROA). Thus, the regression model used was declared feasible to explain the variation in ROA in BPR in the East Bekasi area during the study period.

However, the significance of these simultaneous tests does not mean that all independent variables have a partial significant effect. The results of the partial test showed

that the effect of NPL on ROA was not significant, while BOPO had a negative and significant effect on ROA. This condition indicates that the overall significance of the model is mainly driven by the BOPO variable, which has a dominant role in explaining the variation in BPR profitability.

Model 2 Regression Results

1. The Effect of Direct Influence of NPL (X1) on Core Capital (Y)

Based on the results of the regression analysis, a constant value of 8,475,555.52 was obtained which shows that when the value of Non-Performing Loan (NPL) is zero, the amount of BPR's core capital is estimated at IDR 8,475,555.52. This constant value reflects the basic core capital level that BPRs have without any pressure from non-performing loans. The regression coefficient of the variable Non Performing Loan (NPL) was −28,618.62 with a standardized beta coefficient of −0.432. This negative coefficient value indicates that the increase in NPLs has an impact on the decline in BPR's core capital. Quantitatively, each increase in NPL by one unit will decrease the core capital by Rp28,618.62, assuming other variables are constant.

The results of the partial test showed that the influence of NPLs on core capital was statistically significant, which was indicated by a t-calculated value of −4.461 with a significance level of 0.000 (< 0.05). This indicates that empirically, credit risk has a significant influence on BPR's ability to maintain and increase core capital during the study period.

These findings show that the increase in the level of non-performing loans will pressure BPR's core capital, especially through an increase in reserve expenses, potential credit losses, and a decrease in profits that can be allocated as internal capital. Thus, the results of this study confirm that credit risk management is an important factor in maintaining the stability and capital growth of BPRs.

2. Direct Influence of BOPO (X2) on Core Capital (Y)

Based on the results of regression analysis, a constant value of 8,475,555.52 was obtained which showed that when the value of Operating Costs to Operating Income (BOPO) was zero, the amount of BPR's core capital was estimated at IDR 8,475,555.52. This constant value reflects the basic core capital level that the BPR has before considering the level of operational efficiency. The regression coefficient of the BOPO variable is −26,057.06 with a standardized beta coefficient of −0.235. This negative coefficient value shows that the increase in BOPO has an impact on the decrease in BPR's core capital. Quantitatively, each increase in BOPO by one unit will reduce the core capital by IDR 26,057.06, assuming other variables are constant.

The results of the partial test showed that the influence of BOPO on core capital was statistically significant, which was shown by the t-calculated value of −2.873 with a significance level of 0.010 (< 0.05). This indicates that empirically, the level of operational efficiency has a significant influence on BPR's ability to maintain and increase core capital during the study period.

These findings suggest that high BOPO, which reflects low operational efficiency, will reduce the bank's profits, thereby reducing BPRs' ability to form and grow core capital through retained earnings. Thus, the results of this study confirm that controlling operational costs and increasing efficiency are important factors in BPR's capital strengthening strategy.

3. Direct Influence of ROA(Z) on Core Capital (Y)

Based on the results of the regression analysis, a constant value of 8,475,555.52 was obtained which showed that when the value of Return on Assets (ROA) was zero, the amount of BPR's core capital was estimated at IDR 8,475,555.52. This constant value reflects the basic core capital level that the BPR had before it was affected by profitability performance. The regression coefficient of the ROA variable was 70,549.08 with a standardized beta coefficient of 0.341. This positive coefficient value shows that the increase in ROA has an impact on increasing BPR's core capital. Quantitatively, each increase in ROA by one unit will increase the core capital by IDR 70,549.08, assuming other variables are constant.

The results of the partial test showed that the influence of ROA on core capital was statistically significant, which was indicated by a t-calculated value of 3.799 with a significance level of 0.004 (< 0.05). This indicates that empirically, profitability has a real role in driving BPR's core capital growth during the study period.

These findings show that the higher the ability of BPRs to generate profits from their assets, the greater the bank's ability to strengthen core capital through accumulated retained profits. Thus, the results of this study confirm that ROA is a key factor in the mechanism of strengthening BPR's internal capital, as well as strengthening its position as a mediating variable in the relationship between NPLs and BOPO to core capital.

4. The Effect of NPL Literacy (X1) on Core Capital (Y) through ROA (Z).

The results of the path analysis show that Non-Performing Loans (NPLs) have a direct negative influence on core capital growth of −0.432. This indicates that an increase in the level of non-performing loans can directly suppress BPR's core capital growth, among other things through an increase in reserve expenses and potential losses that banks must bear. In addition to direct influence, NPLs also have an indirect influence on core capital growth through Return on Assets (ROA) of −0.373. Indirect influences that have negative value indicate that an increase in NPLs lowers the bank's profitability level, which ultimately reduces the ability of BPRs to increase core capital through accumulated retained earnings. Thus, the total influence of NPLs on core capital growth was −0.805, which reflects that the impact of credit risk on BPR's capital is significant and strengthened through the mechanism of reducing profitability. Based on these results, the H8 hypothesis which states that NPLs have an indirect effect on core capital growth through ROA is accepted.

5. The Effect of BOPO Literacy (X2) on Core Capital (Y) through ROA (Z).

The results of the study show that BOPO and NPL have a significant effect on the growth of BPR's core capital, both directly and indirectly through ROA as a mediation variable. BOPO has a strong negative total effect on core capital, which indicates that operational inefficiencies are suppressing profitability and reducing banks' ability to strengthen capital through retained earnings. Meanwhile, NPLs also depressed core capital, mainly through a decline in profitability performance although the direct impact on ROA was not significant. These findings confirm that profitability, which is reflected in ROA, is the main mechanism in strengthening BPR's capital structure, in line with financial intermediation theory and previous research.

Relevance to previous research and banking theory

The results show that Return on Assets (ROA) plays a mediating variable in the relationship between Non-Performing Loans (NPLs) and Operating Costs to Operating Income (BOPO) on the growth of the core capital of Bank Perekonomian Rakyat (BPR) in the East Bekasi region for the 2019–2024 period. These findings indicate that the impact of credit risk and operational efficiency on BPR's capital does not occur directly, but is channeled through the bank's profitability performance. Based on the results of the path analysis, NPLs are proven to have a direct negative influence on core capital growth and also have a negative indirect influence through ROA. Theoretically, this condition is in line with banking risk management theory which states that an increase in non-performing loans will increase the burden of reserves, lower profits, and ultimately limit the ability of banks to strengthen internal capital through retained earnings. In the context of BPRs, which have limited access to external sources of capital, the pressure on profitability due to high NPLs will have a direct impact on core capital capacity.

However, the results of the study also show that the direct influence of NPLs on ROA is not always statistically significant. This indicates that in certain BPRs, the impact of non-performing loans on profitability can be restrained by reserve policies, risk management, or income diversification. Nonetheless, when ROA is included as a mediating variable in the model, the indirect influence of NPLs on core capital remains statistically confirmed. These findings reinforce a structural approach in banking research, where relationships between financial ratios are not necessarily directly linear, but are interrelated through internal financial performance mechanisms.

Meanwhile, BOPO showed a strong negative influence both directly and indirectly on core capital growth through ROA. Theoretically, these findings support the bank efficiency theory, which states that the level of operational efficiency is the main determinant of the profitability and sustainability of the bank's capital. High BOPO reflects higher operating costs compared to operating income, thereby reducing profits and reducing banks' ability to form core capital organically. In the context of BPR, operational efficiency is a very crucial factor due to the limitations of the business scale and relatively narrow revenue structure.

The results of this study are consistent with a number of previous studies that found that NPLs and BOPO have a negative effect on ROA and bank capital, especially in the small and medium-scale banking industry. Previous research has shown that profitability serves as a key transmission mechanism that links credit risk and operational efficiency to the strength of a bank's capital. Thus, the findings of this study not only confirm the results of previous research, but also strengthen the empirical evidence that ROA is a relevant and significant mediating variable in explaining the relationship between operational performance and BPR capital.

Overall, the results of the mediation test in this study confirm that BPR's core capital growth is highly dependent on the bank's ability to maintain credit quality and operational efficiency through increased profitability. Therefore, efforts to strengthen BPR's capital cannot only be focused on fulfilling capital regulations, but must be accompanied by prudent credit risk management and sustainable improvement of operational efficiency.

CONCLUSION

This study concluded that Non-Performing Loans (NPL) and Operating Costs to Operating Income (BOPO) negatively and significantly affected the core capital of BPRs in the East Bekasi region over the 2019–2024 period, both directly and indirectly through Return on Assets (ROA) as a mediating variable. Specifically, BOPO was found to negatively and significantly affect ROA, while NPL, although not significantly affecting ROA, still exerted a direct impact on core capital. ROA, in turn, positively and significantly influenced core capital, confirming that higher profitability strengthens a BPR's internal capital accumulation capacity. These findings underscore that effective credit risk management, improved operational efficiency, and sustained profitability are critical to the resilience and long-term sustainability of BPR core capital. For future research, it is recommended that studies expand the sample to include BPRs across multiple regions in Indonesia and incorporate additional variables — such as the Capital Adequacy Ratio (CAR), loan-to-deposit ratio (LDR), or macroeconomic indicators like inflation and GDP growth — to provide a more comprehensive understanding of the factors influencing BPR core capital.

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