

## THE EFFECT OF PROPERTY MARKET VALUE, PROPERTY TYPE, PROPERTY LOCATION AND LOAN-TO-VALUE RATIO ON THE RECOVERY RATE OF NON-PERFORMING LOANS:

A Case Study at PT Bank Negara Indonesia (Persero), Tbk  
At Regional Office 16, Papua

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### Abstract

The rise in the risk of *non-performing* loans (NPLs) highlights the importance of optimising the quality of property collateral to improve loan recovery rates. This study aims to analyse the influence of property market value, property type, property location and *loan-to-value* (LTV) ratio on the recovery rate of non-performing loans at PT Bank Negara Indonesia (Persero) Tbk Regional Office 16 in Papua. The study employs a quantitative approach using multiple linear regression. A sample of 100 data points was selected from a population of 192 using *purposive sampling*. The data used were secondary data in the form of *loan-level data* on non-performing loans sourced from the internal records of BNI Regional Office 16 in Papua. The results of the study indicate that Property Market Value and Property Location have a positive and significant effect on the Recovery Rate of Non-Performing Loans, whilst *Loan-to-Value* (LTV) has a negative and significant effect. Meanwhile, Property Type does not have a significant effect on the Recovery Rate of Non-Performing Loans. Property Market Value is the variable with the most dominant influence on the Recovery Rate of Non-Performing Loans. Furthermore, the results of the simultaneous test indicate that Property Market Value, Property Type, Property Location and *Loan-to-Value* (LTV) collectively have a significant effect on the Recovery Rate of Non-Performing Loans. These findings underscore the importance of the economic value of collateral, the quality of the property's location and the management of the LTV ratio in supporting the effectiveness of non-performing loan recovery and strengthening banking risk management strategies.

**Keywords:** Property Market Value, Property Type, Property Location, *Loan-to-Value*, Recovery of Non-Performing Loans.

### Introduction

One of the key issues of global concern in the banking sector is the rising risk of *non-performing* loans (NPLs) and the low effectiveness of *loan recovery*, as both have a direct impact on the stability of the financial system and the sustainability of the banking

sector's intermediation function (Bischof et al., 2022; Khairi et al., 2021). In the modern financial system, a bank's ability to recover non-performing loans not only determines the asset quality and profitability of financial institutions but also influences the banking sector's resilience to economic pressures and financial crises (Atichasari et al., 2023). High NPL levels that are not offset by effective *recovery* can increase *loss given default* (LGD), put pressure on capital adequacy ratios, and reduce banks' capacity to extend new credit to productive sectors (Betz et al., 2020). Consequently, the effectiveness of non-performing loan *recovery* is now regarded as a key element in maintaining *banking stability* and *financial resilience*, particularly in developing countries with relatively high levels of market risk (Athari et al., 2023).

The issue of loan *recovery* is no longer viewed solely as an internal matter for banks, but rather as part of the dynamics of global financial stability. Wang et al. (2020) emphasise that loan *recovery* rates are influenced by various factors, including the characteristics of collateral, economic conditions, and the efficiency of asset markets. In developing countries, the challenges of *recovery* become more complex because property markets are often *illiquid*, have limited secondary trading, and face disparities in infrastructure and market information (Giammanco et al., 2023). These conditions result in a slower collateral liquidation process and asset *recovery* values that tend to be lower compared to countries with mature property markets (Ling et al., 2021). Consequently, the effectiveness of *collateral recovery* has become a strategic issue in global banking risk management, particularly in *emerging markets* characterised by asset markets that are not fully efficient (Thein et al., 2024).

Theoretically, the success of loan *recovery* is heavily influenced by the level of *collateral liquidity*—that is, the ability of an asset to be converted into cash quickly without suffering a significant decline in value. According to the *Liquidity Theory of Asset Prices* proposed by Pepper & Oliver (2006), assets with high liquidity carry a lower risk of loss as they are easier to resell in the event of default. In the banking context, property used as loan collateral plays a strategic role, as the market value, type and location of the property determine its *marketability* and the bank's potential *for recovery*. Consequently, banks in various countries are increasingly emphasising the importance of collateral quality in credit risk mitigation policies and the strengthening of financial system stability (Benmelech, 2024).

Furthermore, in the wake of the 2008 global financial crisis, international banking regulators have increasingly strengthened oversight of asset quality and the effectiveness of loan *recovery* through a *prudential banking* approach and *risk-based supervision* (Behn et al., 2025). Policies such as strengthening capital adequacy ratios, imposing *loan-to-value* (LTV) limits, and improving the quality of collateral valuation have been implemented to mitigate the risk of default and enhance credit *recovery* capacity (Gatt, 2024; Saha et al., 2023). This demonstrates that *the recovery* of non-performing loans is not only a matter of individual banks' interests but also plays a vital role in maintaining broader economic stability. Consequently, research into the determinants of *the recovery* of non-performing

loans—particularly as they relate to the characteristics of property collateral and credit policies—is becoming increasingly relevant within the international academic discourse on *banking stability, collateral liquidity, and emerging market risk*.

In the national context, the OJK, through OJK Regulation No. 40/POJK.03/2019 on the Assessment of Bank Asset Quality, stipulates that banks are obliged to implement loan recovery strategies to maintain the net NPL ratio below 5 (five) per cent. However, this regulation not only emphasises the reduction of NPLs but also encourages an increase in the credit recovery ratio as part of the *risk-based supervision framework* (Wijoyo & Apriyani, 2024). According to the Indonesian Banking Statistics, June 2025 edition, the national banking sector’s NPL ratio stands at between 2.4 and 2.8 per cent, with state-owned banks such as BRI, Mandiri and BNI maintaining their NPL ratios below 2.6 per cent. However, the *write-off recovery* rate remains low, at only around 18–23 per cent, which is below the industry’s ideal efficiency standard of 25–30 per cent (Financial Services Authority, 2025). This situation indicates that the effectiveness of loan recovery needs to be strengthened to ensure the resilience and intermediation function of the national banking sector are maintained.

As one of the state-owned banks (BUMN) with a wide operational reach, BNI faces significant challenges in maintaining asset quality and the effectiveness of non-performing loan management across its various operational regions, including in areas with less liquid market characteristics. In the context of modern banking, the effectiveness of loan recovery is not only linked to a bank’s operational performance but also plays a vital role in maintaining banking stability and the sustainability of financial intermediation. Consequently, BNI’s ability to manage and recover non-performing loans is a strategic factor in supporting the resilience of the national banking sector whilst strengthening the effectiveness of credit risk management (Harahap et al., 2024).

Non-performing loans are a major challenge facing the banking industry, particularly in regions with limited asset market liquidity and fragmented geographical conditions (Olarewaju, 2020). One key indicator for measuring the effectiveness of non-performing loan management is the *recovery rate* of loans that have been written off, which reflects a bank’s ability to recover productive assets that have defaulted (Amadi et al., 2024). In the context of this study, BNI Regional Office 16 in Papua serves as a relevant *empirical setting* for analysing the dynamics of loan recovery in an *emerging regional market* characterised by a relatively illiquid property market. This phenomenon is reflected in the trends in the realisation of non-performing loan recovery over the past five years, which indicate fluctuations in the effectiveness of loan recovery in regions facing challenges *regarding collateral liquidity and limited asset marketability*. Data on these *recovery trends* are presented in Table 1.1 below.

Table 1.1 of non-performing loan recovery at BNI Regional Office 16, Papua (2020–2024)

Year	Recovery Realisation (million)	Written-off Portfolio (million)	Percentage of Recovery
2020	31,013	187,300	16.56%

2021	21,100	200,711	10.51%
2022	23,538	211,035	11.15%
2023	32,100	276,783	11.60%
2024	42,358	346,508	12.22%

(Source: primary data, 2025)

Based on Table 1.1, the performance of non-performing loan recovery at BNI Regional Office 16 in Papua during the period 2020–2024 showed fluctuations, with recovery rates remaining relatively low compared to the growth in the write-off portfolio. Although the nominal value of recoveries has increased since 2022, reaching Rp42.36 billion in 2024, the recovery ratio has remained within the 10–16 per cent range and still reflects limited effectiveness in loan recovery. This situation indicates that the majority of non-performing assets have not yet been effectively monetised, meaning that the recovery process continues to face various structural market constraints. These conditions have the potential to increase loss given default (LGD), expand the need for loss provisions, and reduce the effectiveness of the banking sector’s intermediation function in regions with high market risk levels.

The low effectiveness of recovery is thought to be linked to limited liquidity in the property market, the slow process of collateral enforcement, and high volatility in asset values in regions where infrastructure and market activity are unevenly distributed. In the context of international literature, Papua is regarded as an emerging regional market representing an illiquid property market characterised by limited secondary transactions, geographical fragmentation, and uneven market accessibility (Giammanco et al., 2023; Ling et al., 2021). These conditions make the collateral liquidation process more complex than in more mature and liquid property markets, meaning that the effectiveness of recovery is heavily influenced by the marketability and collateral liquidity of the pledged assets (Wang et al., 2020).

The market value, type and location of the property determine the level of collateral liquidity and the speed of asset liquidation (Florêncio & de Alencar, 2020), whilst loan-to-value (LTV) policies influence the bank’s margin of safety in mitigating the risk of default (Behncke, 2023). This phenomenon suggests that the effectiveness of recovery in less liquid property markets is likely influenced more by the characteristics of the collateral than by conventional credit policies alone. Therefore, an empirical analysis of the influence of collateral characteristics and credit policies on recovery effectiveness is crucial to strengthening the strategy for recovering non-performing loans at BNI Regional Office 16 in Papua, whilst also broadening our understanding of the dynamics of collateral recovery in emerging markets.

From the perspective of the Liquidity Theory of Asset Prices, property collateral is a key instrument in mitigating banking credit risk as it represents the economic value and potential liquidity of the asset in the event of default. According to Pepper & Oliver (2006), the market value of property not only serves as the basis for the ‘ ’ in determining the amount of credit that can be extended to a borrower, but also reflects the asset’s

*marketability* and its ability to be liquidated in the event of a non-performing loan. Property with a higher market value tends to have better *recovery* potential as it carries a lower risk of liquidation discount and possesses stronger market appeal. From the perspective of asset valuation theory, market price reflects the balance between supply and demand, thereby serving as a key indicator in assessing an asset’s *collateral liquidity*. Consequently, fluctuations in property market value directly influence the effectiveness of non-performing loan *recovery* (Sabriani et al., 2023).

The dynamics of national property market values can be reflected through the development of the Residential Property Price Index (*IHPR*), which illustrates changes in property asset valuations in the domestic market whilst also serving as a key indicator for assessing the potential liquidity of property collateral. The graph in Figure 1.1 presents the development of *the IHPR* in Indonesia over the period 2021–2025.

(Source: *tradingeconomics.com*)

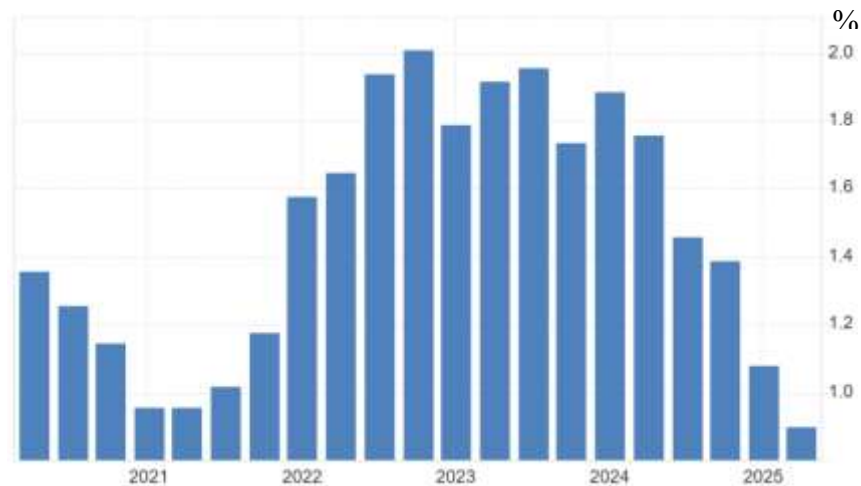


Figure 1.1 Indonesia’s Residential Property Price Index (IHPR) (2021–2025)

Based on the *IHPR* data for the 2021–2025 period in Figure 1.1, it can be seen that national property prices have experienced quite significant fluctuations. Following a decline in 2021 due to the impact of the pandemic and a slowdown in economic activity, *the IHPR* rose in 2022, peaking at around 2.0 per cent in 2023, before levelling off again in the 2024–2025 period to a range of 1.0–1.5 per cent. This pattern indicates that the national property market remains heavily influenced by the dynamics of macroeconomic conditions and monetary policy, meaning that the stability of property asset valuations has not yet been consistently established.

For the banking sector, fluctuations in property market values have direct implications for the quality of collateral and the effectiveness of *collateral recovery*. When property prices rise steadily, the value of collateral tends to be more liquid and the asset liquidation process can be carried out with a more optimal rate of return. Conversely, when the property market weakens or stagnates, the sale value of collateral tends to decline,

thereby increasing the risk of *loss given default (LGD)* and reducing the bank’s ability to recover non-performing loans (Ramcharan, 2020). This situation becomes even more complex in regions characterised by *illiquid property markets*, such as Papua, where limited secondary transactions and market accessibility mean that the asset monetisation process proceeds more slowly than in more mature property markets (Chang & Chuan, 2024). Consequently, fluctuations in *the IHPR* raise empirical questions regarding the extent to which property market values influence the effectiveness of non-performing loan recovery in *emerging markets* with relatively low levels of *collateral liquidity*.

In addition to market value, the type of property is also a key factor influencing the effectiveness of non-performing loan recovery, as each asset type has different levels of *marketability*, liquidity and liquidation potential (Goetzmann et al., 2021). From the perspective of *collateral heterogeneity*, commercial properties such as shop houses, offices and warehouses generally have a higher level of liquidity compared to residential properties or vacant land in regions with limited economic activity (Caglio et al., 2021). Properties with more productive economic functions tend to be easier to remarket and have shorter liquidation times, thereby enhancing the effectiveness of banks’ fund recovery (van Dijk et al., 2022). The literature on asset marketing also emphasises that a property’s appeal is influenced by its function, utility and future utilisation prospects (Tozzi et al., 2024; Xu & Dong, 2024). Consequently, the type of property used as collateral is one of the key determinants in establishing the level of *collateral liquidity* and the success of resolving non-performing loans.

The importance of property type characteristics in determining the effectiveness of recovery can be seen from the composition and recovery rates of collateral in the non-performing loan portfolio of BNI Regional Office 16 in Papua. The data in Table 1.2 and Table 1.3 show differences in liquidity levels and recovery performance across different types of property collateral.

Table 1.2 : Composition of Property Types Used as Collateral for BNI’s Non-Performing Loans at Regional Office 16, Papua (2020–2024)

Type of Property Used as Collateral	Number of Cases (units)	Percentage (%)
Residential Property (homes)	56	55
Commercial Properties (shops, offices, warehouses)	30	30
Vacant Land / Non-productive Land	15	15
<b>Total</b>	<b>101</b>	<b>100</b>

(Source: BNI Regional Office 16 Papua, 2025)

Based on Table 1.2, the portfolio of non-performing loan collateral at BNI Regional Office 16, Papua, is still dominated by residential property at 55 per cent, followed by commercial property at 30 per cent and vacant land at 15 per cent. The dominance of residential collateral indicates that the majority of financing in Papua remains focused on the housing sector and household consumption. However, in the context of *an illiquid*

property market, residential collateral outside urban areas tends to have lower marketability due to limited secondary market demand and property transaction activity. Conversely, commercial property has higher liquidation potential as it is supported by more productive economic functions and higher asset utilisation rates in regional economic hubs such as Jayapura.

Table 1.3 of Recovery Rates for Non-Performing Loans by Type of BNI Collateral Property in Regional Office 16, Papua (2020–2024)

Type of Property	Average Recovery Value (Rp million)	Average Recovery Percentage (%)	Average Time to Liquidation
Commercial Property	1,250	14.8	4–6 months
Residential Property	870	10.3	8–10 months
Vacant Land	640	7.1%	12–15 months
<b>Total Average</b>	-	<b>10.7%</b>	-

(Source: BNI Regional Office 16 Papua, 2025)

These differences in characteristics are reflected in Table 1.3, which shows that commercial property has the highest average recovery rate of 14.8 per cent with a relatively quick liquidation time of 4–6 months. Conversely, vacant land shows the lowest recovery rate of 7.1 per cent with the longest sales period of 12–15 months. This pattern indicates that the economic function, asset utility and *marketability* of a property have a direct influence on the speed of liquidation and the effectiveness of non-performing loan recovery. From the perspective of *collateral liquidity*, assets with high commercial value tend to have a lower risk of liquidation discount, thereby enhancing the bank’s recovery potential (Geltner et al., 2023; Pepper & Oliver, 2006).

However, the context in Papua reveals a different phenomenon compared to more mature property markets. Although commercial property generally has a higher level of *collateral liquidity*, the proportion of financing in this segment remains relatively small, meaning its contribution to *aggregate recovery performance* is not yet optimal. Conversely, the dominance of residential collateral with lower *marketability* leads to a slower asset monetisation process, particularly in regions with limited secondary market activity (Pepper & Oliver, 2006; van Dijk et al., 2022). This phenomenon suggests that the heterogeneity of property types has the potential to be a key determinant in explaining the low effectiveness of non-performing loan recovery in *emerging markets* characterised by illiquid property markets. Therefore, this study is important for empirically testing the extent to which the type of collateral property influences the effectiveness of non-performing loan recovery at BNI Regional Office 16 in Papua.

In addition to market value and property type, the location of the asset is also a key determinant in determining the effectiveness of non-performing loan recovery as it directly influences the property’s *marketability* and *collateral liquidity*. From the perspective of the ‘*’* theory in *spatial economics*, accessibility, proximity to centres of economic activity, and the availability of infrastructure are the main factors determining an asset’s economic value and the speed of its liquidation. Properties situated in strategic areas tend to have

higher market demand, lower liquidation discount risks, and shorter sales times compared to properties in areas with limited infrastructure and economic activity. Consequently, location is a crucial factor in determining the quality of collateral and the effectiveness of banking *collateral recovery* (Scarpa et al., 2024).

The impact of location on the effectiveness of loan recovery can be seen from the distribution of non-performing collateral at BNI Regional Office 16 in Papua across various regions of Papua. The data in Table 1.4 show differences in recovery rates and asset liquidation speeds based on property location categories.

Table 1.4 : Distribution and Effectiveness of Non-Performing Loan Recovery Based on BNI Property Location in Regional Office 16, Papua (2020–2024)

Location Category	Percentage of Collateral (%)	Average Recovery Value (%)	Average Time to Sale (months)
Strategic	40%	14.6%	5–6 months
Sub-urban	35%	10.8%	8–9 months
Non-strategic	25%	7.0%	12–14 months
Overall Average	100%	10.8%	-

(Source: BNI Regional Office 16 Papua, 2025)

According to Table 1.4, around 40 per cent of non-performing loan collateral is located in strategic areas such as Jayapura City and Abepura, whilst the remainder is spread across *suburban* and non-strategic areas with more limited accessibility. These differences in location characteristics have a direct impact on the effectiveness of *recovery*. Collateral in strategic areas shows the highest average *recovery rate* of 14.6 per cent with a relatively quick liquidation time of 5–6 months. Conversely, properties in non-strategic areas yield an average *recovery rate* of only 7.0 per cent with the longest sales period of 12–14 months. This pattern indicates that accessibility, proximity to economic centres, and the quality of infrastructure have a significant influence on asset liquidity and the success of collateral monetisation.

In the context of *emerging regional markets* such as Papua, geographical disparities and infrastructure constraints make the asset liquidation process more complex compared to more mature property markets (Wang et al., 2020). Properties in remote areas generally have low secondary market activity, which slows down the sales process and increases the risk of *loss given default (LGD)*. Conversely, properties in strategic areas tend to have higher *marketability*, supported by a concentration of economic activity and more stable market demand (Feng, 2022). This phenomenon indicates that the location of assets not only influences the sale value of properties but also determines the effectiveness of *collateral recovery* strategies in regions characterised by *illiquid property markets*.

Nevertheless, banks still face a dilemma between credit risk management and expanding access to finance (*financial inclusion*) in regions with a dispersed economic structure. In practice, BNI continues to accept collateral located in non-strategic areas due to the limited availability of property assets in urban centres and the predominance of

small business borrowers situated outside economic hubs. In addition to considering the location of the collateral, the bank also takes into account the business’s potential cash flow, the borrower’s repayment capacity, and long-term business relationships (Sanga & Aziakpono, 2023). These conditions indicate that financing policies in Papua are not based solely on the quality of the collateral’s location, but also take into account aspects of financial inclusion and regional economic development.

This phenomenon raises an empirical question regarding the extent to which property location influences the effectiveness of non-performing loan recovery in *emerging markets with low collateral liquidity*. Furthermore, it is important to analyse whether geographical disparities and infrastructure limitations make a significant contribution to the low effectiveness of loan recovery at BNI Regional Office 16 in Papua. Consequently, this study is expected to provide a more comprehensive understanding of the relationship between location factors, asset liquidity, and the success of *collateral recovery* strategies in a geographically fragmented property market.

In addition to property characteristics, the *Loan-to-Value (LTV)* policy is also a key instrument in mitigating credit risk and strengthening banking stability. From a *prudential banking* perspective, the *LTV* ratio represents the ratio of the value of the loan granted to the value of the collateral received by the bank. The lower the *LTV* ratio, the greater the *margin of safety* the bank possesses to absorb potential losses in the event of default (Scott et al., 2024). The risk management literature emphasises that *LTV* policy serves not only as a tool for individual banks to manage risk, but also as a macroprudential instrument to maintain financial system stability and control exposure to *loss given default (LGD)* (Bian et al., 2018; Reite et al., 2023). Consequently, the *LTV* ratio is a key determinant in explaining the effectiveness of non-performing loan recovery, particularly in regions with relatively low levels of *collateral liquidity*.

To illustrate the relationship between the *loan-to-value* ratio policy and the effectiveness of loan recovery, Table 1.5 presents a comparison of *recovery rates* by *LTV* ratio group within the non-performing loan portfolio of BNI Regional Office 16 in Papua over the period 2020–2024.

Table 1.5 Recovery Rates for Non-Performing Loans by LTV Ratio Group at BNI’s Regional Office 16 in Papua (2020–2024)

LTV Ratio Group	Percentage of Loan Portfolio (%)	Average Loan-to-Value Ratio (Rp million)	Average Recovery Rate (%)	Average Bank Loss (%)
<70% (Conservative)	30%	700	15.2%	8.0%
70–80% (Moderate)	45%	800	11.5%	11.2%
>80% (Aggressive)	25%	900	8.4%	15.6%
<b>Overall Average</b>	<b>100%</b>	-	<b>11.7%</b>	-

(Source: BNI Regional Office 16 Papua, 2025)

Based on Table 1.5, there appears to be a consistent relationship between the *LTV* ratio and the effectiveness of non-performing loan recovery. The loan group with a conservative *LTV* ratio below 70 per cent showed the highest average recovery rate of 15.2 per cent, with a relatively low level of bank losses. Conversely, loan portfolios with an *LTV* ratio above 80 per cent yielded an average recovery rate of just 8.4 per cent and the highest bank loss rate of 15.6 per cent. This pattern indicates that the higher the proportion of the loan relative to the value of the collateral, the greater the risk of loss the bank must bear in the event of default.

This phenomenon demonstrates that the *LTV* ratio has a direct relationship with the effectiveness of collateral recovery. When loans are granted at a proportion that is too high relative to the value of the collateral, the bank's *margin of safety* becomes increasingly narrow, meaning that the proceeds from asset liquidation are often insufficient to cover the debtor's full liabilities. Conversely, a more conservative *LTV* policy provides greater protection against potential declines in the value of the collateral and the risk of liquidation discounts. From a *risk mitigation* perspective, this underscores that the regulation of the *LTV* ratio is a crucial component of strategies for credit risk management and financial system stability (Gatt, 2024).

However, the implementation of *LTV* policies in *emerging regional markets* such as Papua faces different challenges compared to more mature property markets. Limitations in property market liquidity, low levels of secondary market activity, and asset values that are relatively lower than those in major cities mean that banks often need to apply more flexible *LTV* ratios to ensure that financing can still be channelled to the public and local businesses (Morgan et al., 2015). These conditions create a dilemma between expanding access to finance (*financial inclusion*) and applying the principles of *prudential* banking. On the one hand, increasing the *LTV* ratio can support credit growth and regional financial inclusion; on the other hand, it also increases banks' exposure to *loss given default* risk in the event of loan defaults (Bian et al., 2018).

This phenomenon raises an empirical question regarding the extent to which the *LTV* ratio influences the effectiveness of non-performing loan recovery in *emerging markets* characterised by *illiquid property markets*. Therefore, this study is important for empirically testing the impact of *LTV* policy on the recovery rate of non-performing loans at BNI Regional Office 16 in Papua. The research findings are expected to provide an empirical basis for the development of a more adaptive and context-specific *LTV* policy, thereby maintaining a balance between financing expansion, banking stability, and credit risk mitigation in regions with limited asset liquidity.

Previous research findings indicate that the ability of models to explain variations in loan recovery remains relatively limited, as reflected by the coefficient of determination ( $R^2$ ), which generally lies below 0.50. The study by Siraki & Yona (2021) shows that the variables of *internal management*, third-party activities, and *regulatory guidelines* are only able to explain a portion of the variation in non-performing loan recovery, with  $R^2$  values of 43.56 per cent, 27.35 per cent, and 39.82 per cent respectively. Similar findings were also

reported by Rifas et al. (2016), where the variables of *credit policy, instalments, climate, and political factors* exhibited relatively low explanatory power regarding variations in *loan recovery*. The low predictive power of these models indicates that the effectiveness of non-performing loan recovery is still influenced by various other factors that have not been comprehensively accounted for, particularly those relating to the characteristics of collateral and the level of *collateral liquidity*.

A number of previous studies on non-performing loans have also tended to focus more on internal banking aspects, such as loan restructuring strategies (Chao et al., 2023; Prusko & Ehmke, 2023; Segura & Suarez, 2023), the effectiveness of risk management policies (Atichasari et al., 2023; Di Tommaso & Pacelli, 2022; Sewanyina et al., 2025), and the role of regulation in maintaining the *Non-Performing Loan (NPL)* ratio (Bischof et al., 2022; Khairi et al., 2021). Although these studies make an important contribution to credit risk management, the majority have not yet fully integrated external factors relating to the heterogeneity of property collateral. Yet, in banking practice, property collateral is often the primary source of fund recovery when a borrower defaults (Benmelech, 2024). This situation highlights the need to broaden the research perspective on *loan recovery* by incorporating the dimensions of property characteristics and *collateral liquidity* in a more comprehensive manner.

Several studies, such as those by Biswas et al. (2023), Manz et al. (2020), and Wang et al. (2020), indicate that market value, type, and location of property are significant determinants of the effectiveness of *collateral recovery*. However, the majority of these studies were conducted in property markets in developed countries, which generally have relatively higher levels of transparency, market liquidity, and infrastructure quality. Meanwhile, the Indonesian context, particularly in eastern regions such as Papua, exhibits distinct market characteristics, marked by limited secondary transactions, geographical fragmentation and uneven market accessibility. Within the context of international literature, these conditions represent the characteristics of an *illiquid property market in emerging markets*. These differing characteristics raise an empirical question as to whether property factors have the same influence on the effectiveness of non-performing loan recovery in regions with low levels of *collateral liquidity*. Consequently, there is a research gap that needs to be bridged to adapt the development of *collateral recovery* theory to the context of emerging markets.

Similarly, research on *Loan-to-Value (LTV)* policies, such as that conducted by Kinghan et al. (2022), Rahmawan et al. (2024) and van Bekkum et al. (2024), generally remains focused on macroprudential aspects, such as the control of consumer credit and financial system stability. Research that directly links *LTV* policy to the effectiveness of non-performing loan recovery remains relatively limited. Yet, from a *prudential banking* perspective, the *LTV* ratio is a key instrument that determines the size of a bank's *margin of safety* in the event of default (Hong & Ahn, 2022). By integrating the *LTV* variable within the context of *collateral recovery*, this study aims to fill a conceptual gap that remains under-explored in the existing literature. Consequently, this study occupies a strategic

position in expanding the literature on the determinants of *loan recovery* in *emerging markets* characterised by illiquid property markets.

Consequently, this study is not only aimed at testing the empirical relationships between variables but also at broadening our understanding of the dynamics of *collateral recovery* in *emerging markets* with low levels of *collateral liquidity*. The findings are expected to make a theoretical contribution to the development of banking risk management literature whilst also providing an empirical basis for the development of policies on *risk mitigation*, *prudential lending*, and collateral management in the banking sector of developing countries. Furthermore, this study is also expected to strengthen the development of *loan recovery* models that are more adaptable to the characteristics of geographically fragmented asset markets. Consequently, this study is relevant not only at a local level but also holds significant weight in the international academic discourse on banking stability and credit risk mitigation.

### **Research Methodology**

This study employs a quantitative approach using explanatory research methodology. This approach was chosen as the study aims to analyse the causal relationship between the independent variables—namely, property market value, property type, property location, and loan-to-value (LTV)—and the dependent variable, namely the *recovery rate* of non-performing loans. Through a quantitative approach, this study not only describes the characteristics of the data but also empirically tests the extent of the influence of each independent variable on the effectiveness of non-performing loan recovery at BNI in Papua Province.

This study is analytical in nature, as it seeks to explain the causal relationships between variables based on empirical data collected in the field. The analysis was conducted using inferential statistical methods to produce conclusions that are generalisable and relevant to banking risk management theory. The research findings are expected to provide a comprehensive understanding of the key determinants of non-performing loan recovery, whilst also serving as a basis for managerial decision-making and the formulation of the bank's internal policies. Thus, this study is not merely descriptive but also has practical value in supporting the improvement of credit risk management effectiveness at BNI Regional Office 16 in Papua.

### **Results and Discussion**

#### **Property Market Value Has a Positive and Significant Effect on the Recovery Rate of Non-Performing Loans**

The research results indicate that property market value has a positive and significant effect on the *recovery rate* of non-performing loans. This finding suggests that the higher the market value of the collateral held by the debtor, the greater the bank's ability to recover funds from non-performing loans through restructuring, the sale of collateral, or asset foreclosure. In substantive terms, these results indicate that the market

value of property not only represents the economic value of the asset but also reflects the level of *collateral liquidity* and the asset's *resale* potential in the market. In other words, property with a high market value tends to have better market demand and is therefore easier to convert into cash in the event of default. This situation gives banks a greater opportunity to reduce *loss given default* (LGD) and minimise credit losses.

Papua has a relatively more limited property market compared to major cities in Indonesia. Under these circumstances, property market value becomes a key indicator reflecting the quality and attractiveness of an asset. Properties with high market values are generally situated in developing areas, have good access, and are in demand among both the public and businesses. Therefore, in the event of a non-performing loan, properties with higher market values have a greater chance of being sold at a price capable of covering the debtor's liabilities. This explains why property market value has a positive impact on the *recovery rate* of non-performing loans.

Based on the results of empirical testing, the findings of this study are supported by the research of Sabriani *et al.* (2023), who found that rising property prices contribute to a reduction in *non-performing loans* through an increase in the value of collateral. Florêncio and de Alencar (2020) also demonstrated that properties with high market value and good liquidity have a higher probability of *recovery* than those with low value. Furthermore, Wang *et al.* (2020) found that the presence of *tangible collateral* is a key determinant of the *recovery rate*, particularly in unstable economic conditions. The findings of this study also support the results of Ross and Shibut (2021), which show that a decline in the value of collateral significantly increases LGD on *commercial property* loans. The consistency of these results indicates that the market value of property is a fundamental determinant of the effectiveness of *collateral recovery*, in both developed and emerging markets.

Furthermore, the results of this study indicate that the influence of property market value on loan *recovery* is not solely due to the nominal value of the collateral, but rather to the asset's ability to be resold quickly and efficiently. Properties with high market values are generally located in areas with stronger economic activity, have more stable market demand, and are more likely to attract prospective buyers and investors. In the context of Papua, which has a relatively limited and geographically fragmented property market, a high market value also reflects better *marketability* and *collateral liquidity* compared to properties of lower value. Thus, the findings of this study confirm that the quality and liquidity of the collateral's value are more important than merely the nominal value of the asset in determining the success of *recovering* non-performing loans.

The practical implications of these findings suggest that banks need to strengthen the quality of their *valuation* processes and collateral management as part of their credit risk mitigation strategy. Property valuation should not focus solely on estimating market price, but must also take into account the asset's liquidity, resale potential, and sensitivity to changes in regional property market conditions. Banks also need to update appraisal values periodically to ensure that the value of the collateral continues to reflect actual

market conditions, particularly in areas with low market volatility and liquidity. From a theoretical perspective, the findings of this study reinforce banking risk management theory in explaining the mechanism of *collateral recovery*. Thus, this study not only strengthens the empirical evidence regarding the importance of property market value for the recovery of non-performing loans, but also broadens the understanding of the role of *collateral liquidity* in banking credit risk management.

### **Property Type Has No Significant Effect on the Recovery Rate of Non-Performing Loans**

The research findings indicate that the type of property does not have a significant effect on the recovery rate of non-performing loans. This finding indicates that differences in property type—whether commercial or non-commercial—are not a key factor determining the success of non-performing loan recovery at BNI Regional Office 16. Consequently, the success of the recovery process is more influenced by other characteristics of the collateral, such as the market value of the property, its location, and the *Loan-to-Value* (LTV) ratio, rather than by its economic function classification.

The lack of a significant influence of property type suggests that both commercial and non-commercial properties have relatively equal potential to support the recovery of non-performing loans. In banking practice, the recovery process is determined not only by the type of asset used as collateral, but also by the economic value of the asset, property market conditions, the ease of the enforcement process, and buyer interest in the assets on offer. Therefore, although in theory commercial property tends to have a higher level of liquidity than non-commercial property, this difference was not found to have a significant impact on credit recovery rates in this study.

From a banking risk management perspective, the results of this study indicate that the assessment of collateral quality cannot be based solely on the type of property. Factors such as adequate market value, a strategic location, and a healthy loan-to-value ratio actually play a greater role in determining the effectiveness of the recovery of non-performing loans. Thus, the type of property acts more as a supporting characteristic than as a determining factor in the success of loan recovery.

The findings of this study are inconsistent with those of Downs and Xu (2015), Bandyopadhyay (2022), Park and Bang (2014), and Kaposty et al. (2022), who found that asset characteristics and types influence recovery rates or *Loss Given Default* (LGD). These differing results may be attributed to variations in property market characteristics and the conditions of non-performing loans across the study regions. In the context of BNI Regional Office 16 in Papua, the market value and location of the collateral appear to be more dominant factors influencing recovery success than the classification of the property type.

Furthermore, the relatively limited property market conditions in the study area mean that the differences between commercial and non-commercial properties are less pronounced in the collateral sale process. In certain situations, non-commercial properties with strategic locations and high market values may be easier to sell than commercial

properties situated in less strategic locations. This suggests that the market places greater emphasis on the economic value and liquidity potential of assets than on the property type category.

The practical implication of this finding is that banks need not treat the type of property as the primary consideration when assessing the potential success of *recovering* non-performing loans. Instead, greater attention should be paid to the market value of the collateral, the property's location, and the *Loan-to-Value* (LTV) ratio, as these factors have been shown to have a significant influence on *recovery* rates. Consequently, credit risk mitigation and collateral management strategies can be focused on factors that make a tangible contribution to the successful recovery of non-performing loans.

### **Property Location Has a Positive and Significant Impact on Non-Performing Loan Recovery Rates**

The research findings show that a property's location has a positive and significant effect on the *recovery* rate of non-performing loans. These findings indicate that the more strategic a property's location, the greater the bank's ability to recover non-performing loans through the sale of collateral or other loan settlement arrangements. In substantive terms, these results show that location is the primary factor determining the *marketability* and liquidity of assets in the property market. Properties situated in areas with high economic activity and good accessibility tend to be easier to market and have shorter sales times compared to properties in less strategic locations. Thus, a property's location plays a crucial role in enhancing the effectiveness of *collateral recovery* and minimising the risk of credit losses.

Papua is characterised by uneven geographical features and levels of economic development. Consequently, a property's location not only determines its market value but also influences the number of potential buyers, the speed of collateral sales, and the property's liquidity. It is for this reason that location is the most dominant variable influencing the recovery of non-performing loans.

This finding is consistent with the economic location theory developed by Alonso and Von Thünen, which states that the value and utility of a property are significantly influenced by its proximity to centres of economic activity, transport links, and public facilities. Properties situated in strategic locations generally enjoy higher market demand, meaning they are absorbed by the market more quickly and experience a lower rate of depreciation. Consequently, location not only influences a property's economic value but also determines the quality of the collateral in credit risk management.

From a banking risk management perspective, a property's location is a key factor in determining the speed and effectiveness of the collateral liquidation process. Properties situated in strategic areas tend to have a shorter '*time to liquidate*', enabling the *recovery* process to be carried out more quickly and efficiently. Conversely, properties in areas with poor accessibility and limited economic activity generally face challenges in the sales process, both in terms of the number of buyers and the stability of market prices. This

indicates that the success of credit recovery is influenced not only by the nominal value of the collateral but also by the asset's ability to be resold under realistic market conditions. In the context of Papua, which is characterised by uneven geographical features and infrastructure, the location factor becomes even more important as it directly influences the liquidity of the property market and the potential for the successful recovery of non-performing loans.

The findings of this study are consistent with various previous studies. Sitsuksai and Rattagan (2023) found that the location of a property has a significant impact on the effectiveness of credit recovery, particularly in determining the speed of resolving non-performing loans and the liquidity of collateral. Bandyopadhyay (2022) also demonstrated that the debtor's location and regional characteristics influence the level of LGD and the effectiveness of banks' loan recovery. Furthermore, Downs and Xu (2015) found that properties situated in *central business districts* (CBDs) have a higher recovery rate than those in non-strategic locations. Ingermann *et al.* (2016) also confirm that the condition and location of property have a significant impact on the *proceeds ratio* and the recovery rate of non-performing loans. The consistency of these findings indicates that property location is a key determinant in explaining the success of collateral recovery, in both developed and emerging property markets.

Furthermore, the results of this study indicate that the influence of location on credit recovery arises because location determines the level of market demand, accessibility, and the long-term stability of property values. Properties in strategic locations tend to have a broader buyer base, are more easily accessible, and possess better potential for economic growth, thereby making the risk of asset value depreciation lower. Conversely, properties in less strategic locations generally face market constraints and take longer to sell, which may ultimately reduce the effectiveness of recovery. In the context of Papua, infrastructure constraints and regional disparities in economic activity mean that location is a crucial factor in the success of collateral liquidation. Consequently, the findings of this study confirm that geographical aspects and accessibility have a dominant influence on determining the quality of collateral and the effectiveness of recovering non-performing loans.

The practical implications of these findings suggest that banks need to pay greater attention to location in the *appraisal* process, the assessment of collateral quality, and lending policies. Properties situated in strategic areas with high accessibility and economic activity should be prioritised as collateral as they offer better recovery potential and lower liquidation risk. Furthermore, banks need to consider regional infrastructure factors and regional property market conditions when determining credit risk mitigation strategies. Thus, this study makes an empirical and practical contribution to the development of credit policies based on location quality and property market liquidity.

### **Loan-to-Value (LTV) Has a Significant Negative Impact on the Recovery Rate of Non-Performing Loans**

The research findings indicate that the *Loan-to-Value* (LTV) ratio has a negative and significant effect on the recovery rate of non-performing loans. This finding suggests that the higher the LTV ratio, the lower the bank's ability to recover non-performing loans through the sale of collateral or other loan resolution processes. In substantive terms, these results show that an increase in the proportion of the loan relative to the value of the collateral reduces the *safety margin* available to the bank in the event of default. The smaller this safety margin, the greater the potential losses the bank must bear should the value of the collateral decline or the liquidation process not proceed optimally. Thus, the LTV not only represents the amount of financing provided by the bank but also reflects the level of credit risk exposure and the *potential loss given default* (LGD).

This finding is consistent with banking risk management theory, which positions the LTV as one of the key instruments in managing credit risk and ensuring a bank's financial stability. A high LTV ratio indicates that the loan value is approaching or even exceeding the value of the collateral; consequently, in the event of a default, the proceeds from asset realisation may not be sufficient to cover the debtor's liabilities. Conversely, a lower LTV provides a greater *buffer* for banks to absorb potential losses arising from fluctuations in property values and asset liquidation costs. Therefore, the LTV plays a strategic role in maintaining a balance between credit expansion, collateral quality and banking risk management.

From a credit risk management perspective, the findings of this study indicate that a high LTV increases a bank's sensitivity to fluctuations in the property market. When property prices fall, the market value of the collateral may become lower than the outstanding loan balance, thereby reducing the bank's ability to achieve *full recovery*. Furthermore, loans with high LTV ratios generally have a more vulnerable borrower risk profile, as the proportion of bank financing is more dominant than the borrower's own capital contribution. This situation leads to a higher probability of default and a higher credit loss rate. In the context of Papua, which has a relatively illiquid property market that is sensitive to changes in regional economic conditions, a high LTV will further increase the risk of a mismatch between the value of the collateral and the value of the loan liability. This explains why the effect of LTV on loan recovery in this study is negative and significant.

The findings of this study are consistent with various previous studies discussed in Chapter II. Chiang and Tsai (2026) found that the LTV ratio has a negative effect on the *foreclosure recovery rate* and increases the *foreclosure lag* for non-performing mortgage loans. Park and Bang (2014) also demonstrated that the *Current Loan-to-Value* (CLTV) ratio is a key determinant of LGD, with credit loss rates rising sharply when the LTV ratio exceeds a certain threshold. Downs and Xu (2015) found that a high LTV reduces the *recovery rate* on non-performing *commercial real estate* loans by increasing the risk of loss during collateral liquidation. Furthermore, Ross and Shibut (2021) demonstrated that an increase in the LTV and a decline in the value of collateral significantly increased LGD on *commercial property* loans at failed US banks. The consistency of these findings indicates that the LTV

is a key determinant in explaining the effectiveness of *collateral recovery* and the level of banking credit losses.

Furthermore, the findings of this study indicate that the negative impact of LTV on loan recovery arises because this ratio directly determines the collateral's ability to cover the credit exposure in the event of default. The higher the LTV, the smaller the *risk* buffer available to the bank against falls in property prices or the costs of asset foreclosure. This situation makes banks more vulnerable to market risk, particularly in regions with low property price volatility and low liquidity. Moreover, loans with high LTVs are generally more sensitive to changes in economic conditions as borrowers have higher levels of leverage. Consequently, the findings of this study emphasise that a conservative LTV policy is a crucial factor in maintaining the effectiveness of loan recovery and the stability of the banking portfolio.

The practical implications of these findings suggest that banks need to implement more prudent and risk-based LTV policies, particularly in the property sector where market volatility and liquidity are low. The setting of LTV limits must also take into account the type of property, the location of the asset, and regional market conditions to minimise credit loss risk more comprehensively. Furthermore, banks need to monitor changes in the market value of collateral on a regular basis to ensure that the LTV ratio remains at a safe level throughout the loan term. Thus, this study makes an empirical and practical contribution to the development of credit policies that are more cautious, risk-mitigation oriented, and supportive of the sustainability of banking stability.

## Conclusion

Based on the results of the analysis and discussion carried out in this study, the conclusions are as follows:

1. The market value of property has a positive and significant effect on the *recovery* rate of non-performing loans at PT Bank Negara Indonesia (Persero) Tbk, Regional Office 16 Papua.
2. The type of property does not have a significant effect on the *recovery* rate of non-performing loans at PT Bank Negara Indonesia (Persero) Tbk, Regional Office 16, Papua.
3. The location of the property has a positive and significant effect on the *recovery* rate of non-performing loans at PT Bank Negara Indonesia (Persero) Tbk, Regional Office 16, Papua.
4. *The Loan-to-Value (LTV) ratio* has a negative and significant effect on the *recovery* rate of non-performing loans at PT Bank Negara Indonesia (Persero) Tbk, Regional Office 16, Papua.

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