# Projection of Land and Building Tax Revenue in Palembang City: A Time-Series Analysis (2025-2029)

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ABSTRACT

*This study aims to analyze the projection of Land and Building Tax (PBB) revenue at the Bapenda of Palembang City for the years 2025–2029. The study is motivated by discrepancies between the targets and actual realizations of PBB revenue in Palembang City from 2019 to 2023, indicating the need for accurate revenue projections to support more effective fiscal policy planning. This study employs three projection methods: the Least Squares Method, the Quadratic Method, and the Exponential Method, with the best method selected based on the smallest Root Mean Square Error (RMSE) value. The results are expected to provide a more accurate picture of the future potential of PBB revenue, minimize the gap between targets and realizations, and assist the local government in planning resource allocation for sustainable development.*

## 1. INTRODUCTION

National development in Indonesia is a continuous effort to improve the welfare of the people, as stated in the Preamble of the 1945 Constitution. In its implementation, development is carried out not only by the central government but also by regional governments through a system of regional autonomy. This autonomy grants regional governments the authority to regulate and manage governmental affairs and the interests of their local communities based on the potential of their respective regions (Ristanti & Handoyo, 2015). Law Number 32 of 2004 reinforces that regional governments have the

rights, authority, and obligations to independently manage regional development and finances.

One important instrument supporting regional development is taxation. Taxes play a central role as a source of development funding at both central and regional levels. According to Law Number 7 of 2021, taxes are mandatory contributions from the public to the state, imposed by law without direct compensation, and are used to finance various development activities for the welfare of society. Based on their management, taxes are divided into central taxes and regional taxes. Regional taxes, including Land and Building Tax (PBB), are managed by district/city governments to support the implementation of regional autonomy and increase Regional Original Revenue (PAD) (Waluyo, 2017).

Since the enactment of Law Number 1 of 2022 concerning Financial Relations between the Central and Regional Governments, the authority to collect and manage PBB has been fully delegated to regional governments. This is expected to strengthen regional fiscal capacity to finance development according to local characteristics and needs. Palembang City, as the capital of South Sumatra Province, has significant potential for PBB revenue, given its area of 352.51 km² and a population of 1,718,440 (BPS South Sumatra, 2023). This potential provides opportunities to increase regional tax revenue, especially from the PBB sector.

**Table 1. Targets and Realization of Land and Building Tax in Palembang City for 2019-2023**

| Year | PBB Target (IDR) | Realization Target (IDR) |
|---|---|---|
| 2019 | 275.600.000.000,00 | 232.834.459.988,00 |
| 2020 | 250.000.000.000,00 | 229.251.907.196,00 |
| 2021 | 225.000.000.000,00 | 241.731.534.589,00 |
| 2022 | 264.000.000.000,00 | 258.924.991.428,00 |
| 2023 | 279.470.373.132,00 | 249.780.195.087,00. |

Source: Bapenda Palembang City (2024)

Based on the data above, the realization of Land and Building Tax (PBB) revenue in Palembang City shows significant discrepancies between the targets set by the local government and the actual revenue collected during the period of 2019–2023. Although the targets for PBB revenue have generally shown an upward trend, the actual revenue realizations have frequently fallen short of these targets. This persistent imbalance highlights

a critical issue that necessitates the development of more accurate and reliable revenue projections to serve as a solid foundation for effective and efficient fiscal planning.

Several key factors contribute to the decline or fluctuation in PBB revenue, making it essential to understand these causes to improve future projections. First, economic conditions play a major role. Economic slowdowns or recessions tend to reduce property market activity, leading to fewer property transactions and a decline in property values, which directly impacts the taxable base and thus lowers PBB revenue. Second, delays or non-compliance in tax payments by property owners can significantly reduce actual revenue. This may be due to a lack of taxpayer awareness, financial difficulties, or insufficient enforcement of tax regulations.

Third, administrative and technical challenges within the local tax authority can hinder effective tax collection. These challenges include outdated or inaccurate property records, delays in updating ownership changes, and limited capacity in monitoring and auditing taxpayers. Fourth, policy changes or inconsistencies in the implementation of tax regulations may create uncertainty or loopholes that reduce taxpayer compliance. For example, exemptions, discounts, or unclear guidelines can lead to reduced tax payments or disputes (Hasyunah & Yasmina Martini, 2023).Furthermore, external factors such as natural disasters or social disruptions can also affect the ability of taxpayers to meet their obligations, thereby impacting revenue realization. Given these complex and interrelated factors, simply setting higher revenue targets without addressing the underlying causes of revenue shortfalls will not yield the desired outcomes.

Therefore, accurate and comprehensive tax revenue projections are indispensable. They enable regional governments to prepare realistic and achievable budgets, optimize resource allocation, and anticipate potential shortfalls or surpluses in revenue. Reliable projections also support better policy formulation and improve fiscal discipline by providing a clearer picture of future financial capacity. In conclusion, addressing the root causes of revenue fluctuations and enhancing forecasting methods are essential steps to ensure sustainable fiscal management and the successful financing of regional development programs.

Previous studies have shown varied results. Aprilliani (2022) found an increasing trend in PBB projections in Tangerang City using the Least Squares method. Similar studies

by Azuwandri et al. (2024) and Damanik et al. (2024) showed positive projection results, while Hutagalung et al. (2023) reported fluctuating projections. These variations highlight the importance of selecting projection methods that suit the characteristics of each region's data. The way to measure it is by observing the pattern of past PBB revenue data in the respective region. This approach relies on analyzing historical trends and fluctuations in PBB collections to identify consistent patterns, seasonal variations, or anomalies that can inform more accurate forecasting models.

This study aims to project PBB revenue in Palembang City for the 2025–2029 period using three methods: Least Squares, Quadratic, and Exponential. These three methods were chosen based on historical PBB revenue data, which reveals a fluctuating pattern where revenue is sometimes stable, then experiences a sudden drastic decline, and subsequently increases significantly again. By considering the characteristics of this historical pattern, these three methods are expected to provide a more realistic picture of the potential PBB revenue in the future. These methods will be compared based on the Root Mean Squared Error (RMSE) to determine the best method. The results are expected to contribute to strengthening regional fiscal planning and serve as a reference for future research in taxation and regional finance.

## 2. LITERATURE REVIEW AND HYPOTHESIS

### Regional Autonomy

Regional autonomy is the right, authority, and responsibility granted to local governments to independently regulate and manage governmental affairs and resources within their territories, in accordance with the needs and aspirations of the local community. In Indonesia, regional autonomy is regulated under Law No. 23 of 2014 concerning Regional Government, which provides a legal framework for local governments to establish policies, manage budgets, and deliver public services without direct intervention from the central government, if they remain within the limits of applicable laws and regulations.

The purpose of regional autonomy is to improve the efficiency and effectiveness of local governance, encourage public participation in decision-making processes, and accelerate regional development by considering the conditions, potentials, and uniqueness of each region. Through regional autonomy, it is expected that more equitable welfare can be achieved and the quality of life of the community at the local level can be enhanced.

**Fiscal Decentralization**

Fiscal decentralization is the process of dividing authority between the central government and local governments in financial management, including revenue collection and expenditure regulation. This process aims to grant greater autonomy to local governments so that they can be more responsive to the needs of their local communities. Fiscal decentralization is regulated under Law Number 1 of 2022 concerning Financial Relations between the Central Government and Regional Governments (Law on Financial Relations between Central and Regional Governments – Law of HKPD). This law is designed to strengthen fiscal decentralization and promote equitable welfare through a fairer relationship between the central and regional governments.

The Law of HKPD aims to address fiscal disparities, improve the efficiency of regional spending, strengthen the capacity of local governments in managing their own-source revenues (Pendapatan Asli Daerah - PAD), and create synergy between central and regional expenditures. With fiscal decentralization, local governments can manage their own sources of revenue, such as regional taxes, levies, and other income sources. This enables a more efficient allocation of resources aligned with local priorities and increases public participation in decision-making related to regional budget management.

**Taxes**

Based on Law Number 7 of 2021 concerning the Harmonization of Tax Regulations (HPP), tax is a mandatory contribution to the state owed by individuals or entities that is coercive in nature according to the law, without receiving direct compensation, and is used for state purposes to achieve the greatest prosperity of the people. Waluyo (2017) defines tax as a compulsory contribution from the community to the state that is coercive, based on the law, without direct compensation, and used to finance various state expenditures to achieve the welfare of the people. Tax has a fiscal function as a source of state revenue to finance government expenditures, as well as a regulatory function to influence the economy and the welfare of society.

**Regional Taxes**

Regional taxes are mandatory contributions imposed by local governments on individuals or legal entities within their jurisdiction, based on laws and regulations, without providing direct compensation to the taxpayers. These taxes serve as a primary source of

revenue for local governments to finance regional administration and development. According to Law No. 1 of 2022 concerning Regional Taxes and Regional Levies, regional taxes include various types such as land and building tax, hotel tax, restaurant tax, entertainment tax, advertising tax, and others. Regional taxes play a crucial role in increasing Local Own-Source Revenue (Pendapatan Asli Daerah or PAD) and support the implementation of regional autonomy by granting local governments the authority to manage their financial resources independently. This fiscal decentralization enables local governments to better respond to local needs and priorities, thereby promoting equitable regional development and improving public services.

**Land and Building Tax (PBB)**

Land and Building Tax (PBB) is a form of tax levied on land and buildings that are owned or controlled by individuals or legal entities within a certain jurisdiction. This tax is an essential component of regional taxation systems and is specifically regulated under Law No. 1 of 2022 concerning Regional Taxes and Regional Levies in Indonesia. The law clearly defines the objects of taxation, which include various types of land and buildings, as well as the subjects of taxation, namely the individuals or entities responsible for paying the tax. Furthermore, the law outlines detailed procedures for the collection, administration, and management of PBB to ensure transparency, fairness, and efficiency in its implementation.

As one of the primary sources of Local Own-Source Revenue (Pendapatan Asli Daerah or PAD), PBB holds significant importance for regional governments. The revenue generated from this tax is allocated to support a wide range of development programs, including the construction and maintenance of infrastructure such as roads, bridges, public facilities, and utilities. Additionally, the funds collected from PBB contribute to enhancing public services, including education, healthcare, sanitation, and social welfare programs that directly benefit the local population. This financial support enables regional governments to address the specific needs and priorities of their communities more effectively.

**Projection**

Projection originates from the Latin word *projectio*, which means "to throw forward." In the Great Indonesian Dictionary (KBBI), projection is defined both as an image on a flat surface and as an estimate of future conditions based on current data. In the context of

economics, policy, and finance, projection is used to predict future conditions by referring to historical trends. According to Darsyah (2015), forecasting is the art and science of estimating future events to support strategic decision-making. Herlambang & Sugianto (2021) emphasize that forecasting is an effective and efficient way to predict the future through systematic quantitative methods. In general, forecasting is the process of projecting the future using historical data and mathematical models.

**Least Square Method**

The least squares method is a statistical technique used to find the best-fitting line that approximates data points by minimizing the sum of the squares of the differences between the actual and predicted values. This method is typically applied to model linear trends, where the relationship between time and data values is assumed to be a straight line. The least squares method was used in Aprilliani's (2022) research to calculate the projection of Land and Building Tax (PBB) revenue.

**Quadratic Tren Method**

The quadratic trend method is used to model data patterns that do not follow a straight line (non-linear), but rather a parabolic curve. This method is suitable for long-term data trends that experience changes in direction, such as rising then falling, or vice versa (Oktavani et al., 2024). It allows for more accurate prediction of trend changes compared to linear methods when the data pattern is complex.

**Exponential Tren Method**

The exponential trend method is used for data that exhibit rapid and non-linear growth or decline, where the changes in data values follow an exponential pattern. This method is suitable for predicting phenomena that develop geometrically or with an increasing growth rate over time, such as population growth or rapidly increasing product sales (Oktavani et al., 2024).

**Root Mean Square Error**

Root Mean Square Error (RMSE) is a statistical measure used to quantify the difference between the values predicted by a model and the actual observed values. RMSE provides an indication of the average magnitude of the prediction errors in the same units as the original

data, making it easier to understand how accurate the model is. RMSE is widely used in various fields such as statistics, modeling, and machine learning to evaluate the quality and performance of predictive models. By calculating RMSE, we can determine how far the predicted results deviate from the actual values, which can serve as a basis for improving or selecting better models. In general, RMSE is an important tool in data analysis and modeling because it provides quantitative information about prediction errors. A lower RMSE value indicates that the model produces predictions closer to the actual values, meaning the model is considered more accurate and reliable (Chai & Draxler, 2014).

## 3. RESEARCH METHOD

This study uses a descriptive quantitative method, which aims to describe, examine, and explain observed phenomena using quantitative data as the basis for analysis. The focus of this study is the projection of Rural and Urban Land and Building Tax (PBB-P2) revenue in Palembang City for the period 2025 to 2029. The projections are made using time series data, which utilizes historical data to accurately forecast future conditions. The data used is secondary data obtained from the Regional Revenue Agency (Bapenda) of Palembang City.

The data collection technique employed is documentation, involving the request for target and actual PBB revenue data from 2019 to 2023 from the Regional Revenue Agency of Palembang City. The population in this study includes all PBB target and realization data at Bapenda Palembang City, while the sample is PBB revenue data from 2019 to 2023 that represents the characteristics of the population. Thus, this study relies on documentation techniques as the main method of data collection to obtain the information needed to analyze and project PBB revenue in Palembang City.

This study uses quantitative analysis based on projections with three time series approaches: Least Squares (linear trend), quadratic trend, and exponential trend methods, to estimate PBB-P2 revenue in Palembang City for 2025–2029.

**Least Squares Method (Linear Trend)**

This method projects data linearly using a simple regression model. The following are the steps to determine the linear trend equation using the least squares method (Aprilliani, 2022):

$Y = a + bx$ $a = \frac{\sum Y}{n}$ $b = \frac{\sum XY}{\sum X^2}$

Explanation:

Y = Periodic data variable

a = Constant

b = Coefficient

x = Time variable

n = Number of data points

With the following conditions:

a) If the number of data points is even, the X scores are assigned as ... -5, -3, -1, 1, 3, 5, ...

b) If the number of data points is odd, the X scores are assigned as ... -3, -2, -1, 0, 1, 2, 3 ...

In both cases, the sum of all X values equals zero.

**Quadratic Trend Method**

This method is used when the data pattern forms a curve (non-linear). The use of the quadratic trend arises because often the development of a variable's value, which may appear linear in the short or medium term, becomes non-linear in the long term. Consequently, a non-linear trend equation must be formulated (Oktavani et al., 2024). Therefore, the general quadratic trend equation used is:

$$Y = a + bX + cX^2$$

Which means:

$a = \frac{(\sum Y) - [c\,(\sum X^2)]}{n}$ $b = \frac{\sum XY}{\sum X^2}$ $c = \frac{n\,(\sum X^2 Y) - [(\sum X^2)\,(\sum Y)]}{n\,(\sum X^4) - (\sum X^2)^2}$

Explanation:

Y = Trend value at a specific period

X, $X^2$ = Variables for the period calculated from the base period

a = Constant value

b, c = Coefficient values

n = Number of data points

**Exponential Trend Method**

The exponential trend is a trend that involves an exponent of time (Oktavani et al., 2024). The exponential equation is formulated as follows:

$y = a(1+b)^x$ or equivalently, $y = a.b^x$

which means:

$X$ = Time variable, for example when n is odd (e.g., n = 5)

$y$ = Variable to be forecasted

$a$ = Constant

$b$ = Growth factor

The exponential equation expresses the dependent variable $y$ as a function of time $x$ raised to a power. To find the values of $a$ and $b$ from data $Y$ and $X$, the following formulas are used:

$$a = anti\ log\left[\frac{\sum log\ Y}{n}\right] \qquad b = anti\ log\left[\frac{\sum X\ log\ Y}{\sum X^2}\right]$$

Next, the best projection method will be selected by examining the lowest Root Mean Square Error (RMSE). This is a way to measure the overall forecasting error. Root Mean Square Error (RMSE) is the average of the squared differences between the predicted and observed values. The formula is as follows (Chai & Draxler, 2014):

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n} e_i^2}$$

Explanation:

e = the difference between the actual realization per year and the projected value from each projection method.

## 4. RESULTS AND DISCUSSIONS

### Projection Results of Land and Building Tax Targets and Realizations at Bapenda Palembang City for 2025–2029 Using the Least Squares Method

**Tabel 2. Projection Results of Land and Building Tax Targets and Realizations at the Regional Revenue Agency (Bapenda) of Palembang City for 2025–2029 Using the Least Squares Method**

| Year | Projected PBB Target (IDR) | Projected Realization Target (IDR) |
|---|---|---|
| 2025 | 254.465.925.373 | 229.791.706.771 |
| 2026 | 256.640.000.000 | 236.148.162.214 |
| 2027 | 258.814.074.626 | 242.504.617.657 |
| 2028 | 260.988.149.253 | 248.861.073.100 |
| 2029 | 263.162.223.879 | 255.217.528.543 |

Source: Data Processed, 2025

Based on Table above, the projected Land and Building Tax (PBB) targets for Palembang City show a steady increase each year, starting from IDR 254,465,925,373 in 2025 and reaching IDR 263,162,223,879 in 2029. Similarly, the projected PBB realizations also follow an upward trend, beginning at IDR 229,791,706,771 in 2025 and increasing to IDR 255,217,528,543 by 2029. This projection was obtained using the Least Squares method, a statistical technique used to estimate future values based on historical data trends that form a linear pattern (Machfiroh & Ramadhan, 2022). These figures indicate an optimistic expectation of growth in PBB revenue over the five-year period, reflecting the city's potential to enhance its regional fiscal capacity through improved tax collection efforts.

However, despite the upward trends in both targets and realizations, a consistent gap remains between the projected targets and the actual revenue realizations each year. This gap suggests that the achievement of PBB revenue targets is likely to fall short, highlighting challenges in taxpayer compliance and the effectiveness of tax collection by local authorities. The ratio of actual realization to target revenue, which remains below 100%, points to suboptimal taxpayer compliance. Factors contributing to this shortfall may include low public awareness of tax obligations, inadequate enforcement of administrative sanctions, and limited dissemination of policies related to PBB reductions (Ningsih et al., 2021). From the perspective of collection effectiveness, indicators such as the collection ratio and the proportion of tax arrears to total receivables reveal weaknesses in the tax administration system. Persistent arrears and low collection ratios, despite increasing targets, may indicate

insufficient innovation in digital tax services and limited human resources for field supervision. Therefore, the role of the Regional Revenue Agency (Bapenda) is crucial, as successful revenue collection depends not only on setting ambitious targets but also on ensuring efficient, transparent, and accountable tax administration processes.

The use of the Least Squares method in this projection offers a conservative estimate of revenue realization trends by accommodating historical fluctuations in compliance and collection effectiveness. Thus, the observed gap between targets and projected realizations reflects not only mathematical estimations but also real institutional and behavioral factors affecting tax performance. To reduce this gap, future strategies should emphasize improving taxpayer compliance through a balanced approach combining education and enforcement, alongside strengthening Bapenda's institutional capacity in technological integration, data management, and continuous monitoring of payments. These efforts are vital to transform targets from mere planning figures into achievable outcomes. Moreover, the conservative nature of the Least Squares projections compared to more aggressive targets provides a realistic basis for formulating strategies that align with historical trends, thereby supporting more effective planning to enhance PBB revenue and minimize the gap between targets and realizations in the future.

**Projection Results of Land and Building Tax Targets and Realizations at Bapenda Palembang City for 2025–2029 Using Quadratic Method**

**Table 3. Projection Results of Land and Building Tax Targets and Realizations at the Regional Revenue Agency (Bapenda) of Palembang City for 2025–2029 Using Quadratic Method**

| Year | Projected PBB Target (IDR) | Projected Realization Target (IDR) |
|---|---|---|
| 2025 | 275.343.174.839 | 230.875.898.556 |
| 2026 | 246.201.375.267 | 237.606.065.353 |
| 2027 | 237.936.825.160 | 243.420.425.914 |
| 2028 | 250.549.524.520 | 248.318.977.239 |
| 2029 | 284.039.473.345 | 252.301.720.328 |

Source: Data Processed, 2025

The projection of the Land and Building Tax (PBB) targets for Palembang City during 2025–2029 shows a significant fluctuating pattern, with sharp declines in 2026 and 2027, then rising again in 2028 and reaching its peak in 2029. This pattern reflects the uncertainty and complex dynamics in regional revenue planning, which cannot be assumed to follow a linear path. The decrease in targets for two consecutive years is likely influenced by external and

internal factors, such as more conservative fiscal policies, changes in macroeconomic conditions, and a reassessment of revenue potential based on previous realization achievements. For example, in 2025, the PBB target was lowered compared to the previous year due to the absence of incentive programs like penalty waivers and principal tax reductions that previously boosted revenue (SiberSumsel Editor, 2025). This shows that the targets set are not solely based on historical trends but also consider current policies and conditions that affect taxpayer behavior.

On the other hand, the projected PBB realizations show a more stable and consistently increasing trend. This indicates that although the targets fluctuate, tax revenue achievements tend to follow a more realistic and conservative growth pattern. The more stable realizations may reflect the local government's efforts to improve taxpayer compliance through various payment conveniences, such as online services via e-commerce platforms (Tokopedia, Alfamart, Indomaret), as well as enhanced supervision and socialization (Fitria Ningsih, 2025). Additionally, the stable realizations also indicate that despite sharp decreases or increases in targets, revenue achievements are still supported by structural factors such as local economic growth, property development, and gradually increasing public awareness.

This difference in patterns is strongly influenced by the projection method used, namely the quadratic trend method. This method allows for changes in trend direction (curvature) in the projection, so that the calculated targets can experience sharp rises and falls according to the non-linear historical pattern. By including a squared time variable, this method can capture more complex fluctuation dynamics compared to linear methods that only project a constant upward or downward trend. However, this method also requires caution because overemphasizing historical fluctuations can cause target projections to become less realistic if current policy factors and external conditions are not considered.

In the context of tax administration, the difference between targets and realizations also indicates challenges in taxpayer compliance and the effectiveness of tax management by the Regional Revenue Agency (Bapenda). Although targets may be lowered in response to real conditions, the more stable realizations show that efforts to improve compliance, such as easier payment methods and better supervision, are beginning to yield positive results. However, there remains a risk of mismatch between targets and realizations if factors such as

public awareness, supervision, and enforcement of administrative sanctions are not yet optimal.

Furthermore, the reduction of the PBB target in 2025 by IDR 15 billion compared to the previous year also reflects the local government's realistic attitude in setting achievable targets, considering the previous year's realization was influenced by a penalty waiver program that will not be continued. This shows that targets are not merely ambitious figures but the result of a comprehensive evaluation of revenue potential and applicable fiscal policies.

Overall, this analysis confirms that the projection of PBB targets and realizations in Palembang cannot be separated from the context of fiscal policy, economic conditions, taxpayer behavior, and innovations in tax payment services. The quadratic trend method provides flexibility in capturing historical fluctuation patterns but must be balanced with a deep understanding of external factors and tax management strategies so that the targets set can be more realistic and realization achievements can be sustainably improved. Efforts to increase public awareness, strengthen Bapenda's capacity, and utilize digital technology are key to reducing the gap between targets and realizations, thereby supporting regional development with optimal tax revenue.

**Projection Results of Land and Building Tax Targets and Realizations at Bapenda Palembang City for 2025–2029 Using Exponential Method**

**Tabel 4. Projection Results of Land and Building Tax Targets and Realizations at the Regional Revenue Agency (Bapenda) of Palembang City for 2025–2029 Using Exponential Method**

| Year | Projected PBB Target (IDR) | Projected Realization Target (IDR) |
|---|---|---|
| 2025 | 253.778.346.460 | 229.033.171.166 |
| 2026 | 255.856.014.000 | 235.397.739.810 |
| 2027 | 258.000.000.000 | 242.209.841.988 |
| 2028 | 260.135.040.000 | 248.250.202.186 |
| 2029 | 262.292.340.000 | 255.307.021.303 |

Source: Data Processed, 2025

Based on Table 3 above, the projected PBB targets show a consistent increasing trend during the period from 2025 to 2029. In 2025, the target is projected at IDR 253,778,346,460. The projection then rises to IDR 255,856,014,000 in 2026 and continues to increase to IDR 258,000,000,000 in 2027. The upward trend continues in 2028, reaching IDR 260,135,040,000, and attains its highest value in 2029 at IDR 262,292,340,000.

Furthermore, the projected PBB realizations also exhibit a consistent increasing trend over the same period. In 2025, the realization is projected at IDR 229,033,171,166. The projected realization then increases to IDR 235,397,739,810 in 2026 and continues rising to IDR 242,209,841,988 in 2027. This increase continues in 2028, reaching IDR 248,250,202,186, and attains its highest value in 2029 at IDR 255,307,021,303. Overall, both the projected targets and realizations of PBB show a stable upward trend during the 2025–2029 period, based on analysis using the Exponential Trend method.

In summary, both the projected targets and realizations of PBB demonstrate a stable increasing trend throughout the 2025–2029 period. This indicates that the Exponential Trend method can provide a relatively consistent depiction of PBB revenue projections, assuming that the year-to-year increases follow a continuous and proportional pattern. This trend reflects the nature of data that grows exponentially, where each year's increase is larger than the previous year's, consistent with the method's characteristic of giving greater weight to higher values.

**Results of Root Mean Square Error (RMSE) Comparison Analysis for Each Projection Method**

**Table 5. RMSE Analysis Results for Each Projection Method**

| Projection | Least Square Method | Quadratic Method | Exponential Method |
|---|---|---|---|
| **Target** | 8.738.780.990 | 3.917.391.589 | 8.739.565.667 |
| **Realization** | 2.744.167.524 | 2.795.180.865 | 2.806.754.471 |

Source: Data Processed, 2025

Based on Table 5 above, the comparison of RMSE values from various projection methods can be interpreted as follows: for target projections, the Quadratic Trend Method demonstrates the best performance with the lowest RMSE value of 3,917,391,589. This indicates that in predicting or estimating targets, the Quadratic Trend Method yields the smallest squared error compared to the Least Squares Method and the Exponential Trend Method. Meanwhile, for realization projections, the Least Squares Method is the best choice with an RMSE value of 2,744,167,524, which is lower than the other two methods.

The Root Mean Squared Error (RMSE) value is used as an indicator of projection model accuracy, where a smaller RMSE value means a smaller deviation or error between the projection results and the actual data. Therefore, the method with the lowest RMSE can be

considered the most suitable to represent the historical data pattern and provide projections that closely approximate reality. The Quadratic Trend Method is considered most appropriate for target projections because it can capture variations in target patterns that tend to be unstable from year to year. On the other hand, for realizations, the Least Squares Method is deemed more suitable because the data pattern tends to be linear and stable, enabling this method to produce more accurate estimates.

These findings align with the research by Wiijaya et al. (2022), which stated that the Quadratic Trend Method is effective for projecting targets in data with nonlinear or fluctuating patterns over time. Meanwhile, for realization projections, this result is also supported by research conducted by Chandra Astiti (2023) which showed that the Least Squares Method is more appropriate for data with stable and consistent linear patterns. Thus, the selection of projection methods in this study has been adjusted to the characteristics of each data set, both for targets and realizations, and is reinforced by accuracy comparisons through the RMSE approach.

**Analysis Results of Projected Targets and Realizations of Land and Building Tax Revenue at Bapenda Palembang City for 2025–2029**

The following table presents the projected targets and realizations of Land and Building Tax (PBB) revenue at Bapenda Palembang City for the years 2025–2029. These projections are compiled based on the selection of the best methods using the Root Mean Square Error (RMSE) approach, where the Least Squares method is chosen to project targets, and the Quadratic Trend method is selected to project realizations, as both showed the lowest prediction errors in the historical revenue data analysis.

**Table 6. Projection of Land and Building Tax Revenue Targets at Bapenda Palembang City for 2025–2029**

| Year | Projected PBB Target (IDR) | Projected Realization Target (IDR) |
|---|---|---|
| 2025 | 275.343.174.839 | 229.791.706.771 |
| 2026 | 246.201.375.267 | 236.148.162.214 |
| 2027 | 237.936.825.160 | 242.504.617.657 |
| 2028 | 250.549.524.520 | 248.861.073.100 |
| 2029 | 284.039.473.345 | 255.217.528.543 |

Source: Data Processed, 2025

Table above shows that the projection of Land and Building Tax (PBB) revenue at Bapenda Palembang City for the years 2025–2029 indicates an increasing trend in both targets

and realizations. However, throughout the projection period, the actual PBB revenue consistently falls below the set targets, with a significant gap each year. This gap indicates challenges in achieving fiscal targets that are not solely due to weaknesses in projection calculations but also point to implementation issues on the ground, particularly related to taxpayer compliance and the effectiveness of collection policies by the local government.

According to research by Putri Cahyaning Permadhani & Candradewini (2025), taxpayer compliance is the main factor influencing low realization. When taxpayers do not fully meet their obligations—whether due to economic factors, limited understanding of tax regulations, or lack of awareness of the tax's role in regional development—the targets set based on historical data and mathematical projection methods will not be fully achieved. Furthermore, the effectiveness of Bapenda Palembang City's work in socialization, supervision, collection, and the imposition of administrative sanctions also determines the level of revenue realization. If these mechanisms are not operating optimally, the potential revenue cannot be collected to its fullest extent.

Government policy interventions can also affect tax revenue realization, both directly and indirectly. For example, fiscal incentive policies such as reductions, tax amnesty, or partial exemptions of PBB aimed at alleviating the community's burden post-pandemic, while socially beneficial, mathematically reduce the potential real revenue. On one hand, these policies can improve the government's image and encourage voluntary compliance, but on the other hand, they also lower the achievement of realizations against set targets, especially if the reductions are not accompanied by an expansion of the tax base or an increase in the number of active taxpayers.

Thus, the gap between targets and realizations shown in the table not only reflects estimation inaccuracies but also reflects the dynamic reality of the regional tax system influenced by taxpayer behavior, regional fiscal policies, and the effectiveness of tax management by related agencies. Therefore, strategies to increase PBB revenue going forward should not rely solely on mathematical projection methods but also require managerial and regulatory approaches that emphasize improving compliance, strengthening supervision systems, and continuously evaluating fiscal policies.

To reduce this gap, Bapenda Palembang City needs to strengthen strategies that address the root causes of revenue issues. One effort that can be undertaken is optimizing the

digitalization of tax services so that payment processes, billing checks, and reporting can be done easily, quickly, and transparently, thereby encouraging increased taxpayer compliance. In addition, intensification of registered tax objects through active collection and receivable management, as well as extensification by reaching new tax objects in developing areas, should be carried out.

These efforts must be supported by more massive and participatory socialization and education to foster collective awareness of the importance of tax contributions for regional development. Evaluation of tax amnesty or PBB reduction policies must also be conducted carefully to avoid reducing revenue potential without significantly improving compliance. If fiscal incentive policies continue to be implemented, they need to be balanced with strategies to expand the tax base or strengthen supervision.

## 5. CONCLUSIONS

Based on the research findings above, The difference between the targets and realizations of PBB revenue from 2025 to 2029 indicates that revenue planning is not yet fully accurate and still faces many challenges in its implementation. Although the projection methods used were selected based on the lowest error rates, the results still fail to fully reflect the actual conditions on the ground. This shows that, besides the limitations of projection calculations, challenges in PBB revenue collection are also influenced by other factors such as taxpayer behavior, regional policies, and the economic conditions of the community. Therefore, regional financial planning should not rely solely on mathematical projection methods but must also comprehensively consider social, economic, and institutional factors.

The low realization of PBB revenue is also caused by the still low level of taxpayer compliance, influenced by economic conditions, lack of understanding about taxes, and limited awareness of the importance of taxes for regional development. When the community does not understand the direct benefits of taxes or feels economically burdened, tax obligations are often neglected. Therefore, the local government needs to be more proactive in providing socialization and education to the public. On the other hand, tax incentives such as reductions or amnesties should be implemented carefully so as not to drastically reduce revenue and must be balanced with expanding the number of taxpayers or stricter supervision.

To increase PBB revenue, Bapenda Palembang City needs to implement a more comprehensive and modern strategy, not just relying on numerical projections. An important

step is to expand the digitalization of tax services, enabling the public to pay and access tax information more easily and quickly. Additionally, active collection efforts should be made for delinquent taxpayers, as well as outreach to new tax objects in developing areas. These efforts must be supported by stronger supervision systems, regular policy evaluations, and public participation in raising awareness about the importance of paying taxes to support regional development.

## IMPLICATIONS, LIMITATIONS AND SUGGESTIONS

Considering several limitations of this study, the following suggestions are offered for future researchers as points of consideration:

1. Future research can use data with a longer time and higher frequency (e.g., monthly or quarterly) to improve projection accuracy and capture more detailed fluctuations in PBB revenue.
2. Future research can validate the projection results by using actual PBB data in the future to test how accurate the projections produced by various methods are and to identify potential improvements in the projection models.
3. Future research can compare projection results with other time series methods, such as ARIMA or machine learning techniques, to identify the method that provides the most accurate projections and best fits the characteristics of PBB data in Palembang City.

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