

Analysis of the Influence of the Number of Workers, Population and Regional Levies on Regional Original Income

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A B S T R A C T

This study examines the influence of the number of workers, population size, and regional retribution on Regional Original Revenue in Probolinggo City during the period 2009 to 2023. Although showing an upward trend, PAD in Probolinggo City remains relatively low compared to other regions in East Java. Using a quantitative time series approach, secondary data were analyzed through multiple linear regression using SPSS version 25. The regression model meets classical assumptions and is considered valid, with an R^2 value of 0.886. Partially, only the population variable has a significant effect. This indicates that population growth has the potential to expand the region's economic and fiscal base, while the contributions of labor and retribution remain limited due to the dominance of the informal sector and inefficiencies in the collection system. These findings highlight the need for policies aimed at strengthening the local economic structure, improving labor quality, and reforming the retribution collection system to support more sustainable PAD growth.

INTRODUCTION

The Indonesian government implements a regional autonomy system as a form of decentralization, granting authority to regional governments to use and manage resources independently (Jegen, 2022). This system is intended to enhance regional development, including infrastructure and public service improvements, to achieve greater community welfare. Consequently, regional governments are mandated to actively explore and create new sources of revenue to finance sustainable development (Jumadi & Hayati, 2022).

One of the key indicators for measuring regional fiscal capacity is Local Own-Source Revenue (PAD). The management of PAD is part of a region's authority, so the level of fiscal independence is largely determined by the extent to which PAD can be increased in accordance with local economic capabilities (Azizah & Kiki Asmara, 2023). The level of regional economic independence is reflected in the contribution of Local Own-Source Revenue (PAD) to total regional revenue. Regions that can optimally manage and increase their PAD tend to be more independent and less reliant on transfer funds from the central government (Baharuddin, 2022). To this end, an increase in Local Own-Source Revenue (PAD) can be achieved by optimizing existing sources, such as local taxes and user fees, or by exploring local economic potential that has not been fully utilized (Wibowo & Oktivalerina, 2022).

Probolinggo City, located on the northern coast of East Java Province along the strategic Pantura route, is a region with significant economic potential from various sectors, including trade, fisheries, and tourism. The city consists of five districts, each possessing distinct economic characteristics. Based on data from the Directorate General of Fiscal Balance (DJPK) of the Ministry of Finance, Probolinggo City's Local Own-Source Revenue (PAD) showed an increasing trend, rising from approximately Rp130 billion in 2014 to Rp209.8 billion in 2023. However, this amount is still considered low compared to other cities in East Java, such as Surabaya (Rp5.8 trillion), Malang (Rp753.4 billion), Mojokerto (Rp246.9 billion), and Batu (Rp222.3 billion). This indicates that Probolinggo City continues to face challenges in maximizing its fiscal potential.

Probolinggo City was selected as the research location due to the need to optimize local economic resources to increase Local Own-Source Revenue (PAD). The upward trend in PAD, which has not been commensurate with the region's full potential, highlights the importance of strengthening fiscal capacity, particularly through variables such as the number of workers, population, and regional levies. Therefore, this study aims to analyze the influence of these three variables on Probolinggo City's

PAD to provide a basis for formulating sustainable and locally-based strategies for increasing regional revenue.

One of the factors influencing Local Own-Source Revenue (PAD) is the number of workers. This aligns with Becker's Human Capital Theory, which posits that labor is measured not just by its quantity but also by its quality, encompassing education, skills, and experience. These qualitative attributes directly influence productivity and regional economic growth. Furthermore, a productive workforce plays a strategic role as the basis for both production and consumption, thereby supporting economic growth. An increase in the number of productive workers can therefore expand the local tax base and enhance the revenue potential of PAD (Aditya Ananta Ashari & Ririt Iriani S, 2024). However, a quantitative increase alone is not sufficient; the quality of the workforce must also be enhanced through training and education to support more productive economic sectors (Andriansyah & Athoillah, 2024).

In addition to the workforce, population size is also a significant factor in increasing Local Own-Source Revenue (PAD). Moderate and qualitative population growth can support economic growth by enhancing consumption and production, as well as expanding the tax base (Hendri Saldi et al., 2021). Nevertheless, challenges persist, such as a high proportion of the non-productive age population and low human resource quality. These factors can impede the population's contribution to increasing Local Own-Source Revenue (PAD) (Nashiruddin & Witono, 2024; Susilo, 2022).

Regional levies serve as another key indicator of a local government's capacity to exercise fiscal autonomy (Awaludin & Wibowo, 2023). Regrettably, revenue from regional levies in Probolinggo City during the 2014–2023 period exhibited a fluctuating pattern. This instability can be attributed to a weak collection system, low public compliance, and inefficiencies in levy collection policies. Given that regional levies are a critical component of Local Own-Source Revenue (PAD), their sustainable management is essential for promoting fiscal independence (Karenina et al., 2022). Based on the issues previously discussed, this study specifically aims to examine the causal influence, rather than a mere correlation, of the number of workers, population size, and regional levies on Local Own-Source Revenue (PAD) in Probolinggo City. Employing a quantitative approach and time-series data from 2009–2023, this research is expected to provide empirical evidence on the significant contribution of these variables to the increase in PAD. Furthermore, the findings are intended to serve as a strategic reference for regional development planning that is based on local potential.

METHOD

This study employs a quantitative approach to test and analyze numerical data (Sugiyono, 2022). This approach was chosen because it can yield objective, measurable, and statistically verifiable findings. The Statistical Package for the Social Sciences (SPSS) was utilized as a data analysis tool to facilitate systematic and accurate data processing. The study employed secondary data, which was obtained from official institutions, including the Directorate General of Fiscal Balance (DJPK) of the Ministry of Finance, the Probolinggo City Statistics Agency (BPS), and the East Java Province Statistics Agency (BPS). The data covers the period from 2009 to 2023.

This study utilizes one dependent variable, Local Own-Source Revenue (PAD), and three independent variables: the number of workers, population size, and regional levies. Each variable is measured using an appropriate indicator. The PAD is measured by the value of its annual realization, expressed in billions of rupiah, based on the financial statements of the Probolinggo City Government. This variable reflects the degree of a region's fiscal independence in financing its development needs. The number of workers is measured by the total employed, working-age population, based on the BPS (Statistics Indonesia) definition and expressed annually in persons. The second independent variable, population size, is measured by the total population administratively recorded as residing in Probolinggo City during the corresponding year, also in persons. The regional levies variable is measured by the annual realized revenue from levies, in billions of rupiah, which reflects regional income from public services and community-related fees provided by the local government. These four variables were analyzed using a time-series dataset covering the period from 2009 to 2023.

The study's population consists of all annual data related to Local Own-Source Revenue (PAD), the number of workers, population size, and regional levies in Probolinggo City over a specific period. The sample for this research is a 15-year time-series dataset, spanning from 2009 to 2023. Data was collected using a documentation technique, which involved retrieving secondary data from the official websites of government agencies such as the Directorate General of Fiscal Balance (DJPK) and Statistics Indonesia (BPS). This technique was selected for its ability to provide accurate, reliable, and relevant historical data suitable for longitudinal analysis. Data analysis was performed using multiple linear regression. Prior to the regression process, a series of classical assumption tests were conducted to

ensure the data satisfied the BLUE (Best Linear Unbiased Estimator) criteria. These tests included those for normality, multicollinearity, heteroscedasticity, and autocorrelation (Gujarati, 2021).

The multiple linear regression model for this study is specified as follows, $PAD = \beta_0 + \beta_1(JTK) + \beta_2(JP) + \beta_3(RD) + \mu$ Where PAD represents Local Own-Source Revenue, JTK is the Number of Workers, JP is Population Size, and RD is Regional Levies. The model's overall explanatory power, which assesses its capacity to account for the variance in the dependent variable, is evaluated using the coefficient of determination (R^2). The statistical significance of each individual variable's influence is examined through a t-test. In this study, a decision is made based on a significance level (p-value) of less than 0.05, serving as the threshold for statistical confidence (Gujarati, 2021).

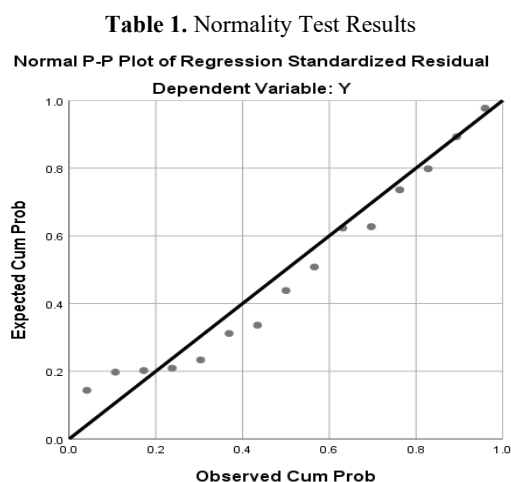
RESULTS & DISCUSSION

Classical Assumption Test

Satisfying the classical assumptions is a crucial step to ensure that the multiple linear regression model meets the BLUE (Best Linear Unbiased Estimator) criteria, as it guarantees that the estimated coefficients are both efficient and unbiased, the model residuals are normally distributed with constant variance, and there is no multicollinearity or autocorrelation that could distort the accuracy and reliability of the regression results.

Normality Test

Based on Gujarati (2021), the normal distribution of residuals in a regression model can be confirmed by conducting a normality test. One of the methods applied in this study is the Normal P-Plot, where the data distribution is considered normal if the data points closely follow the diagonal line. The results of the normality test are presented in the following table:



Source: Author's own processing, 2025

Based on the results of the normality test using the Normal P-Plot method, as presented in the table, it can be concluded that the data are normally distributed. This is confirmed by the data points' distribution, which closely follows the diagonal line on the plot.

Multicollinearity Test

Based on Gujarati (2021), a multicollinearity test is performed to assess the correlation among the independent variables within a regression model. The tolerance and Variance Inflation Factor (VIF) values are the indicators used. A model is considered free from multicollinearity when the tolerance value is greater than 0.10 and the VIF is less than 10. The results of this test are presented as follows:

Table 2. Multicollinearity Test Results

Model	Unstandardized Coefficients		Collinearity Statistics				
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>	<i>T</i>	<i>Sig</i>	Tolerance	VIF
(Constant)	-.258	264.984	.035	-4.749	.001		
Number of Workers	.000	.001	.883	.143	.889	.172	5.828

Total Population	.006	.002	-.050	3.817	.003	.194	5.153
Regional Levies	-.526	1.316	.772	-.399	.697	.622	1.511

Source: Author's own processing, 2025

Based on the results of the multicollinearity test, the tolerance values for the number of workers (0.172), population size (0.194), and regional levies (0.662) were all above the 0.10 threshold, indicating no multicollinearity. Furthermore, the VIF values for each respective variable 5.828 for the number of workers, 5.153 for population size, and 1.511 for regional levies were all below the threshold of 10. Therefore, it can be concluded that the regression model is free from multicollinearity, and the relationships between the independent variables are within acceptable limits for analysis.

Heteroscedasticity Test

The purpose of the heteroscedasticity test is to ensure that the regression model exhibits consistent residual variance across all observations. A robust model must satisfy the assumption of homoscedasticity, where residuals have a constant variance. The presence of non-constant variance, or heteroscedasticity, would violate this assumption. In this study, the Glejser method was employed to detect this condition. The test outcome is determined by the significance value (Sig), where a Sig > 0.05 indicates the absence of heteroscedasticity, while a Sig < 0.05 suggests its presence. The results of the test are presented in the following table:

Table 3. Heteroscedasticity Test Results

Variabel	Sig	Keterangan
Number of Workers	0.274	No Heteroskedasticity
Total Population	0.262	No Heteroskedasticity
Regional Levies	0.264	No Heteroskedasticity

Source: Author's own processing, 2025

The table above presents the results of the heteroscedasticity test using the Glejser method. The significance values for the variables of number of workers, population size, and regional levies are 0.274, 0.262, and 0.264, respectively. Since all these values are greater than 0.05, it is confirmed that the regression model is free from heteroscedasticity, and the assumption of homoscedasticity has therefore been satisfied.

Autocorrelation Test

The purpose of the autocorrelation test is to identify any relationship between the residuals of the current and previous periods. In this study, the Run Test was the method employed for this analysis. The results of the autocorrelation analysis are presented as follows:

Table 4. Autocorrelation Test Result

	Unstandardized Residual
Test Value	-376.824
Cases < Test Value	7
Cases >= Test Value	8
Total Cases	15
Number of Runs	7
Z	-.521
Asymp. Sig. (2-tailed)	.603

Source: Author's own processing, 2025

The test results show an Asymp. Sig. value of 0.603. Since this value is greater than the 0.05 threshold, it indicates that the regression model is free from autocorrelation. As all classical assumptions have now been satisfied, the regression model is confirmed to meet the BLUE (Best Linear Unbiased Estimator) criteria.

Multiple Linear Regression Analysis

The study employed multiple linear regression analysis using SPSS version 25. The results of the analysis are presented in the following table:

Table 5. Multiple Linear Regression Analysis Result

Model	Unstandardized Coefficients		Collinearity Statistics				
	<i>B</i>	<i>Std.Error</i>	<i>Beta</i>	<i>T</i>	<i>Sig</i>	<i>Tolerance</i>	<i>VIF</i>
(Constant)	-.258	264.984	.035	-4.749	.001		
Number of Workers	.000	.001	.883	.143	.889	.172	5.828
Total Population	.006	.002	-.050	3.817	.003	.194	5.153
Regional Levies	-.526	1.316	.772	-.399	.697	.622	1.511

Source: Author's own processing, 2025

Based on the provided information, I have translated the text into a format suitable for an academic publication.

$$\text{PAD} = -1258,360 + 0,000X_1 + 0,006X_2 - 0,526X_3 + \mu,$$

Here, X_1 represents the number of workers, X_2 is the population size, and X_3 is regional levies. The negative constant indicates that, without the contribution of these three independent variables, the Local Own-Source Revenue (PAD) is predicted to decline by Rp1,258.36 billion. Despite the number of workers variable having a positive coefficient (0.000), its contribution to PAD is statistically insignificant. Conversely, population size shows a positive influence on PAD, with every one-person increase estimated to raise PAD by Rp6 million.

Interestingly, the regional levies variable has a negative effect. Every Rp1 billion increase in levies is estimated to decrease PAD by Rp526 million. These findings suggest that the management of regional levies in Probolinggo City is not yet optimal and may even hinder PAD growth if not addressed effectively. Therefore, strategies for increasing PAD should focus on fostering the growth of the productive population and more efficiently optimizing the potential for regional levies.

Coefficient of Determination Test

This study quantifies the influence of the independent variables on the dependent variable. This relationship is assessed by the regression model's explanatory power, as indicated by the R-squared value.

Table 6. Coefficient of Determination Test Result

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.941 ^a	.886	.855	24.24508

Source: Author's own processing, 2025

The analysis reveals an R-squared value of 0.886. This indicates that the independent variables—number of workers, population size, and regional levies—can explain 88.6% of the variation in Local Own-Source Revenue (PAD). The remaining 11.4% of the variation is attributed to other factors not included in the model.

Hypothesis Test (t test)

A t-test is used to individually assess the influence of each independent variable on the dependent variable, as well as the statistical significance of that influence. The results are presented in this study:

Table 7. Hypothesis Test Result

Model	Unstandardized Coefficients		Collinearity Statistics				
	<i>B</i>	<i>Std.Error</i>	<i>Beta</i>	<i>T</i>	<i>Sig</i>	<i>Tolerance</i>	<i>VIF</i>
(Constant)	-1.258.360	264.984	.035	-4.749	.001		
Number of Workers	.000	.001	.883	.143	.889	.172	5.828
Total Population	.006	.002	-.050	3.817	.003	.194	5.153
Regional Levies	-.526	1.316	-.399	-.399	.697	.622	1.511

Source: Author's own processing, 2025

The Influence of the Number of Workers on Regional Original Income

Based on the t-test results, the number of workers variable did not have a significant influence on Local Own-Source Revenue (PAD) in Probolinggo City during the 2009-2023 period. This finding is supported by a significance value of 0.889 (which is greater than the 0.05 threshold) and a calculated t-value of 0.143 (which is less than the t-table value of 2.145). This suggests that an increase in the number of workers does not directly lead to an increase in PAD. This outcome can be explained by the theory of the informal sector and labor productivity, where despite an increase in the workforce, many individuals are employed in the informal sector and are therefore not recorded within the region's revenue base.

Furthermore, this condition indicates that the expansion of the labor force has not been effectively aligned with productive economic activities capable of generating taxable income, reflecting the limited capacity of local governments to optimize workforce potential for revenue enhancement. This finding is consistent with the research by Andriansyah and Athoillah (2024) This suggests that low taxpayer awareness and a high proportion of workers in the informal sector result in an insignificant contribution of labor to Local Own-Source Revenue (PAD). However, this finding contradicts the work of Tianto (2022), who reported a positive influence of the number of workers on PAD.

The Influence of Population on Regional Original Income

The Population Size variable shows a significant influence on Local Own-Source Revenue (PAD) in Probolinggo City. This finding is supported by a significance value of 0.003 (less than the 0.05 threshold) and a calculated t-value of 3.817 (which is greater than the t-table value). This result is consistent with regional economic theory, which posits that an increase in population expands the tax base, boosts consumption, and increases the demand for goods and services, thereby stimulating local economic growth. The research objective of examining the influence of population size on PAD was therefore achieved. In this context, an increase in population provides an opportunity for the local government to enhance revenue from both the tax and levy sectors, particularly from local-scale economic activities.

Moreover, the significant impact of population growth on PAD underscores the importance of integrating demographic dynamics into fiscal planning, ensuring that the expansion of public services and infrastructure keeps pace with the growing population to sustain local revenue performance. This finding is consistent with the research by Priyono and Handayani (2021) which concluded that an increase in population can enhance Local Own-Source Revenue (PAD), provided it is accompanied by effective fiscal management. However, this finding is inconsistent with the research by Andriansyah and Athoillah (2024), which emphasized the absence of a significant influence of population size on Local Own-Source Revenue (PAD).

The Influence of Regional Levies on Regional Original Income

Based on the t-test results, Regional Levies showed no significant relationship with Local Own-Source Revenue (PAD), with a significance value of 0.697 and a calculated t-value of -0.399 (which is less than the t-table value). This finding contradicts regional finance theory, which posits that levies, as a key component of PAD, should contribute to regional fiscal independence. The failure of levies to provide a significant contribution to PAD can be attributed to several factors, including a weak collection system, low public compliance in paying levies, and the limited scope of levy types managed by the local government. As a result, the research objective of examining the influence of regional levies on PAD was not achieved.

Furthermore, the insignificance of the relationship indicates that the local government's fiscal capacity is not yet optimal in utilizing regional retribution as a sustainable source of revenue, reflecting inefficiencies in local financial management and enforcement. This finding is consistent with the study by Aditya Ananta Ashari & Ririt Iriani S (2024), which reported that regional levies do not have a significant impact on Local Own-Source Revenue (PAD) due to the continued heavy reliance on central government transfer funds. However, this result contradicts the findings of Sudarmana and Sudiarta (2020), who emphasized that PAD is positively influenced by regional levies in areas with a more well-structured collection system.

CONCLUSION

Based on the analysis of the influence of the number of workers, population size, and regional levies on Local Own-Source Revenue (PAD) in Probolinggo City from 2009 to 2023, the following conclusions can be drawn. The number of workers has no significant influence on PAD, which is attributed to the dominance of the informal sector, low skills, and minimal investment in high-value-added sectors. Population size has a positive influence on PAD, as population growth expands the consumer market, increases demand for goods, services, and public utilities, and stimulates local economic activity that contributes to tax and levy revenues. Regional levies do not have a significant influence on PAD. This is caused by low public compliance and awareness, a weak management system, and a limited scope of services subject to levies. The Probolinggo City Government is advised to enhance labor productivity by providing skills training and expanding employment opportunities in the formal sector. Future research should consider additional variables such as poverty, unemployment, or sectoral Gross Regional Domestic Product (GRDP) to gain a more comprehensive understanding of the factors influencing PAD.

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