The Effect of the Labor Force Participation Rate (LFPR) and Population on Economic Growth in North Sumatra

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| Keywords:	Abstract
Labor Force Participation Rate; Population; Economic Growth; Regional Development; North Sumatra	This study investigates the effect of the Labor Force Participation Rate (LFPR) and population size on economic growth in North Sumatra Province during the 2018–2023 period. Economic growth remains a crucial indicator of regional development performance, particularly in provinces experiencing demographic dynamics and labor market fluctuations. Using a quantitative approach, this study employs multiple linear regression analysis based on secondary data obtained from the Central Bureau of Statistics (BPS) and the North Sumatra Manpower Office. Prior to estimation, classical assumption tests including normality, multicollinearity, autocorrelation, and heteroscedasticity were conducted to ensure model robustness. The empirical results reveal that LFPR has a positive and statistically significant effect on economic growth, indicating that higher labor market participation enhances regional production capacity and output. Population size also shows a positive and significant influence, suggesting that population growth can stimulate economic activity through expanded labor supply and consumption demand when properly managed. Simultaneously, LFPR and population significantly affect economic growth, as confirmed by the F-test results. The coefficient of determination (R^2) of 91.84% indicates that the two independent variables explain a substantial proportion of variations in economic growth in North Sumatra. These findings highlight the strategic role of labor force engagement and demographic management in fostering sustainable regional economic growth. Policy implications emphasize the importance of job creation, workforce skill development, and human capital investment to maximize the benefits of demographic potential and support inclusive economic development in North Sumatra Province.

1. Introduction

Economic growth is a critical indicator for assessing the success of regional development, reflecting not only increases in production capacity but also the effectiveness of resource utilization and management strategies. In general, economic growth refers to the expansion of an economy's capacity to produce goods and services over a given period. Yunianto (2021) defines economic growth as a process of continuous change in a country's economic condition toward a better state. A region experiences growth when its level of economic activity surpasses that of previous periods. Consequently, understanding the determinants of regional economic growth has become a central concern for policymakers, researchers, and development practitioners.

One of the most widely used indicators for measuring regional economic performance is the Gross Regional Domestic Product (GRDP). GRDP captures the economic output generated within a region and reflects the region's ability to manage and utilize its resources to create added value. Thus, economic growth is not merely a measure of production but also serves as a proxy for assessing the quality of regional development management and the efficiency of policy implementation (BPS, 2023).

Figure 1. Economic Growth of North Sumatra 2018–2023
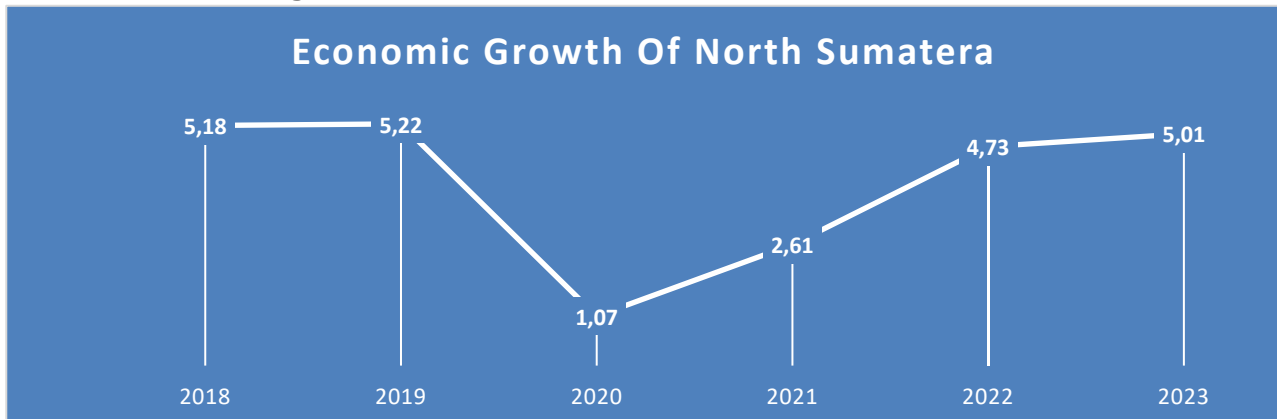
Source: North Sumatra Central Bureau of Statistics 2023

North Sumatra Province, as one of the largest contributors to Sumatra's economy, exhibits interesting growth dynamics that warrant systematic analysis. Data from the Central Bureau of Statistics (BPS) show that North Sumatra's economic growth stabilized around 5% in 2018 (5.18%) and 2019 (5.22%). However, in 2020, the province experienced a drastic contraction to 1.07% due to the COVID-19 pandemic. The regional economy subsequently recovered, with growth increasing to 2.61% in 2021, 4.73% in 2022, and reaching 5.01% in 2023. These fluctuations indicate that while North Sumatra's economy is resilient, it remains sensitive to both structural and external shocks, highlighting the need for policies that enhance stability and promote sustainable growth. To understand the dynamics underlying these trends, it is essential to examine the key determinants of regional economic growth. Two particularly important variables are the labor force participation rate (LFPR) and population, which together represent the labor capacity and demographic burden of the region. Both factors are closely linked to economic productivity and efficiency, playing a strategic role in shaping sustainable growth.

The Labor Force Participation Rate (LFPR) is defined as the ratio of the total labor force to the working-age population engaged in economic activities, including both employment and active job-seeking. An increase in LFPR indicates a larger supply of labor capable of contributing to the production of goods and services (Syarifa et al., 2023). In economic theory, labor productivity tends to increase with investments in physical and human capital, and population growth influences the availability of productive labor. The Cobb-Douglas production function, for example, emphasizes the importance of labor as a production factor that can enhance output optimally if accompanied by adequate capital and skilled human resources (Syafira et al., 2023).

Figure 2. Labor Force Participation Rate of North Sumatra 2018–2023
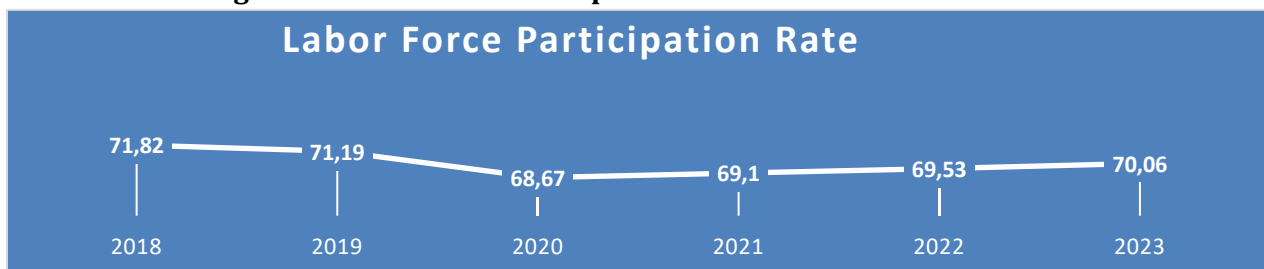
Source: North Sumatra Manpower Office

According to BPS (2023), the LFPR in North Sumatra fluctuated between 2018 and 2023. In 2018, LFPR was 71.82%, declining to 68.67% in 2020, likely reflecting the pandemic's impact on labor market participation. From 2021 onward, LFPR began to recover, reaching 70.06% in 2023. This trend demonstrates the workforce's responsiveness to economic conditions and its significant influence on regional economic activity. Notably, periods of declining LFPR coincide with slowed economic growth, whereas increasing LFPR aligns with economic recovery, illustrating the labor force's potential to drive regional productivity.

Population, as another key determinant, functions both as a source of labor and as consumers within the economy. The growth of the working-age population can stimulate economic activity by increasing labor supply and purchasing power. However, as Syarifa et al. (2023) note, population growth yields positive economic effects only if accompanied by improvements in human capital quality and employment opportunities. Without these conditions, rapid population growth may exacerbate unemployment and hinder economic development. Government interventions that promote job creation and human resource development thus become crucial for harnessing demographic potential.

Figure 3. Total Population of North Sumatra 2018–2023
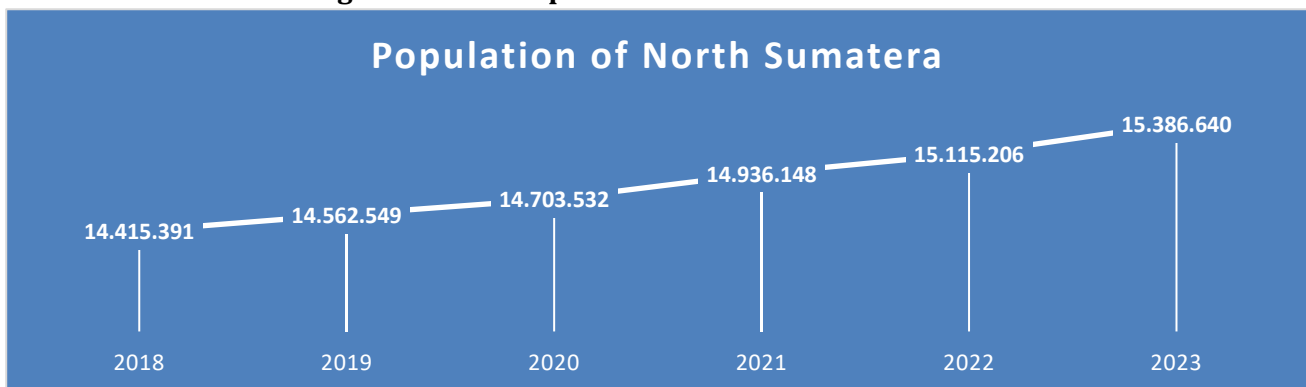
Source: Central Bureau of Statistics 2023

BPS data indicate that North Sumatra's population has grown steadily from 14,415,391 in 2018 to 15,386,640 in 2023. While this increase represents a significant potential labor force, it also underscores the need for regional readiness in terms of employment provision and human resource quality improvement. The relationship between population and economic growth is not inherently linear; rather, it depends on how effectively the population is integrated into productive economic activities and supported through appropriate policies.

Despite the evident potential of LFPR and population to drive economic growth, empirical evidence suggests that these factors do not automatically translate into improved economic performance. North Sumatra's post-

COVID economic recovery illustrates that structural, institutional, and policy-related factors interact with demographic variables to influence growth outcomes. Moreover, previous studies have largely focused on national-level data or other regions, leaving a **research gap regarding the empirical relationship between labor force participation, population, and economic growth at the provincial level**, particularly in the context of post-pandemic recovery.

Therefore, this study aims to empirically examine the effect of labor force participation rate and population on economic growth in North Sumatra Province. The findings are expected to provide a solid evidence base for policymakers to design targeted strategies that

enhance regional economic performance. Specifically, this research seeks to:

1. Analyze the trend of economic growth in North Sumatra from 2018 to 2023.
2. Examine the relationship between labor force participation rate and economic growth.
3. Investigate the influence of population dynamics on regional economic development.
4. Provide policy recommendations for sustainable economic growth based on empirical findings.

By addressing these objectives, the study contributes both theoretically and practically. Theoretically, it expands the understanding of how demographic and labor factors influence regional growth within a developing economy. Practically, it offers insights for regional planners and policymakers to align workforce development and population management with growth objectives, particularly in a post-pandemic environment.

In summary, understanding the interplay between labor force participation, population, and economic growth is essential for fostering sustainable regional development. North Sumatra Province provides a relevant case study due to its significant economic contribution, demographic dynamics, and post-pandemic recovery trajectory. By examining these relationships empirically, this study contributes to the literature on regional economic growth while offering actionable guidance for policymakers aiming to optimize the socio-economic potential of the province.

2. Literature Review
2.1 Economic Growth

Economic growth is a critical indicator for assessing the performance and development of a country or region. It generally refers to the increase in the production of goods and services over a given period (Yunianto, 2021). In other words, economic growth reflects not only the expansion of output but also the improvement in people's welfare and income levels. Gross Domestic Product (GDP) and Gross Regional Domestic Product (GRDP) are commonly used measures to quantify economic growth, as they reflect the ability of a region to manage resources efficiently and create economic value (Arsyad, 2010).

Classical economic theory, as proposed by Adam Smith, emphasizes the role of population growth in expanding markets, enabling labor specialization, and stimulating technological innovations that promote economic growth. However, Smith also warned that unchecked population growth could lead to diminishing returns, particularly due to resource constraints such as limited land, which may eventually slow productivity growth (Sukirno, 2006). Simon Kuznets later added that sustainable economic growth depends on technological progress, institutional development, and social adaptation to ensure the equitable distribution of wealth.

Based on these perspectives, economic growth can be understood as a long-term phenomenon influenced by three main factors: (1) sustained output growth, reflecting economic stability; (2) technological advancement, which enhances production capacity; and (3) institutional and social structures, which ensure that technological innovations are effectively utilized and broadly beneficial. In the context of North Sumatra, these factors are crucial, as the province has experienced fluctuations in economic performance, particularly due to external shocks such as the COVID-19 pandemic.

2.2 Labor Force Participation Rate (LFPR)

The labor force is a fundamental component in economic analysis. It includes all individuals who are either employed or actively seeking employment (Sukirno, 2004). The Labor Force Participation Rate (LFPR), also known as TPAK in Indonesian statistics, measures the proportion of the working-age population engaged in economic activities (Central Bureau of Statistics, 2020). The formula for LFPR is:

$$LFPR = \frac{\text{Total Labor Force}}{\text{Working-Age Population}} \times 100$$

LFPR serves as a key indicator of the potential labor supply and the overall efficiency of human resource utilization in an economy. A high LFPR implies a greater proportion of productive individuals contributing to output, income generation, and consumption, which ultimately enhances regional welfare (Wisna Sarsi et al., 2014). Conversely, low LFPR may indicate underutilized labor potential and reduced economic productivity.

Empirical studies have demonstrated that LFPR significantly influences regional economic growth. According to the Solow-Swan growth model, labor is a primary input alongside capital in production. An increase in the labor force, if combined with adequate productivity and capital investment, can substantially raise output levels (Octaviany, 2016; Sunardi et al., 2017). In North Sumatra, LFPR declined during the COVID-19 pandemic but has since rebounded, highlighting its dynamic impact on economic performance.

2.3 Total Population

Population refers to all individuals residing in a specific geographical area within a given time period, including considerations of birth, death, and migration processes (Mulyadi, 2008; Said, 2001). In economic development studies, population plays a dual role: as a source of labor and as a consumer market. A growing population can expand the labor supply and stimulate consumption, but if not matched with adequate employment opportunities and human resource quality, it may increase unemployment and strain public services (Saharuddin Didu, 2016).

From a demand perspective, a large population contributes to market expansion, while from a supply perspective, a well-educated and healthy workforce enhances productivity (Tambunan, 2003; Robinson, 2012). In developing regions, high population growth can create dependency pressures, particularly when a large proportion of the population is young and not yet economically active. This demographic structure requires strategic investment in education, health, and employment programs to convert population potential into economic growth (Syarifa et al., 2023).

2.4 Relationship Between Labor Force Participation Rate and Economic Growth

The Labor Force Participation Rate (LFPR) is closely linked to economic growth because it represents the proportion of the working-age population actively engaged in production. According to Solow-Swan theory, the combination of labor and capital inputs determines output levels; therefore, labor participation is a crucial driver of economic performance (Octaviany, 2016).

High LFPR increases the effective labor supply, which can lead to higher GDP or GRDP if productivity is maintained. Sunardi et al. (2017) confirmed that an increase in the labor force, coupled with high productivity, directly contributes to regional economic growth. Nanda (2019) further highlighted that higher LFPR positively affects GRDP and public consumption, indicating that regions with more active labor participation achieve greater per capita income and stronger economic momentum.

2.5 Relationship Between Population and Economic Growth

Population growth has a complex relationship with economic development. Malthus (1766–1834) posited that excessive population growth could hinder economic progress due to limited resources, leading to decreased per capita income. Modern studies argue that population contributes positively when balanced with adequate employment opportunities, capital investment, and human resource quality (Jhingan, 2014).

A growing population enhances labor supply and consumption demand, creating opportunities for production expansion. However, if the working-age population

increases faster than job creation, unemployment rises, and living standards may decline. Quantitative models suggest an **optimal population size** that maximizes per capita income, while deviations from this size require strategic investment to maintain welfare levels. In developing regions like North Sumatra, demographic characteristics, such as a large young population, present both opportunities and challenges for economic growth, highlighting the importance of labor market policies and education programs (Syarifa et al., 2023).

2.6 Synthesis and Research Gap

Based on the reviewed literature, both LFPR and population are essential determinants of economic growth. LFPR indicates the efficiency and utilization of human resources, while population provides potential labor supply and market demand.

Empirical studies suggest that the relationship is **context-dependent**; high labor participation enhances growth when supported by adequate capital and productivity, whereas rapid population growth may hinder growth if employment and human resource quality are insufficient.

Despite extensive theoretical discussion, there is a research gap regarding the combined effect of LFPR and population on regional economic growth in North Sumatra, particularly in the post-COVID-19 period. Previous studies focus on national-level analyses or cross-country comparisons, while regional dynamics, including demographic characteristics and labor market fluctuations, remain underexplored. Therefore, empirical research is needed to quantify these effects and provide evidence-based recommendations for sustainable regional economic policies.

Conceptual Framework:

Conceptual Framework

Variable	Measurement Indicator	Expected Relationship with Economic Growth
Labor Force Participation Rate	% of working-age population engaged in economic activity	Positive
Population	Total population, age structure	Positive or negative depending on employment capacity

3. Research Methods
3.1 Research Design

This study employs a quantitative research method with an associative descriptive design, aiming to empirically examine the effect of the Labor Force Participation Rate (TPAK) and population on economic growth in North Sumatra Province. Quantitative research allows for systematic data collection and statistical analysis to determine the strength and direction of relationships among variables (Sugiyono, 2019).

The choice of an associative descriptive approach is justified because the study seeks to identify the relationship between independent variables (TPAK and population) and the dependent variable (economic growth) rather

than merely describing trends or testing causal differences. Unlike causal-comparative or panel data regression methods, associative descriptive research is suitable for time-series data analysis when the goal is to explore correlations and predictive relationships between variables over a specific period.

Variables are defined as follows:
1. Dependent Variable: Economic growth, measured by the annual Gross Regional Domestic Product (GRDP) in billion Rupiah (BPS, 2023).
2. Independent Variables:
   a. Labor Force Participation Rate (TPAK), measured as the percentage of the working-age population (15–64 years old) engaged in economic

activities, including employment and actively seeking work (BPS, 2021).

b. Population, measured as the total number of individuals residing in North Sumatra Province, expressed in thousands of people (BPS, 2023).

3.2 Data Source and Period

This study uses secondary data collected from official government sources, including:

1. The Central Bureau of Statistics (BPS) North Sumatra, for annual data on GRDP and total population.

2. The North Sumatra Manpower Office (Disnaker), for annual Labor Force Participation Rate data.

The study period covers 2018 to 2023, selected to reflect pre-pandemic, pandemic, and post-pandemic economic conditions, allowing the study to capture fluctuations in economic growth and labor dynamics during these critical years. All datasets are annual time-series data, ensuring consistency in measurement and comparability across variables.

3.3 Variable Operationalization

Variable	Definition	Measurement Unit	Data Source
Economic Growth	Growth in the production of goods and services in the region	Billion Rupiah (IDR)	BPS North Sumatra
Labor Force Participation Rate (TPAK)	Proportion of working-age population (15–64) engaged in economic activity	Percentage (%)	Disnaker North Sumatra
Population	Total number of residents in North Sumatra	Thousand People	BPS North Sumatra

3.4 Data Analysis Procedure

The data analysis involves multiple linear regression to determine the effect of TPAK and population on economic growth. The analysis follows a structured procedure using EViews software, chosen for its robust capability in time-series analysis and classical assumption testing (Ghozali, 2018). The analysis steps are as follows:

1. Classical Assumption Tests
   o Normality test: Ensures the residuals of the regression model are normally distributed.
   o Multicollinearity test: Detects correlation among independent variables using Variance Inflation Factor (VIF).
   o Heteroscedasticity test: Verifies the constancy of residual variance using the White test.
   o Autocorrelation test: Checks for correlation between residuals over time using the Durbin-Watson statistic.

2. Multiple Linear Regression Model
$$EG_t = \alpha + \beta_1 TPAK_t + \beta_2 POP_t + \epsilon_t$$

Where:
- EG_t = Economic Growth in year t
- $TPAK_t$ = Labor Force Participation Rate in year t
- POP_t = Population in year t
- α = Intercept
- β_1, β_2 = Regression coefficients
- ϵ_t = Error term

3. Hypothesis Testing
- t-test: Evaluates the effect of each independent variable on economic growth individually.
- F-test: Assesses the joint significance of TPAK and population on economic growth.
- Coefficient of Determination (R^2): Measures the proportion of variation in economic growth explained by TPAK and population.

By following this methodological procedure, the study ensures transparency, reproducibility, and alignment with Scopus-standard research reporting guidelines.

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4. Result and Discussion
4.1 Result
1. Classical Assumption Test
Normality

Table 1. Normality Test

Series: Residuals	
Sample 2018 2023	
Observations 6	
Mean	3.79e-14
Median	-0.180701
Maximum	0.828365
Minimum	-0.503861
Std. Dev.	0.493893
Skewness	0.787980
Kurtosis	2.261152
Jarque-Bera	0.757387
Probability	0.684756

Source: Own Processing, 2025

Based on the results of the normality test in the table above, the Jarque-Bera value is 0. 757387 with a probability of reaching 0. 684756, where the probability value is higher than the significance limit of 0.05, it can be concluded that the residuals are normally distributed. Thus, the normality assumption in the regression model of this study has been met, so that the model can be used for further analysis.

Multicollinearity

Table 2. Multicollinearity Test

Variance Inflation Factors
Date: 05/20/25   Time: 11:59
Sample: 2018 2023
Included observations: 6

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	787.8723	11627.65	NA
X2	8.22E-13	2676.976	1.331323
X1	0.072079	5222.991	1.331323

Source: Own Processing, 2025

Based on the multicollinearity test results above, the Centered VIF value for variables X1 (labor force participation rate) and X2 (total population) is obtained at 1. 331323, which is very far below the maximum limit of 10. Therefore, it can be concluded that in this regression model there is no multicollinearity problem, so the independent variables used do not affect each other excessively and can be used for regression analysis.

Autocorrelation

Table 3. Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	51.24730	Prob. F(2,1)	0.0983
Obs*R-squared	5.942026	Prob. Chi-Square(2)	0.0513

Source: Own Processing, 2025

From the results of the autocorrelation test in the table above, the Prob. Chi-Square (2) of 0.0513 and Prob. F-statistic of 0.0983, both of which are above the 0.05 significance level. Therefore, it can be concluded that the regression model applied in this study does not have autocorrelation issues, which means that the residuals are not correlated between time and this model can be used for regression analysis.

Heteroscedasticity

Table 4. Heteroscedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.624513	Prob. F(2,3)	0.5933
Obs*R-squared	1.763734	Prob. Chi-Square(2)	0.4140
Scaled explained SS	0.278042	Prob. Chi-Square(2)	0.8702

Source: Own Processing, 2025

In this heteroscedasticity test using the Breusch-Pagan-Godfrey Test. The results of the test show the Prob. F-statistic reaches 0.5933, Prob. Chi-Square (Obs * R^2) of 0.4140, and Prob. Chi-Square(Scaled explained SS) of 0.8702. All of these probability values are greater than 0.05, which states that the data is homoskedastic. Therefore, it can be concluded that the regression model in this study does not experience heteroscedasticity issues, so the error variance remains constant and this model is suitable for further analysis.

2. Hypothesis Test

Table 5. Multiple Linear Regression Analysis

Dependent Variable: Y
Method: Least Squares
Date: 05/20/25 Time: 11:55
Sample: 2018 2023
Included observations: 6

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-148.1870	28.06906	-5.279373	0.0133
X2	2.90E-06	9.07E-07	3.198257	0.0494
X1	1.557107	0.268476	5.799796	0.0102

R-squared	0.918393	Mean dependent var	3.970000
Adjusted R-squared	0.863988	S.D. dependent var	1.728896
S.E. of regression	0.637614	Akaike info criterion	2.244684
Sum squared resid	1.219653	Schwarz criterion	2.140564
Log likelihood	-3.734053	Hannan-Quinn criter.	1.827882
F-statistic	16.88071	Durbin-Watson stat	2.817875
Prob(F-statistic)	0.023313		

Source: Own Processing, 2025

T-Test (Partial)

1. From the results of the regression analysis in the table above, the variable labor force participation rate (X1) shows a significance value of 0.0102, which is smaller than 0.05. This indicates that partially, the labor force participation rate has a significant influence on economic growth in North Sumatra.

2. From the regression analysis results in the table above also shows, the total population variable (X2) recorded a significance value of 0.0494, also below 0.05. In other words, population partially has a significant effect on economic growth in North Sumatra.

F-Test (Simultan)

The multiple linear regression analysis in the table above shows an F-statistic value of 16.88071 with a probability of 0.023313, which is smaller than the 0.05 significance level. Therefore, it can be concluded that labor participation and population together have a significant effect on economic growth in North Sumatra between 2018 and 2023.

Coefficient Of Determination (R2)

In the multiple linear regression analysis table above, the R-squared value of 0.918393 indicates that 91.84% of the variation in economic growth can be explained by the labor force participation rate and population variables in this model. Meanwhile, the remaining 8.16% is influenced by other factors outside the model. The Adjusted R-squared value of 0.863998 also indicates that the power of the model remains high, even after adjusting for the sample size and independent variables.

4.2 Discussion

1. The Effect of Labor Force Participation Rate on Economic Growth

Based on the results of multiple linear regression testing in the study, it indicates that the variable labor force participation rate (TPAK) has a positive and significant impact on economic growth in North Sumatra Province. The TPAK regression coefficient of 1.557107 indicates that every 1% increase in TPAK, assuming other variables remain constant, will increase economic growth by 1.557 units. The significant probability value of 0.0102 (<0.05) also proves that the effect of TPAK on economic growth is partially real in the statistical study. This means that the higher the participation of the population in the labor force, the greater the potential for economic growth that can be achieved by a region. High labor participation reflects the increasing number of working-age individuals who actively contribute to economic activities, both in the formal and informal sectors, thereby encouraging increased production and economic output.

The results of this study are in line with previous research conducted by Syamsuddin et al. (2021), which found that TPAK has a significant impact on economic growth in Aceh Province. This strengthens the evidence that labor force participation is one of the key indicators in improving the economic performance of a region. Furthermore, Purba et al. (2024) also obtained similar results in their study, where the TPAK regression coefficient for North Sumatra Province was found to be 4.467278. This indicates that a 1% increase in TPAK has the potential to spur economic growth by 4.467278 units,

confirming the strong positive relationship between TPAK and economic growth in the region.

This relationship can be understood through a macroeconomic approach, where economic growth is strongly influenced by an increase in factors of production, one of which is labor. When more people are active in the economy, national productivity will increase, people's purchasing power will also be lifted, and business sector investment can grow optimally. Therefore, government policies in encouraging the expansion of employment opportunities, skills development, and vocational education are very strategic to improve the quality and number of workers who are actively involved in regional economic development.

2. The Effect of Population on Economic Growth

Based on the results of multiple linear regression testing in this study, it shows that the population variable (X2) has a positive and significant effect on economic growth in North Sumatra Province. This is indicated by the regression coefficient value of 2.90E-06, which means that if the population increases by one unit (for example, one individual), then economic growth will increase by 2.90E-06 units, assuming other variables do not change. In addition, the probability value of 0.0494 (<0.05) indicates that the effect is statistically significant. Thus, the larger the population, the stronger the contribution to regional economic growth. This can be explained because a large population can provide broad market opportunities for production and consumption activities. The population not only acts as labor in the production process, but also as consumers who drive demand for goods and services. The greater the domestic demand, the higher the economic activity that will drive growth.

This finding is in line with the research of Darma and Wulansari (2021) which states that population individually affects economic growth. This means that the contribution of

population to economic growth is strong and significant. Likewise, the results of Simarmata and Iskandar's research (2022) show that population has a t-count of 14.01190, which is greater than the t-table of 1.65251, so it is concluded that population has a positive and significant effect on economic growth. The increase in population in North Sumatra has the potential to be a driving force in increasing economic growth, especially if it is well managed through improving the quality of human resources, equal access to education and employment. A large population will become a demographic bonus if the productive population is maximally empowered.

3. The Effect of Labor Force Participation Rate and Population on Economic Growth

Based on the results of multiple linear regression testing in the study, it shows that simultaneously the variables of labor participation rate (TPAK) and population have a significant impact on economic growth in North Sumatra Province. With an F-statistic value of 16.88071 and a significance value of 0.023313 (<0.05), it has been proven that these two independent variables can collectively explain variations in the dependent variable, namely economic growth. This suggests that increased labor participation and population growth play an important role in stimulating economic activity and increasing regional output. Empirically, the more individuals are involved in the workforce and the more the population grows, the more the potential labor force, consumption market, and economic productivity will also increase.

This relationship indicates that the success of economic development is strongly influenced by the efficient management of human resources and demography. The population not only functions as consumers, but also acts as a very important production factor in various economic sectors. If a large population is accompanied by a high level of labor participation and good quality human resources, economic growth can be achieved

sustainably. Therefore, local government policies that support job creation, workforce training, and population growth control are key to maximizing the positive effects of these two variables on economic growth. This finding confirms that inclusive economic development should consider structural factors such as labor and demography as the main foundation.

5. Closing

5.1 Conclusion

Based on the analysis and discussion, the study concludes that both the labor force participation rate (TPAK) and population have a significant impact on economic growth in North Sumatra Province during 2018–2023.

1. Partial Effects: The labor force participation rate positively influences economic growth, indicating that higher workforce involvement enhances regional production and economic output. Similarly, population growth contributes positively to economic growth, provided it is managed effectively.
2. Simultaneous Effects: Collectively, TPAK and population significantly explain variations in economic growth. The regression model demonstrates a high explanatory power (R^2 = 0.918), indicating that these two variables account for the majority of regional economic fluctuations.
3. Theoretical Contribution: These findings reinforce the macroeconomic understanding that labor and demographic factors are fundamental drivers of regional economic development.

5.2 Policy Implications

The results of this study have direct implications for regional development policies in North Sumatra:

1. Workforce Development: Policies aimed at improving labor skills, vocational education, and access to employment can enhance the productive participation of the population, thereby supporting economic growth.
2. Population Management: Strategic management of population growth—through education, healthcare, and infrastructure development—can optimize the demographic bonus and strengthen regional economic capacity.
3. Integrated Approach: Simultaneous attention to workforce quality and population management is crucial for sustainable and inclusive economic development.

5.3 Recommendations

Based on the study findings, the following recommendations are proposed:

1. Enhance Employment Opportunities: Local government should implement training programs and provide broader access to jobs to maintain and increase labor force participation.
2. Human Capital Investment: Strengthening education, health services, and infrastructure is essential to improve the quality of human resources and ensure the population contributes effectively to economic growth.
3. Demographic Strategy: Population growth should be managed strategically to leverage economic potential rather than create challenges. Policymakers should monitor demographic trends and adjust development programs accordingly.
4. Further Research: Future studies could incorporate additional socio-economic variables, explore long-term trends, or evaluate the impact of specific policy interventions on economic growth.

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