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How Regional Economic Growth, Population, and Manufacturing Value-Added Contribute to Regional Labor Force Participation

Muhammad Farid Alfarisy

Abstract: This study investigates the relationship between manufacturing value-added, GRDP (Gross Regional Domestic Product), and population growth on the labor participation rate in the region. The sample comprises 16 provinces in total. It consists of 10 provinces that experienced economic growth rates lower than the national growth rate between 2017 and 2019. The remaining six provinces have economic growth that exceeded the average national economic growth from 2017 to 2019. These 6 provinces are located on Java Island, and the other 10 provinces are located outside Java Island. Thus, we also added the province location variable to our analysis. We employed panel data regression to estimate the data. This study finds that the region's economic and population growth substantially impacts the region's labor participation rate. While the manufacturing value-added, the labor productivity rate, and the location do not significantly affect the labor participation rate of the region. Since economic and population growth are significant factors influencing labor force participation, some government policies should prioritize promoting sustainable economic development and attracting people to the province. The result of the study on the effect of manufacturing value-added and labor productivity shows that it has no impact on labor participation rates. This suggests that policies aimed solely at boosting manufacturing output or labor productivity may not automatically translate into higher labor force participation. Policymakers should, therefore, diversify their focus to other sectors, such as services or technology, that might better encourage workforce engagement.

Keywords: Labor Participation Rate; Regional Economic Growth; Labor Productivity Rate
JEL Classification: J21; J23; P25

AFFILIATION:
Faculty of Economics and Business, Universitas Jenderal Soedirman, Central Java, Indonesia

***CORRESPONDENCE:**
muhammad.farid.alfarisy@unsoed.ac.id

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Introduction

Regional economic development is the process by which local governments and communities use existing resources to create new employment and support the growth of regional economic activity in an area. A region's economic development success is measured by a rise in real production and an improvement in the community's quality of living or welfare. However, in the course of regional development, there are regions where economic development is very quick and regions where economic development is relatively sluggish, resulting in economic growth disparities across regions. A region's ability to grow varies according to

geographical characteristics (Redding & Rossi-Hansberg, 2017), prospective natural resources (Hayat & Tahir, 2021), human resources (Curea & Ciora, 2015), and infrastructure (Palei, 2015).

According to Evenhuis et al (2021), there is a strong correlation between national and regional economic growth. To effectively address economic growth disparities across regions and achieve regional economic development success, it is crucial to tailor regional development planning and policy to each area's unique geographical circumstances and financial capacity. This tailored approach, a key factor in ensuring the success of regional economic development, underscores the practical implications of our research (Rodríguez-Pose & Wilkie, 2017).

National economic growth plays a pivotal role in influencing regional growth. A region that experiences higher growth at the national level indicates a competitive advantage, which is a direct result of economic development in the area. This understanding is crucial for policymakers and researchers, as it provides a broader context for our research. Interestingly, throughout 2017-2019, when the national economy experienced growth, the number of regions or provinces whose growth was below the national average increased. Table 1 shows that there are provinces in Indonesia throughout 2017-2019 whose economic growth is slower than national economic growth, and the number is rising.

Table 1 Number of Provinces with the Regional Economic Growth Above the Average National

Year	National GDP (Billion Rupiah)	National Growth Rate (%)	Number of Provinces with the Regional Economic Growth Above the Average National Level
2017	9,912,928	5.07	24
2018	10,425,852	5.17	22
2019	10,949,155	5.02	21

Examining the distribution (Figure 1), it is evident that most regions experiencing economic growth above the national average are located on the islands of Java and Sulawesi. Consequently, the provinces on these islands continued to contribute to national economic growth throughout the year.

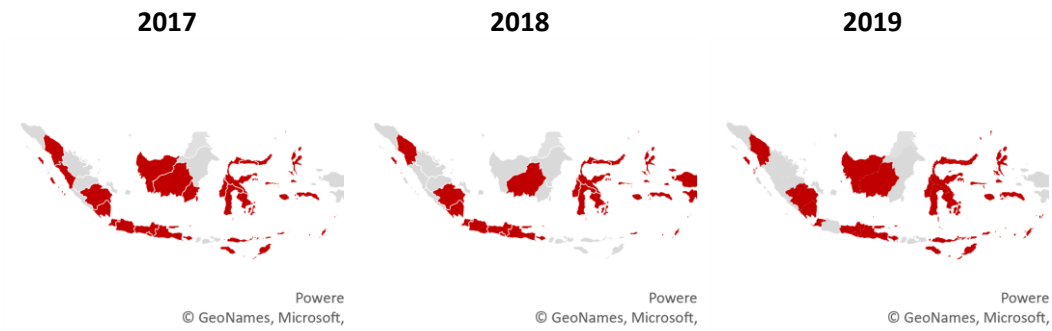

Figure 1 Distribution of Regions with Economic Growth Above the Average National Economic Growth

Population growth and increased labor productivity frequently benefit regions with relatively rapid economic development (Bala et al., 2020; Golley & Wei, 2015). This is shown by the rise in the region's labor force participation rate. Between 2017 and 2019, provinces like Aceh, Riau, Kepulauan Riau, and Papua showed a decline in their labor force participation rates. On the contrary, provinces like DKI Jakarta, West Java, East Java, DI Yogyakarta, and Banten exhibit opposite trends. Consequently, the solid economic expansion in the region has the potential to enhance labor force participation. The research conducted by Syafira & Selvia (2024) and Mumekh et al. (2023) supported this premise, which shows the strong correlation between Gross Regional Domestic Product (GRDP), economic growth, and the rate of labor force participation in the Indonesian region. However, interestingly, other studies indicated otherwise that regional economic growth has no impact on labor force participation, as in Ariesti & Asmara (2023) and Ramadhan & Setyowati (2023).

This study explicitly examines provinces that saw economic growth below the national average from 2017 to 2019. This research examines specific locations' distinctive features by studying six Java Island provinces. These provinces have seen economic growth at a pace higher than the average national level. The objective is to analyze how this economic expansion affects the level of labor force participation in these areas. Other factors, such as population growth in regions such as Ayuningtyas & Islami (2022) and Herman (2023), and the added value of the manufacturing sector, can also influence labor participation. The population factor can be one of a region's economic growth determinants. Population growth can contribute to labor production, particularly in regions with high migration rates. High economic growth requires and draws in more productive factors, particularly in regions with industrial sectors dominated by labor-intensive businesses.
Furthermore, the population is a target market that motivates businesses to expand their production, requiring a larger workforce. To enhance production, it is necessary to raise the workforce. The growth of value addition in the industrial industry directly impacts the demand for more workers.

The perspective of labor demand for the degree of labor force participation remains limited. Industries require labor and capital as inputs in their production processes for creating goods and services. Capital formation refers to the process of investing funds to generate further income. It entails a rise in the production of capital goods. Suppose there

is an increase in the demand for higher output. In that case, the industry will require a greater amount of labor, resulting in the employment of additional workers. This study sees Labor Rate Participation as an interaction between supply and demand for labor. Thus, our study aims to investigate the relationship between the labor participation rate, manufacturing value-added, GRDP (Gross Regional Domestic Product), and population growth in the region. Using 16 provinces as our samples, 10 provinces experienced economic growth rates lower than the national growth rate between 2017 and 2019. The remaining six provinces are located on Java Island and witnessed economic expansion surpassing the average national economic growth throughout the same period.

Research Method

The Labor Force Participation Rate, as defined by the Indonesian Statistics-BPS, is the proportion of the total working-age population that is either currently employed or previously had a job but is presently jobless relative to the total working-age population. The drop in the participation rate suggests a decrease in available job opportunities.

Research regarding labor participation predominantly centers on the viewpoint of labor supply. Previous studies by Wasono et al. (2020) and Ramadhan & Setyowati (2023) extensively utilized indicators such as the Human Development Index to assess workforce quality. Others also examine the involvement of the workforce from a public policy standpoint by studying the correlation between government expenditure and the rate of labor force participation, as demonstrated in the works of Akmal (2017) and Ikhwan & Siradjuddin (2017). Under the minimum wage policy, the labor market will demand fewer employees and an excess supply of employees. Due to the excess or surplus in the labor supply, a significant portion of the labor force will remain unemployed.

A change in the number of populations, like an increase in positive net migration or a change in demographical structure, will cause the labor supply to shift further, creating more excess supply in the labor market. This has two effects. One is that when the regional economy spurs and the labor demand is high, the excess labor supply will be absorbed, increasing labor participation. Two, if the regional economy is sluggish, then an increase in the supply of labor will create more excess supply and lower labor participation. Hence, based on this, we formulate our first hypothesis that the region's population growth affects the region's labor participation. Changes in the population due to net migration or changes in the number of productive age cohorts will shift the labor supply curve to the right. Its effect is either increasing or decreasing the number of labor participants in the market.

Industries require labor and capital as inputs in their production processes for creating goods and services. Capital formation refers to the process of investing funds to make additional capital. It entails a rise in the production of capital goods. So, suppose there is an increase in the demand for higher output. In that case, the industry will require more labor, increasing employment. This research will use manufacturing value added as a proxy of labor productivity and regional economic growth as factors affecting labor

demand in the labor market. Thus, our second hypothesis is a positive relationship between economic growth and the level of labor participation. Changes in economic growth mean increased aggregate output. The industry responds to the heightened demand for goods and services by augmenting the number of production factors, including a short-term increase in labor. Then, the relationship between economic growth and the level of labor participation is positive. Then, for our third hypothesis, we expect a positive correlation between the manufacturing industry's value-added and the level of labor force participation. A shift in manufacturing value-added signals that the sector should expand its workforce. Companies investing in new technologies or workers becoming more productive can contribute to increased industrial value added. Both can increase demand for new labor, ultimately increasing labor force participation.

We also emphasize the geographical location of our sample. According to Elhorst & Zeilstra (2007), employing spatial dependence in the model is beneficial in analyzing labor market issues. As mentioned in the introduction, Java plays a significant role in promoting national economic development, and most provinces with growth rates surpassing the national average are located in Java. Hence, our fourth hypothesis is that the provinces located in Java have higher labor participation.

This study employs quantitative analysis to examine the correlation between various independent variables, including population growth, economic growth, manufacturing added value, location, and the dependent variable of labor participation rate. The study selected 16 provinces as a representative sample, with a primary focus on 10 provinces that had below-average economic growth rates compared to the national average. These provinces are Aceh, Riau, Jambi, Bengkulu, Kepulauan Bangka Belitung, Kepulauan Riau, West Nusa Tenggara, East Kalimantan, West Papua, and Papua. The study included six provinces on Java Island: DKI Jakarta, West Java, Central Java, East Java, DI Yogyakarta, and Banten. These Java provinces exhibited a rate of economic growth exceeding the national average between 2017 and 2019. Hence, the total number of observations for this research is 48.

The fixed effect model is an analytical tool for panel data regression. We refer to some recent research on estimating our model. We believe that the regional economy is essential in affecting regional labor participation. Previous work from Manik (2020) and Lubis (2019) showed the importance of regional economic output to the region's labor participation rate. Thus, we employ economic growth as our variable. Then, we also want to analyze the relationship between the number of regional populations and the region’s labor participation rate. This is based on previous research by Seventina et al. (2024), which pointed out the importance of the number of people categorized as productive age in the region on labor rate participation. As the number of people of productive age increases, the region’s labor supply will also increase. According to Ramadhan & Setyowati (2023) and Ariesti & Asmara (2023), increasing the number of people has two effects. If the region can use this as a source of growth, it will benefit from the increased population. Yet, if the region fails to seize the opportunity of the increased population, it will experience high unemployment.

Manufacturing value-added and labor participation rates are strongly correlated, especially in economies shifting from rural to industrial. Manufacturing businesses are labor-intensive in their early phases, which results in high employment and participation rates. As manufacturing value-added rises owing to productivity gains and technological advancements, labor may move from manufacturing to service sectors, affecting total labor participation rates (UNDP, 2024). Also, as Jongwanich et al. (2022) note, advanced technology tends to affect the labor market, shifting from unskilled to skilled workers and creating more efficiency (Liu et al., 2024) on a business's optimal resource allocation. Hence, we employ manufacturing value-added as a variable in our model to identify the impact on the region's labor participation. We also emphasize the geographical site of our sample. As indicated in the beginning, Java plays a significant role in encouraging the nation's economic development, and most provinces with growth rates higher than the national average are located in Java. We use a location dummy variable to control this phenomenon. The econometric model to be estimated is as follows:

$$TPAK_{it} = \alpha_{it} + \beta_1 Pop_{it} + \beta_2 EG_{it} + \beta_3 VA_{it} + \beta_4 Loc_{it} + e_{it}$$

The variables include in the model are TPAK, which represents the Workforce Participation Rate in percentage units, Pop, which means the Population Growth Variable in percent, EG, which represents the Economic Growing Variable in percentages; VA, which represents the manufacturing industry's added value per capita in millions of rupees, and Loc, which is a dummy variable for location (1 for the province that is located on Java Island and 0 for provinces that are outside Java).

Result and Discussion

The fixed effect models' panel data regression estimates are displayed in Table 3. The redundant fixed-effect test determines whether individual diversity is accurately represented through fixed-effect analysis (Kennedy, 2003: 303). If a fixed effect is absent, the utilization of fixed effects is deemed unnecessary or redundant. The redundant fixed-effect test result is displayed in Table 4.

Table 3 Fixed Effect Model Regression Result

Dependent Variable	: TPAK			
Independent Variables	**Coefficient**	**Std. Error**	**t-statistic**	**Prob.**
C	-5.177	26.777	-0.193	0.848
Pop	37.344	14.920	2.502	0.019*
EG	0.272	0.127	2.151	0.041*
VA	0.292	0.526	0.556	0.583
Loc	4.790	2.995	1.599	0.121
Adjusted R-squared		0.948246		
F-statistic		42.00687		
Prob(F-statistic)		0.000000		
*) significant at α=5%				

Table 4 Redundant Fixed Effect Model Test

Effects Test	Statistic	d.f	Prob.
Cross-section F	42.198718	(15,26)	0.0000
Cross-section Chi-square	155.164695	15	0.0000
Period F	2.435031	(2,26)	0.1073
Period Chi-square	8.241136	2	0.0162
Cross-Section/Period F	37.249493	(17,26)	0.0000
Cross-Section/Period Chi-square	155.183675	17	0.0000

The test results presented in Table 4 suggest that the null hypothesis (Ho) should be rejected. Therefore, the estimate of fixed effects is not redundant.

The panel data regression estimated using the fixed effect model, as in Table 3, shows that just two variables, population growth (Pop) and economic growth (EE), are statistically significant. The Manufacture Value-Added (VA) and geographical location (Loc) variables are not statistically significant, affecting the TPAK. Therefore, only hypotheses I and II are supported out of the four hypotheses, while hypotheses III and IV are rejected.

The results of this study align with earlier studies such as Sari & Susanti (2018), Syafira & Selvia (2024), and Mumekh et al. (2023), which demonstrate that variations in population and economic growth have an impact on the degree of labor participation in the region. In explaining this finding, we argue that the region's migration rate is a factor that contributes to the variation in population size and labor participation, as found in Hilgenstock & Kóczán (2018) and Bao et al. (2002). An increased net migration will add to the population and increase the labor supply in the region. The region's positive economic growth will also attract some workers (Blanco-Moreno, 2024), resulting from increased labor demand in the labor market. This can be supported by the data from the Indonesian Statisic-BPS (2020) that, based on our sample's region, the number of net migrants (the difference between in-migration and out-migration) who moved within the last 5 months in 2019 was 320,776 people for the provinces on Java Island and 120,850 people for the provinces outside of Java Island.

We initially assume that location contributes to the region's participation rate. Previous research, such as Bao et al. (2002), has found that geographical factors are essential in regional disparity. However, our result shows no significant difference between labor participation in Java and outside Java. Our sample's average labor participation rate is 67% for provinces located in Java and 67% for provinces located outside Java. The trading and Manufacturing sector is the most significant contributor to labor participation in Java.
Meanwhile, even though provinces outside Java still depend on the agriculture sector, some provinces have a mining industry that contributes significantly to labor participation, such as in Papua. Thus, this implies that labor participation rates are comparable between Java and outside Java. Still, the economic sectors driving this participation vary between the two regions.

The estimation result also indicates that the manufacturing value added (VA) variables have no significant impact on the region's labor participation rate. This suggests that

industrial value-added incentives do not impact the region's labor participation level. Previously, we hypothesized that increased manufacturing value would incentivize the business to expand and absorb workers. However, according to Grigoli et al. (2018) and Frey & Osborne (2017), companies tend to replace routinized tasks with more capital in the era of automation. Bruckner et al. (2017) gave some areas that are likely to be most affected by automation, such as wholesale and retail trade, administrative and support services, production, and transportation and storage. Also, another factor, such as an increase in the region minimum wages, nudges the business to use more capital instead of labor. The data from Statistics Indonesia shows that the average minimum salary in Indonesian provinces has increased 37% from Rp1,790,342 in 2015 to Rp2,455,662 in 2019. Table 4 displays the distribution of the average manufacturing value added across 16 selected provinces from 2017 to 2019. It shows that regions with relatively low average labor participation rates have manufacturing sectors as their leading economic sectors.

Table 4 Sample Province Based on Largest Sectoral Contribution to Regional Economy

Provinsi	Largest Sector Contribution	Average Manufacture Valued-Added	Average Labor Participation Rate
DKI Jakarta	Trading	20.6	62.9
Banten	Manufacturing	11.8	63.0
Aceh	Agriculture	1.2	63.6
Jawa Barat	Manufacturing	12.6	63.7
Riau	Manufacturing	**21.5***	64.7
Kep. Riau	Manufacturing	**30.4***	65.1
Kalimantan Timur	Mining	**26.7***	66.3
Kep. Bangka Belitung	Manufacturing	8.1	67.0
Jambi	Agriculture	4.3	67.2
Papua Barat	Manufacturing	19.7	67.5
Nusa Tenggara Barat	Agriculture	0.9	68.2
Jawa Tengah	Manufacturing	9.4	68.9
Jawa Timur	Manufacturing	11.8	69.3
Bengkulu	Agriculture	1.4	69.9
DI Yogyakarta	Manufacturing	3.3	72.5
Papua	Mining	0.9	77.6

* indicates the three provinces with the highest value added in our sample.

The red color on the Average Labor Participation Rate column shows a lower average of 16 provinces in the sample of 67.35%. While the blue color shows provinces with a Labor Participation Rate above the average of our sample. The average labor participation rate for provinces located in Java is 66.7% and for provinces located outside Java is 67.7%.

The provinces with comparatively low manufacturing-added value are provinces where the primary contributors to the regional economies are agricultural sectors. These provinces often have a higher labor force participation rate than regions that rely on manufacturing or mining sectors (as indicated by the blue color in Table 4). This is because

the rise in value-added is not due to a boost in labor productivity in the industrial sector but rather to an increase in capital production and automation (Hawksworth et al., 2018).

Conclusion

Thus, conclusions that can be derived from this study are that the degree of labor participation in the region is impacted by the population's expansion and the growth of the entire economy. Our research only analyzed the change in demographic structure by putting the number of populations as a variable affecting the region's labor participation. A shift in the region's demographic structure, such as a large number of in-migration, will impact the region's labor participation. The study suggests that as more people move into an area, it could lead to changes in the available workforce, potentially increasing or decreasing labor participation. Since economic and population growth are significant factors influencing labor force participation, some government policies should prioritize promoting sustainable economic development and attracting people to the province.

The finding of this research is that the degree of involvement of the labor force in the region is unequivocally unaffected by either the location or the added value of the manufacturing sector. Thus, this implies that labor participation rates are not relatively different between provinces located in Java and outside Java. Still, the economic sectors driving this participation vary between the two regions. Our study also suggests that the increase in manufacturing value added alone may not lead to more job creation, as automation and higher labor costs (through increased wages) are pushing businesses to rely more on technology and less on human workers. Further policies aimed solely at boosting manufacturing output or labor productivity may not be automatically translated into higher labor force participation. Policymakers should, therefore, diversify their focus to other sectors, such as services or technology, that might better encourage workforce engagement.

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