International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Labor Absorption In Gerbangkertosusilo Plus: Mediating Effects Of Firm Numbers On Regional Employment Dynamics

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Abstract

Industrial agglomeration is expected to stimulate economic activity and employment; however, the Gerbangkertosusilo Plus (GKS Plus) area, the main industrial hub of East Java Province, continues to experience an unemployment rate above the national average. This study investigates the determinants of labor absorption in the GKS Plus agglomeration area by examining both direct and indirect effects through the mediating role of the number of firms. A quantitative causal research design was employed using panel data from ten cities and regencies in the GKS Plus area covering the 2017–2024 period. Panel data regression with a path analysis framework was applied to estimate the relationships among variables, while the Sobel test was used to assess the significance of indirect effects. The estimated results indicate that industrial sector GRDP, government capital expenditure, and the agglomeration index are significant determinants of labor absorption, both through direct relationships and through indirect pathways mediated by the number of firms. This study provides new insights into how economic factors affect labor absorption through the mediating role of the number of manufacturing firms. The research also offers analytical novelty by expanding the scope of the Gerbangkertosusilo agglomeration area from the conventional seven regions to ten cities and regencies. These findings highlight the importance of maintaining industrial diversification while regulating the growth of firms within environmental carrying capacity to reduce excessive competition, pollution, congestion, and rising land costs, thereby sustaining the positive employment effects of industrial agglomeration.

Keywords: Agglomeration, Business Entities, Employment, Industry.

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INTRODUCTION

Regional economic growth is highly influenced by the ability of the industrial sector to create employment opportunities. In regional economic theory, the industrial sector is not only the main driver of the economy but also the largest provider of job opportunities capable of absorbing a large number of workers and supporting SDG 8, namely decent work and economic growth. One development strategy considered effective is the development of industrial agglomeration areas, which refers to the concentration of industrial activities within a single area that is economically and geographically interconnected. Industrial agglomeration can increase production efficiency, accelerate the flow of information, facilitate the distribution of goods, and reduce logistics costs, thereby encouraging economic growth (Hasanpouri et al., 2025).

The Gerbangkertosusilo Plus area which, based on Presidential Regulation Number 80 of 2019, consists of Gresik, Bangkalan, Mojokerto, Surabaya, Sidoarjo, Lamongan, Bojonegoro, and Tuban is one of the largest industrial agglomeration areas in Indonesia as well as a major center of economic growth in East Java (JDIH BPK Indonesia, 2022). This area was originally named Gerbangkertosusilo, an acronym derived from each region included in the agglomeration, without incorporating Tuban and Bojonegoro Regencies, with the legal basis of East Java Regional Regulation No. 4 of 1996 and Government Regulation No. 4 of 1996. Furthermore, the agglomeration area was expanded under the name Gerbangkertosusilo Plus with the aim of enhancing connectivity, investment, and equitable development based on SDG 9. This region has strategic advantages due to its close geographic proximity, supported by adequate transportation infrastructure, international-scale ports, and a strong manufacturing industrial network (Fauzani & Rahmi, 2023; Sularno & Jauhari, 2017). Theoretically, these conditions should serve as a major driver of increased labor absorption due to the high level of economic activity and labor demand from various industrial sectors operating within the area.

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Figure 1. Open Unemployment Rate by Regency in East Java

However, the open unemployment rate (OUR) in several regions within the GKS Plus (Gerbangkertosusilo Plus) area remains relatively high, even exceeding both provincial and national averages (BPS Jatim, 2025). Data from the Central Statistics Agency (BPS Jawa Timur, 2024b) show that Surabaya (4.84%) and Lamongan (4.29%) record fairly high open unemployment rates, while Sidoarjo (5.75%), Gresik (5.47%), and Bangkalan (5.31%) are above the national average (4.91%). This situation presents a paradox, as regions characterized by high industrial concentration have not fully translated their industrial advantages into greater labor absorption. The gap between the large industrial potential and low labor absorption constitutes a fundamental issue that requires special attention.

Low labor absorption in strategic industrial areas such as Gerbangkertosusilo Plus also generates various economic and social consequences. From an economic perspective, limited labor absorption can reduce people's purchasing power and slow local economic circulation (Lube et al., 2021). From a social perspective, this condition may increase income inequality, expand poverty, and trigger other social problems such as crime and social instability (Yustitia et al., 2022). Therefore, employment issues are a crucial aspect in ensuring that economic growth in industrial areas truly benefits public welfare. The disparity between substantial industrial potential and low labor absorption is a critical problem in Indonesia, especially considering the important momentum that will occur in the coming years.

The high unemployment rate in industrial areas becomes even more crucial as Indonesia is entering a demographic bonus period, a condition in which the productive-

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age population far exceeds the non-productive-age population (BPS, 2025). A demographic bonus creates the potential for stronger economic performance by increasing the proportion of the productive-age population, thereby supporting higher production and income generation. As this demographic phase is temporary and typically experienced only once, its benefits depend on the ability of policymakers to create sufficient productive employment opportunities. The development trajectories of Japan and South Korea demonstrate that effectively harnessing a demographic dividend can accelerate economic growth and facilitate the transition to developed economies.

However, this opportunity can only be realized if adequate employment opportunities are available. Indonesia's demographic bonus is expected to peak in the 2030s. If job opportunities are not proportional to the continuously growing labor force, the demographic bonus could instead turn into a demographic burden, characterized by rising unemployment, inequality, and social pressure. A demographic burden is associated with the ageing population phenomenon, where failure to optimally utilize the demographic bonus results in a larger non-productive population than productive population, thereby increasing the dependency ratio. An example of a country that failed to optimally utilize its demographic bonus is South Africa, which continues to experience economic inequality and low public income levels. This phenomenon clearly illustrates both the positive and negative impacts of a demographic bonus. In this context, industrial areas such as Gerbangkertosusilo Plus should serve as the main pillar for job creation for the productive-age population, which continues to grow each year.

The potential of the industrial area in Gerbangkertosusilo Plus has not been fully able to accommodate this labor surplus. This is reflected in the persistently high open unemployment rates despite the presence of many large and medium-scale firms, integrated market networks, and relatively more advanced infrastructure compared to other regions in East Java. If this condition persists, the surplus productive-age population will be difficult to convert into economic growth and may instead generate new waves of unemployment that further burden the regional economy. Therefore, it is important to understand the factors that determine the magnitude of labor absorption in strategic industrial areas such as Gerbangkertosusilo Plus.

While earlier studies have explored the influence of investment, the agglomeration index, government capital expenditure, and industrial GRDP in strategic industrial regions, they have rarely examined the mechanisms through which these factors affect labor absorption, particularly through the mediating role of the number of firms (Renaldi & Nurfahmiyati, 2022; Yanti et al., 2023; Rahayu et al., 2025). In addition,

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most previous studies only examine the general relationship between economic growth and employment in aggregate terms, without considering the role of the number of firms as a linkage between economic growth and increased employment opportunities (Tasyim et al., 2021; Saraswati et al., 2022; Widyapangesti & Soelistyo, 2022). A more detailed understanding of both direct and indirect implications is therefore needed to formulate more targeted strategies for increasing labor absorption in agglomeration areas such as Gerbangkertosusilo Plus. Other studies have also paid limited attention to the expansion of the Gerbangkertosusilo agglomeration into Gerbangkertosusilo Plus by adding Jombang, Bojonegoro, and Tuban Regencies (Muhlisin & Sakti, 2024; Alfiyani & Syawaludin, 2025). Information regarding Gerbangkertosusilo Plus also demonstrates that this research considers novelty factors based on the latest government policies, making the analysis results more relevant to current conditions (Bappeda Jawa Timur, 2024).

This study focuses on analyzing the factors that influence labor absorption in the GKS Plus area, both through direct and indirect implications using mediation. The use of mediation aims to provide deeper information regarding the influence of each factor, thereby producing more comprehensive conclusions. This research can serve as a policy consideration for the government in planning economic development by taking into account key aspects that affect regional economic performance in order to support SDGs 8 and 9. In addition, the study's findings may contribute to the empirical literature on the role of economic agglomeration areas in shaping employment conditions in developing countries.

RESEARCH METHOD

A quantitative research design was adopted to investigate the causal relationships among the variables. The study relies on secondary panel data gathered from three official Indonesian institutions: the Central Statistics Agency (BPS), the Investment Coordinating Board (BKPM), and the Directorate General of Fiscal Balance (DJPK).The panel data coverage includes ten regions within the Gerbangkertosusilo Plus agglomeration area from 2017 to 2024. These regions consist of Surabaya City, Mojokerto City, Gresik Regency, Sidoarjo Regency, Mojokerto Regency, Lamongan Regency, Bangkalan Regency, Tuban Regency, Bojonegoro Regency, and Jombang Regency. Data analysis uses panel data regression with a path analysis concept. This study aims to identify the factors influencing labor absorption, both through direct effects and indirect implications mediated by intervening variables.

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Data or sample collection in this research uses a purposive sampling technique based on the criterion of the Gerbangkertosusilo Plus agglomeration area, which consists of ten cities and regencies in East Java Province. The unit of analysis was selected based on predefined regional criteria. Specifically, the study focuses on all regencies and municipalities within the Gerbangkertosusilo Plus agglomeration area because of their strategic role as East Java's primary industrial corridor.

Table 1. Research Variables

No	Variable	Indicator	Unit	Source
Dependence Variable (Output)				
1	Labor Absorption (LA)	Number of people aged 15 years and over who worked during the past week in the industrial sector	Persons	BPS
Intervening Variable				
1	Number of Firms (NF)	Number of Medium and Large-Scale Companies	Business units	BPS
Independence Variable (Input)				
1	Gross Regional Domestic Product (GRDP)	Industrial sector GRDP at constant 2010 prices	Billion Rupiah	BPS
2	Investment Realization (IR)	Realization of domestic and foreign investment	Billion Rupiah	BKPM
3	Government Capital Expenditure (GCE)	Capital expenditure for the provision of public facilities and infrastructure	Billion Rupiah	DJPK
4	Agglomeration Index (AI)	Hoover Balassa Index	Index	BPS

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Based on Table 1, there are two regression models in this study to support the path analysis method. The mediation analysis is implemented through two regression models. The first model estimates the effects of the explanatory variables on the number of firms as the mediating variable. The second model evaluates the effects of the explanatory variables and the mediator simultaneously on labor absorption. The mathematical specifications of both models are presented below.

$$Model\ 1: NF_{it} = \alpha_i + \beta_1 LOG_GRDP_{it} + \beta_2 IR_{it} + \beta_3 GCE_{it} + \beta_4 LOG_AI_{it} + \varepsilon_{it} \quad (1)$$

$$Model\ 2: LA_{it} = \alpha_i + \beta_1 GRDP_{it} + \beta_2 IR_{it} + \beta_3 GCE_{it} + \beta_4 LOG_AI_{it} + \beta_5 LOG_NF_{it} + \varepsilon_{it} \quad (2)$$

The research instrument used is Stata 17, with preliminary tests including the Chow test, Hausman test, and Lagrange Multiplier test to determine the best model. In addition, the Sobel test is employed to examine the indirect effect of each independent variable on the dependent variable. Furthermore, the study applies the Driscoll–Kraay estimator and the Variance Inflation Factor (VIF) test to address violations of the classical regression assumptions and to ensure the robustness, reliability, and accuracy of the estimated relationships among the variables (Khosropour, 2017).

Following the estimation of the regression models, the Sobel test is applied to assess whether the number of firms significantly mediates the relationship between the explanatory variables and labor absorption. The procedure calculates a z-statistic from the product of the path coefficients connecting the independent variables to the mediator (a) and the mediator to labor absorption (b), while incorporating the standard errors of both coefficients. The Sobel test is formulated as follows:

$$Z = \frac{a \times b}{\sqrt[2]{b^2 \times SE_a^2 + a^2 \times SE_b^2}} \quad (3)$$

In Equation (3), $a$denotes the regression coefficient representing the effect of the independent variable on the mediating variable, whereas $b$represents the coefficient measuring the effect of the mediating variable on the dependent variable. The terms $SE_a$and SE_brefer to the standard errors associated with coefficients $a$and b, respectively. The Sobel test statistic (Z) is calculated using these coefficients and their standard errors to assess the significance of the indirect effect. The mediation effect is considered statistically significant when the absolute value of the calculated Z-statistic exceeds the critical value of 1.96 at the 5% significance level (equivalently, when the *p*-value is less than 0.05). Otherwise, the indirect effect is not statistically significant (Sobel, 1982).

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RESULT AND DISCUSSION

Table 2. Descriptive Statistics of Data

Variable	Obs.	Mean	Std. Deviasi	Min	Max
GRDP	80	41332.05	39609.81	972.79	143123.9
IR	80	6186.808	9822.403	0.04	49461.93
GCE	80	683.4886	664.4742	113.44	2754.3
AI	80	1.180375	0.3464702	0.62	1.81
NF	80	350.6375	371.0119	9	1203
LA	80	191866.6	111934.3	18089	456687

A total of six variables are used to examine the factors influencing labor absorption in the second-largest agglomeration area in Indonesia. Based on Table 2, the GRDP variable shows a fairly high level of data variation, with a coefficient of variation reaching 95%, indicating that the data used contain many observations that deviate far from the mean value. The domestic and foreign investment realization variable (IR) and the number of medium and large-scale firms (NF) exhibit even greater variability than GRDP, with coefficients of variation exceeding 100%. This indicates the presence of extremely high and low values, causing the standard deviation to exceed the mean. Similar to the GRDP coefficient of variation, the government capital expenditure variable (GCE), with a value of 97%, and labor absorption (LA), with a value of 58%, also display highly dispersed data distributions. However, a different condition occurs in the agglomeration index variable (AI), which has the lowest coefficient of variation at 29%. This is due to its unit being in index form, resulting in less dispersed variation around the mean. The high data variation across several variables is influenced by differences in data values across the Gerbangkertosusilo regions, each of which records different income levels shaped by the unique potential and comparative advantages of each area.

Table 3. Fixed Effect Regression Estimation Results with Driscoll–Kraay

Variable	Model 1	Model 2
	Number of Firms	Labor Absorption
GRDP	256.7926*** (52.26948)	0.2415076 (0.1595547)

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IR	-0.0005149 (0.0015821)	0.214343 (0.2327991)
GCE	0.0755232*** (0.0201118)	12.88355*** (3.685309)
AI	-403.2971*** (87.15644)	435823*** (55452.33)
NF		14061.17** (5713.926)
Constant	-783.5254*** (238.8435)	76243.71** (30675.5)
R-Squared	0.1752	0.5398

Note: Significance levels: ***p < 0.01 or 1%, **p < 0.05 or 5%, *p < 0.1 or 10%

Based on Table 3, all variables in the first model are found to significantly influence the number of firms entering the GKS Plus area, except for investment. Based on the regression estimates, a 1% increase in industrial sector GRDP is associated with an increase of approximately 256 manufacturing firms in the Gerbangkertosusilo Plus region. Furthermore, an additional IDR 100 billion in government capital expenditure contributes to the establishment of approximately seven new firms. In contrast, a 1% increase in the agglomeration index is associated with a reduction of approximately 403 firms, indicating that more firms leave the GKS Plus agglomeration area.

The second model demonstrates better overall performance than the first model, with all variables jointly explaining labor absorption more effectively. The estimation results indicate that industrial sector GRDP and investment do not have a statistically significant direct effect on labor absorption. Meanwhile, The estimated coefficient indicates that an additional IDR 1 billion in government capital expenditure is associated with an increase in labor absorption of approximately 12 workers. Likewise, a 1% increase in the agglomeration index contributes to an increase in labor absorption of more than 435 thousand workers within the GKS Plus area. In addition, each increase in the number of new firms entering the GKS Plus region is estimated to generate employment for more than 14 thousand workers, highlighting the important mediating role of firm growth in promoting labor absorption.

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The estimation results show that industrial sector Gross Regional Domestic Product (GRDP) exerts a significant positive influence on the number of firms in the first model, supporting the findings reported by (Kharroubi, 2022). This finding is consistent with agglomeration theory and aggregate demand theory, both of which argue that higher regional economic output promotes infrastructure development, increases the availability of skilled labor, and strengthens demand for goods and services. As a result, these favorable conditions stimulate the establishment of new firms while also encouraging existing businesses to expand their operations by increasing production capacity. Moreover, strong economic performance signals a productive and efficient regional economy, thereby attracting entrepreneurs seeking higher returns by investing in new production capacity.

Although the estimated coefficient for industrial sector Gross Regional Domestic Product (GRDP) is positive, its effect on labor absorption in the second model is not statistically significant (Jaya & Kholilah, 2020; Rudatin et al., 2024). This finding is consistent with Okun's Law, which suggests that higher economic activity, reflected in increased industrial output, is generally associated with improvements in labor market conditions through lower unemployment (Pratysto et al., 2026). However, the positive relationship is not statistically significant, indicating that increases in industrial output do not necessarily translate into immediate employment growth. In the GKS Plus area, industrial expansion is likely driven by productivity improvements within existing firms rather than by increased labor demand. Consequently, higher industrial output may be achieved through greater production efficiency without requiring a proportional increase in the number of workers.

A different result is observed for the realized investment variable, which is found to be statistically insignificant in the first model. Based on the estimation results, realized investment is not found to have a statistically significant impact on the number of firms. One possible explanation is that not all investment funds are allocated to establishing new production facilities; instead, a substantial proportion is directed toward the acquisition of production machinery, research and development (R&D) activities, and improvements in product quality (Atabayeva et al., 2024). Investment in R&D also generates positive regional economic impacts, as the knowledge created is more likely to be adopted and applied locally, benefiting both firms and the surrounding economy. Furthermore, knowledge spillovers from R&D enable local firms to adopt new technologies and production processes, thereby enhancing productivity and

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strengthening their long-term capacity to create employment opportunities (Wang & Henning, 2025).

Similarly, the estimation results in the second model indicate that realized investment does not have a statistically significant effect on labor absorption, although its estimated coefficient remains positive. This finding suggests that investment in the GKS Plus area is primarily directed toward increasing production capacity and improving operational efficiency rather than immediately expanding employment. Investments in modern machinery, technological upgrading, and production facilities enable firms to increase output without requiring a proportional increase in the workforce. Moreover, the employment effects of investment are likely to occur with a time lag, as firms require time to install equipment, complete production facilities, and gradually expand their operations before additional workers are recruited. Therefore, although investment exhibits a positive relationship with labor absorption, its direct effect is not sufficiently strong to achieve statistical significance (Pratysto et al., 2026).

Government capital expenditure also contributes to the provision of infrastructure and public goods that support economic activity (Ajide, 2020). This is evidenced by the first model, which indicates that government capital expenditure has a significant positive effect on the number of firms. This finding is consistent with Gibbons et al. (2019), who concluded that government investment in the transportation sector in the United Kingdom increased both the number of firms and employment opportunities in surrounding areas. The result is further supported by Keynesian economic theory, which emphasizes the importance of government expenditure as an internal driver of economic development by creating a favorable business environment that encourages private firms to establish and expand their operations. Moreover, agglomeration effects enable governments to provide infrastructure more efficiently, thereby reducing production costs and enhancing the competitiveness of the private sector. These conditions attract additional firms seeking to benefit from lower operating costs and the economic advantages associated with industrial agglomeration.

Government capital expenditure is also found to have a significant positive effect on labor absorption. This finding is consistent with the studies of Abiad et al. (2016), Aisyah et al. (2025) and Satrio (2021), which reported that capital expenditure significantly increases employment. More specifically, Tasmilah (2021) found that government capital expenditure positively affects formal employment, particularly expenditure allocated to the tourism sector, whereas spending on housing and public facilities has a negative effect. These findings are consistent with Keynesian economic

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theory, which argues that government spending reduces unemployment both directly through infrastructure development and indirectly by generating agglomeration economies. By providing adequate public infrastructure and public goods, government expenditure lowers production costs for private firms, enabling them to allocate more resources toward business expansion and the recruitment of additional workers.

The agglomeration index is statistically significant in both models, although the direction of its effect differs. Based on the first model, the agglomeration index is found to have a statistically significant negative impact on the number of firms (Chen, 2015). This finding is supported by Power et al. (2019), who concluded that highly specialized agglomeration areas are more vulnerable to regional economic decline and business failure. Similarly, Marshall (1920) argued that regions heavily dependent on a single industry are more susceptible to economic shocks than those with a more diversified industrial structure. Basile et al. (2017) also found that industrial concentration increases the likelihood of manufacturing firms exiting the market due to intensified competition. In the GKS Plus area, three industries dominate the regional industrial structure, namely the food industry (19%), the rubber industry (11%), and the chemical industry (8%) of the total number of firms operating in the region (BPS Jawa Timur, 2024a). Furthermore, at least six regencies and municipalities in GKS Plus have agglomeration index values greater than one, indicating a high degree of industrial specialization. Such specialization tends to favor large firms over smaller enterprises, increasing the risk of financial losses among small firms and ultimately encouraging them to relocate or exit the agglomeration area.

The negative relationship observed in the first model is further explained by the presence of agglomeration diseconomies. Excessive industrial concentration can increase production costs through higher land prices, congestion, environmental pollution, and rising operating expenses, thereby reducing the attractiveness of the region for business activities (Fukuda, 2020; Matsuo et al., 2023; Imantria, 2024). The GKS Plus area accommodates approximately 3,606 of the 6,274 medium- and large-scale manufacturing establishments in East Java Province (BPS Jawa Timur, 2024a). In other words, more than half of the province's medium- and large-scale firms are concentrated within only 10 of its 38 regencies and municipalities. This high concentration indicates that GKS Plus has reached a level of industrial density that generates negative externalities, including escalating production costs and declining business competitiveness. Consequently, further increases in the agglomeration index

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may encourage firms to relocate outside the region rather than establish new operations within it.

By contrast, the second model indicates that the agglomeration index exerts a statistically significant positive effect on labor absorption. This result is consistent with the findings of Deschamps & Wilemme (2025), who showed that agglomeration economies significantly enhance employment, although their influence on unemployment remains relatively limited under conditions of wage flexibility. According to agglomeration theory, industrial clusters provide firms with several advantages, including well-developed infrastructure, knowledge spillovers, technological diffusion, and access to a larger pool of skilled labor. These advantages reduce production costs and improve operational efficiency, enabling firms to expand employment. Moreover, urban network externalities strengthen economic integration across neighboring regions, facilitating the movement of production factors and enhancing regional economic connectivity (Guo et al., 2025). As a result, the benefits of agglomeration extend beyond geographical proximity and encompass the broader urban agglomeration system (Wu et al., 2022).

Finally, the results confirm a significant positive relationship between the number of firms and labor absorption (López et al., 2024). The estimation indicates that each additional business unit contributes to the creation of approximately 14 thousand jobs in the GKS Plus area. This finding is consistent with the studies of Dewi (2019), Widodo & Woyanti (2023), and Alfarih (2024), which demonstrate that the number of firms is a significant determinant of employment because every firm requires labor as a fundamental production factor. Agglomeration theory further explains that regions with a high concentration of firms attract workers from surrounding areas, resulting in a larger labor market and lower recruitment costs for employers. In addition, firms benefit from easier access to skilled labor, suppliers, distributors, and supporting services, all of which reduce transportation costs, improve production efficiency, and encourage further employment growth.

Table 4. Sobel Test Results

Variable	T Statistic	P-value
GRDP > NF > LA	2.20026561	0.02778806
IR > NF > LA	-0.32264413	0.74696477
GCE > NF > LA	2.05826852	0.03956436

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AI > NF > LA	-2.17271431	0.02980183

Based on the Sobel test, investment is the only variable indicated as having no significant indirect effect, while the other variables show indirect effects on labor absorption. The industrial sector GRDP is proven to have an indirect effect on increasing employee recruitment by firms. Furthermore, government capital expenditure plays a role in indirectly boosting employee recruitment. Lastly, an increase in the agglomeration index in the GKS Plus area actually reduces labor absorption indirectly.

The industrial sector GRDP is indicated to have a significant indirect effect on labor absorption, which implies that an increase in GRDP indirectly contributes to the increase in the number of employees entering the workforce. This finding is consistent with the meaning of industrial sector GRDP, which reflects an increase in output produced by the industrial sector. As a result, there is an increase in demand that requires existing firms to expand or new entrepreneurs to enter the market to meet the excess demand. One option to address this demand is by establishing new factories. These new firms inevitably require production factors, one of which is labor, meaning that GRDP indirectly influences labor absorption.

On the other hand, the indirect effect of investment realization on firms' workforce recruitment is not statistically significant. This finding relates to how business entities utilize investment funds beyond constructing new factories. There are several options for companies to use these funds, including financing research to improve product quality, funding the development of new products, acquiring new technology, and financing maintenance or repair of production machinery. The acquisition of new technology can also explain why the Sobel test for the investment variable shows a negative relationship, indicating a substitution of human labor with technology. Gradually, business units transition from labor-intensive firms to capital-intensive firms, which ultimately reduces labor absorption.

Government capital expenditure shows a significant result and has an indirect effect on labor absorption. Capital expenditure is directly related to government intervention in providing public goods, such as infrastructure, which supports economic activities in a region. The presence of the GKS Plus agglomeration area facilitates the government in allocating the budget by focusing development in regions with high factory density. This development effort generates a multiplier effect for the private sector by reducing business costs compared to locations outside agglomeration areas. Consequently, these

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benefits attract new entrepreneurs to establish businesses in the area, absorbing labor and contributing to reducing unemployment.

Conversely, the agglomeration index has a negative indirect effect that is statistically significant. This finding indicates that the GKS Plus area is considered an overly dense and specialized industrial region, consistent with the conclusions of Basile et al. (2017) and Power et al. (2019). GKS Plus contains 3,218 firms dominated by the three largest types of industries in East Java: food, rubber, and chemical industries. The high density and specialization of these industries create negative externalities, such as congestion, pollution, high land costs, and increased labor wages. Additionally, the dominance of large firms pressures smaller firms to struggle to grow due to competition and economies of scale that smaller firms have not yet achieved. Therefore, small firms have limited options: either maintain operations with minimal profits or exit the agglomeration area, potentially going bankrupt. The abundance of negative externalities and the dominance of large firms lead to a reduction in the number of firms in GKS Plus and increase the occurrence of layoffs.

CONCLUSION

This study concludes that labor absorption in the Gerbangkertosusilo Plus area is influenced directly and indirectly by industrial sector Gross Regional Domestic Product (GRDP), government capital expenditure, and the agglomeration index through the mediating role of the number of firms. In contrast, realized investment has no significant direct or indirect effect. Industrial GRDP stimulates labor demand by increasing economic activity and attracting firms, while government capital expenditure supports employment through infrastructure development, reduced operating costs, and multiplier effects. The number of firms also plays an important role in increasing labor demand. Therefore, local governments should strengthen leading industrial sectors, improve licensing procedures and legal certainty, and develop strategic infrastructure to enhance production efficiency and support business expansion. However, the negative implication of the agglomeration index indicates the need for industrial diversification and careful regulation of firm concentration to reduce excessive competition and negative externalities, while supporting the objectives of SDG 8 and SDG 9.

Future research should incorporate additional factors, such as environmental conditions, infrastructure, financial inclusion, and workforce urbanization, to provide a more comprehensive understanding of labor absorption in agglomeration areas. Comparative studies across different industrial agglomeration regions in Indonesia may

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also identify variations in regional employment dynamics and policy effectiveness. Furthermore, future studies should employ more robust estimation techniques, such as GMM, IVFE, or FGLS, according to data characteristics, to improve the credibility and reliability of the findings. Such approaches can provide stronger empirical evidence for designing policies that balance industrial diversification, firm concentration, environmental sustainability, and long-term employment creation.

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