Journal of Infrastructure, Policy and Development 2024, 8(7), 4094.
https://doi.org/10.24294/jipd.v8i7.4094

Article

Investment and industrial sector in regional economic performance: Development strategies to Papua-Indonesia

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CITATION

Rahim DA, Supartoyo YH, Setiawan S, Kasikoen KM. (2024). Investment and industrial sector in regional economic performance: Development strategies to Papua-Indonesia. Journal of Infrastructure, Policy and Development. 8(7): 4094. https://doi.org/10.24294/jipd.v8i7.4094

ARTICLE INFO

Received: 9 January 2024
Accepted: 22 April 2024
Available online: 25 July 2024

Abstract: Papua, one of the provinces in Indonesia, is recognized for its limited infrastructure and high poverty rates. This limitation undoubtedly emphasizes the government's special attention toward augmenting foreign and domestic investments by expanding industrial sectors to absorb more labor, thereby aiming to enhance the region's economic performance. The focus of the study seeks to assess the extent to which foreign and domestic investments, industrial employment, and the proliferation of industries in Papua contribute to increasing the Gross Development Product (GDP) and reducing poverty. By employing secondary data from 2016 to 2022 and utilizing the Regression Data Panel method, it encompasses 29 districts. The findings reveal that domestic investment, employment in the industrial sector, and the number of industries significantly influence poverty rates. However, as conclusion, foreign investment, surprisingly, demonstrates no substantial impact on economic performance. This unexpected result might be attributed to issues linked with the inadequate quality of financial performance, which doesn't align with the available investment funds. Utilizing the analytical network process (ANP), the study outlines two primary strategies. The first involves prioritizing investment expansion by focusing on both domestic and foreign investments. The second strategy emphasizes industrial revitalization through augmenting the number of industries and enhancing labor participation in the industrial sector.

Keywords: investment; industry; gross domestic product; poverty; development strategies

1. Introduction

The development aims to achieve high economic growth by improving people's welfare income equality and reducing inequality between regions (Bach and Cong, 2024; Sakalasooriya, 2020). One way to realize this is through developing the industrial sector and increasing regional investment. The industrial and investment sector has so far become the leading sector in the development of an area because this sector can contribute 30%–50% to GDP (Nuraini and Hariyani, 2019). Developing countries like Indonesia use industry and investment to propel regional development (Afrimadona et al., 2019; Getzner and Moroz, 2020; Puspitawati, 2021). It happens because the industrial and investment sectors can trigger the growth of other economic sectors (Coad et al., 2022; Fosu and Ankrah Twumasi, 2022). In line with the changing economic structure, where agriculture is no longer a leading sector, the industrial sector has begun to increase economic growth (Bivens

and View, 2023; Pham and Riedel, 2019). Massive investment was made in the construction of the plant. This high number of industries is followed by an increase in the absorption of workers in the industrial sector so that industrial estates become scattered in each region (Janků et al., 2020). Although, in reality, not all workers are absorbed in the industrial sector, this sector has contributed significantly to the reduction of unemployment in Indonesia (Hidayati et al., 2022). Indirectly, this condition can improve the community's welfare (Topalli et al., 2021).

As one of the easternmost provinces in Indonesia, Papua is known as an area that has limited infrastructure and inadequate transportation (Fauzi et al., 2019; Hidayatulloh et al., 2022; Munro and Baransano, 2023), so the economic performance and economic growth of the region are pretty low (Rahim et al., 2021). Papua is also known as one of the poorest provinces in Indonesia (Indriani and Permatasari, 2022) (**Figure 1**).

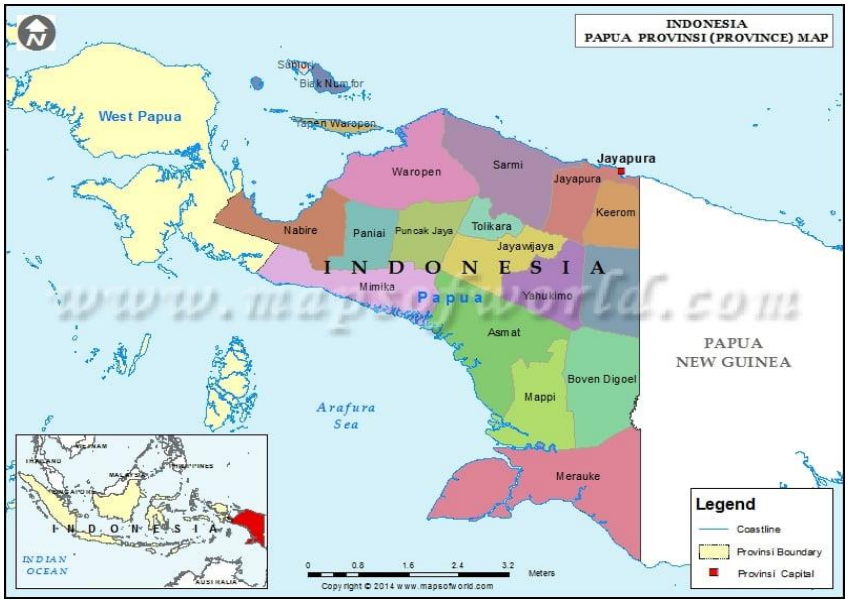


Figure 1. Map of Papua province (Source: Geospatial and Information Agency).

There is no doubt that Papua receives more attention from the government so that economic performance in Papua increases rapidly (Fauzi et al., 2019; Oktasari et al., 2020). Various programs have been rolled out by the government in Papua, including increasing investment by facilitating regulations so that the industry will grow and develop (Pentury, 2023; Rumbiak et al., 2021). Even Regulation Number 82/2015 by the Papuan Governor emphasizes the ease of regulation for investment. However, this government effort does not seem to have yielded maximum results. It can be seen that during the range of 2015–2022, investment was in the range of 7.3%, and there was a decline in 2019–2021, while at the same time, GDP growth was only 0.2%, but poverty was also relatively high, namely 31% throughout 2015–2022, and then there was another increase in poverty in 2020–2022 (**Figure 2**). This condition shows that investment growth is not linear with GDP growth and decreased poverty.

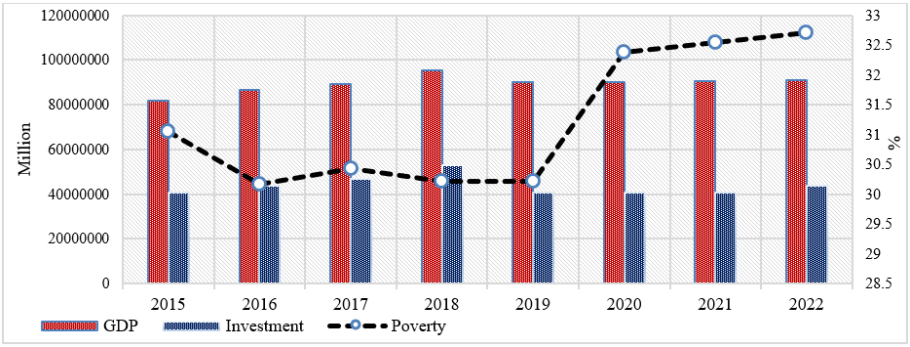


Figure 2. Percentage of GDP, poverty, and investment in Papua.

This rapid increase in investment is not being matched by growth in the industrial sector. Throughout 2015–2018, the development of this sector in Papua was quite promising, averaging 5.8%, but from 2019 to 2022, the growth of the industrial sector fell to 5.6% (**Figure 3**).

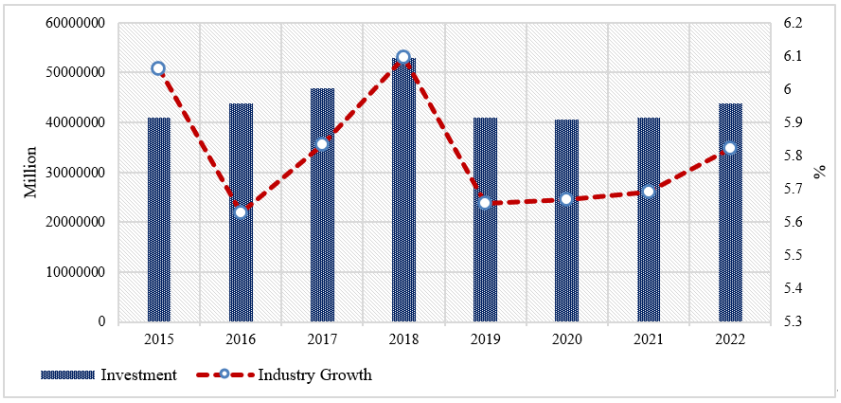


Figure 3. Investment and industrial growth in Papua.

The above conditions raise a gap as well as intriguing question: with the increasing growth of investment, why would this not be followed by increased industrial development and economic performance? For this reason, this study aims to see the extent of the influence of the industrial sector and investment on regional financial performance in Papua. The outcome of this research is expected to serve as a foundation for the government to enhance development performance in Papua.

2. Literature review

2.1. Industry, investment and employment

Experts agree that industry is an entire economic activity that processes raw materials and utilizes industrial resources to produce goods that have added value to the economy (Attiah, 2019). This activity is closely related to the development of an area. Industry is believed to be able to change the economic structure of a region so that it has a significant added value to the increase in GDP per capita and poverty reduction through employment (Liu et al., 2021; Lin et al., 2022; Zhou et al., 2023). Meanwhile, investment is defined as the activity of planting a certain amount of funds for the benefit of greater profits (Hartzmark and Sussman, 2019; Nguyen,

2022; OECD, 2022; Yuslaini et al., 2023). In general, investment activities are not solely aimed at increasing industrial growth. Still, in line with Keynes' statement, investment as part of fiscal and monetary policy seeks to improve economic performance (Mariati et al., 2022). Harrod Domar also explained that investment is needed for steady-state growth (Campano et al., 2020). Investment in Papua consists of two types: foreign investment and domestic investment. This increased number of industries and high investment is believed to increase employment (Rendon, 2022). It is in line with Rostow's theory, which states that when industry has become a leading sector, the need for workers in this sector will also be higher (Muda et al., 2020; Willis, 2023). Based on this, increasing investment and the number of industries became the foremost program for local governments (Sall and Burlea-Schiopoiu, 2021).

In the case of Papua, the industry's growth is very attractive. Based on the number of workers, this area has two types of industries: a large sector and a small one. The development of large industries has decreased by an average of 5.2% throughout 2015–2022, even though, when compared, large industries in Indonesia increased by 4.8% (**Figure 4a**). Slightly different from large industries, small industries in 2015–2020 had stagnant growth on average but increased in 2021–2022 by 2.2%. Meanwhile, Indonesia's small industries experienced a sharp decline in 2016–2020, then began to grow in 2021–2022 (**Figure 4b**).

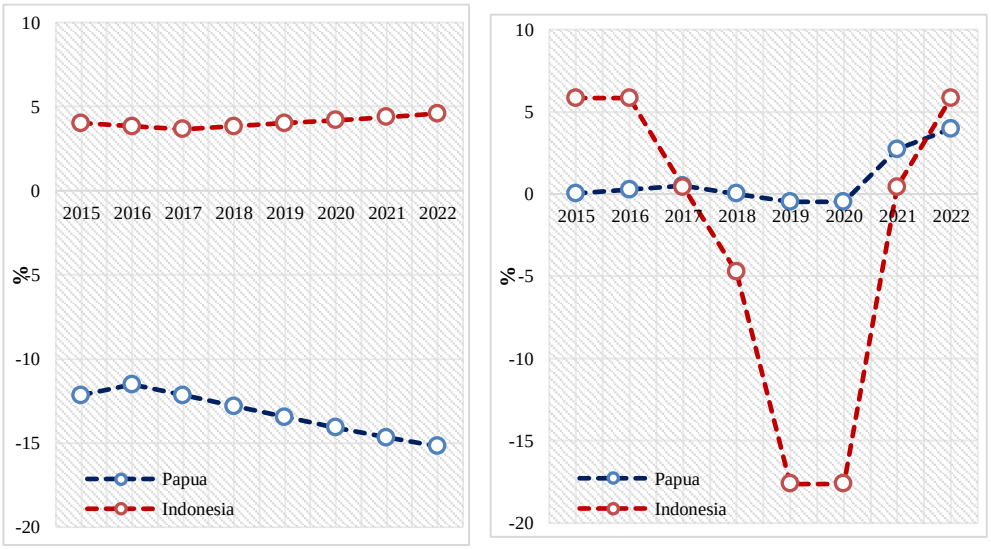
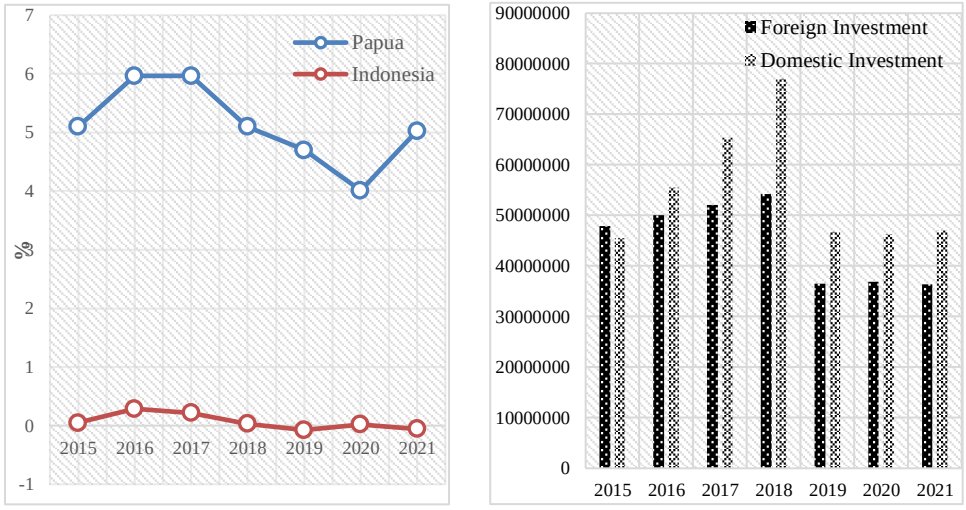


Figure 4. Growth of **(a)** large; and **(b)** small industries.

On the other hand, the absorption of labor in the industrial sector in Papua is also quite eye-catching. In 2015–2022, the industrial sector absorbed an average workforce of 5.18%, while Indonesia was only 0.06% (**Figure 5a**). This figure shows that the industrial industry turns out to be entirely instrumental in the province of Papua, tiny industries, which are suspected to be more able to absorb labor than large industries. Meanwhile, if we look at investment data, in 2015–2018, there was an increase in average foreign investment of 4.4% and domestic investment of 21%, but in 2019–2021 it experienced a reasonably drastic decline with an average of 32% in foreign and 39% in domestic investment (**Figure 5b**).



(a) **(b)**

Figure 5. (a) absorption of industrial sector labor; **(b)** foreign and domestic investment in Papua.

2.2. Regional economy performance

The economic performance indicators of a region describe the level of achievement that has been achieved related to development in the area. Therefore, such a performance indicator must be something that will be calculated and measured and used as a basis for assessing or seeing the level of performance both in the planning and implementation stages and in the stages after the activity is completed and functioning. Based on development objectives, there are at least two indicators of success in regional economic performance: GDP, which represents growth in the area, and poverty, which means equity (Breunig and Majeed, 2020; Tri and Thanh, 2023). GDP is the amount of added value generated by all business units in an area or the sum of the final goods and services produced by all economic units in an area (Priyadarshini, 2022; Sukono et al., 2019). The greater the GDP value of a region, the more advanced its economic development.

In comparison, poverty is defined as the inability to meet life's needs, including food and housing (Deonandan, 2019). Many things cause poverty, including low education, access to capital, mastery of resources (Tri and Thanh, 2023; Tackie, 2021), and mistakes in designing development programs not rooted in the community's needs (Javanmardi et al., 2023). Regarding Nurkse's poverty trap theory, low capital formation and investment, lack of capital, poverty, and low GDP are in an unbroken circle. They are an unavoidable cycle (Wang et al., 2022), (Wijatmoko et al., 2024).

GDP and poverty in Papua province are highly volatile from 2015 to 2022. GDP increased in 2015–2018 but fell in 2019–2022. Unfortunately, poverty is also growing, especially in 2019–2022 (**Figure 1**). This condition more or less proves Nurkse's thesis in Papua that GDP and poverty are in the same cycle. The central and local governments have issued various policies to increase development in Papua aimed at increasing GDP and alleviating poverty (**Table 1**). However, the government seems to need more efforts to solve the problem.

Table 1. Government policy on development in Papua.

No	Policy	Information
1	Presidential Regulation No. 65/2011	Acceleration of Development in Papua and West Papua Provinces
2	Presidential Instruction No. 9/2020	Acceleration of Welfare Development in Papua and West Papua
3	Presidential Regulation No. 20/2020	Establishment of an Integrated Coordination Team for the Acceleration of Welfare Development in Papua and West Papua Provinces
4	Regional Regulation No. 5 of 2021	Providing Incentives and Ease of Investment
5	Presidential Regulation No. 121/2022	Steering Agency for the Acceleration of Papua Special Autonomy Development
6	Local Government Regulation No. 4/2023	Regional Budget for Papua include investment in 2023
7	Regional Law No. 2/2021	Special autonomy related to regional management by Papua

3. Materials and methods

This research was conducted in 29 districts in Papua Province using secondary data from 2016 to 2022 and analyzed using the Panel Data Regression method, which combines time series and cross-sectional data. The advantage of this method is that it can increase the number of observations (samples) and, secondly, obtain different interunit variations according to space and variations according to time (Abdullahi and Sieng, 2023; Hallin et al., 2023). Data panels also have ase-dioxide between variables, so multicollinearity is unlikely (Song et al., 2023). The variables used in this study are shown in **Table 2**.

Table 2. Operational variables.

No	Variable	Unit	Information
Dependent variables			
1	GDP (Y_1)	IDR	Total gross value added from all economic activities in (regional)
2	Poverty (Y_2)	Percentage	Percentage of poor people in Papua
Independent variables			
1	Foreign investment (X_1)	IDR	The amount of realized foreign investment in Papua
2	Domestic investment (X_2)	IDR	The amount of domestic investment realized in Papua
3	Labor in the industrial sector (X_3)	Percentage	Percentage of employment in large and small industrial sectors in Papua
4	Number of industries (X_4)	Unit	The number of large and small industries in Papua
	β		Constant
	i		Research locations, 29 districts
	t		Years of research

The equations in this research are:

1) The effect of investment, labor, and the number of industries on GDP.

$$\ln \mathrm{GDP}_1 = \beta_0 + \beta_1 \ln X_{1it} + \beta_2 \ln X_{2it} + \beta_3 \ln X_{3it} + \beta_4 \ln X_{4it} + \varepsilon_{it} \quad (1)$$

2) The effect of investment, labor, and the number of industries on poverty.

$$\ln \text{Pov}_1 = \beta_0 + \beta_1 \ln X_{1it} + \beta_2 \ln X_{2it} + \beta_3 \ln X_{3it} + \beta_4 \ln X_{4it} + \varepsilon_{it} \quad (2)$$

Meanwhile, to find out the investment development strategy in Papua, the analytical network process (ANP) method is used, which is a decision-making analysis tool based on in-depth interviews conducted with a group of people (respondents) who are considered to know about the problem to be studied (Kheybari et al., 2020). This method is often used to formulate strategies through various subjective inputs, combined with rules or policies that have been legislate. It conducted in-depth interviews with seven people: three Papua Bappeda officials, two officials at the Papua Investment Coordinating Board (BKPM Papua), and two academics who understand development in Papua. ANP applies a consistency index (CI) or consistency number for various question answers in the 0–0.1. If it exceeds the above value, the respondent's answer is unacceptable and must be reconfirmed (Kheybari et al., 2020). In addition, there is a rater agreement, a measuring instrument that shows the level of agreement or approval of answers. The rater agreement value is marked by Kendall's coefficient of concordance (*W*), which is between 0 and 1. The closer to 1, means the better the results **(Table 3)**. The equation is as follows:

$$W_i = \frac{\sum_{i=1}^{n} a_{ij}}{n} \quad (3)$$

Then, calculate the eigenvalue and maximum eigenvalue.

$$\lambda_1 = \sum_{i=1}^{n} a_{ij}/W_i \quad (4)$$

$$\lambda_{\max} = \sum_{i=1}^{n} \frac{\left(\frac{a_{ij}}{W_i}\right)}{n} \quad (5)$$

$$CI = \frac{\lambda_{\max} - n}{n-1} \quad (6)$$

where:

W_i = Weighting

a_{ij}/n = Line normalization matrix

n = number of respondents

λ_1 = Eigen value

λ_{max} = Eigen value max

CI = Consistency index

Then, get Kendall's coefficient of concordance using the following:

$$R_i = \sum\nolimits_{i=1}^{n} r_{ij} \quad (7)$$

$$R = \frac{m(n+1)}{2} \quad (8)$$

$$S = \sum\nolimits_{1=1}^{n} (R_i - R)^2 \quad (9)$$

$$W = \frac{12 \sum_{i=0}^{n} d_i^2}{m^2 n(n^2-1)} \quad (10)$$

where:

R_i = The aggregated ranking of criterion i

R = The mean of the R_i values

r_{ij} = The rank given to criterion i by the evaluator group j
m = The number of rater groups rating n factors
S = A sum-of-squares statistic deviation over the row sums of ranking R_i
W = Kendall's Coefficient of Concordance; $0 \leq W \leq 1$

Table 3. Interpretation of Kendall's coefficient of concordance (W) value.

W	Interpretation
0	No agreement
0.1	Weak agreement
0.3	Moderate agreement
0.6	Strong agreement
1	Perfect agreement

4. Result and discussion

4.1. The effect of investment, labor, and the number of industries on GDP

For the case of Papua in 2016–2022, domestic investment, the number of workers in the industrial sector, and the number of industries significantly impact increasing GDP. It explains that for every 1% increase in domestic investment, the GDP will increase by 0.9%. If there is a 1% increase in the workforce in the industrial sector, then the GDP will increase by 2.3%. The increase in the amount of industries by 1% also increased the GDP by 17.1%. The variation in the research model can be explained by the independent change of 81.68% (*R*-squared 0.816795), and the rest is explained by other variables outside the model (**Table 4**).

Table 4. The effect of investment, labor, and the number of industries on GDP.

Variable	Coeff	Std. error	*t*-stat	Prob
C	15.07883	0.064741	232.9087	0
ForeignInv	0.007404	0.006201	1.194086	0.2341
DomesticInv	0.009897	0.005571	1.776649	0.0474**
IndustryLabour	0.023723	0.012098	1.960988	0.0415**
IndustryAmount	0.171553	0.011381	15.07416	0*
R-squared	0.816795	-	-	-
Prob (*F*-stat)	0	-	Durbin-Watson	1.772242

**: $\alpha = 0.05$, *: $\alpha = 0.01$.

The research above further confirms the critical role of domestic investment, employment in the industrial sector, and the number of industries in Papua. However, it's pretty unfortunate that foreign investment has not been able to significantly influence the increase in GDP, even though if you look at **Figure 4b**, it can be seen that foreign investment every year is relatively high. The government has also enacted laws to stimulate the investment growth. Yet in reality, the investments made should be capable of absorbing labor and increasing people's income, where higher incomes would enlarge demand for goods and services

(Getzner and Moroz, 2020; Sijabat, 2023). Consequently, the profits attained by a business sector can reach its target, thereby stimulating new investments in other business sectors. Indirectly, this process can enhance community welfare. Some things that affect the insignificance of foreign investment are the low quality of labor and improper management of investment funds (Radulescu et al., 2019). In addition, the fact that the magnitude of the problem in an area is not proportional to the value of the available investment can also be an obstacle to the success of development (Dunn and Holmes, 2019). This situation becomes ironic considering the government has issued several important policies (**Table 1**) to ensure the success of development in Papua. In reality, these government regulations must contend with serious challenges in Papua, including remote and inaccessible areas resulting in limited infrastructure, poverty leading to low levels of education and community capability, as well as insufficient development funds for the region.

4.2. The effect of investment, labor, and the number of industries on poverty

Based on the results, it can be seen that throughout 2016–2022, domestic investment, labor in the industrial sector, and the number of industries significantly reduced the poverty rate in Papua. Every 1% increase in domestic investment can reduce poverty by 1.9%, and with a 1% increase in industries, poverty will decrease by 3.7%. The variation in the research model can be explained by the independent change of 63.04% (*R*-squared 0.634077), and the rest is explained by other variables outside the model (**Table 5**).

Table 5. The effect of investment, labor, and the number of industries on poverty.

Variable	Coefficient	Std. Error	*t*-stat	Prob
C	3.201433	0.040699	78.66107	0
ForeignInv	0.001756	0.003898	0.450548	0.6529
DomesticInv	−0.01991	0.003502	−5.6861	0*
IndustryLabour	−0.0099	0.007605	−1.30128	0.194
IndustryAmount	−0.03708	0.007154	−5.18349	0*
R-squared	0.634077	-	-	-
Prob (*F*-stat)	0	-	Durbin-Watson	2.499176

**: $\alpha = 0.05$, *: $\alpha = 0.01$.

The above results further confirm the inability of foreign investment to improve economic performance, especially given the decline in the number of poor people in Papua (Anetor et al., 2020; Oktasari et al., 2020). Some of the obstacles that hamper foreign investment are safety factors that concern investors, the small value of investment, and the type of foreign investment that does not involve local workers (Hill, 2021; Matsuura and Saito, 2023). Regarding security and defense, until now Papua has been an area that still experiences separatist threats that disrupt regional stability and even the Indonesian state. This separatist threat has an impact on security, violence, and even murder, so that in the end economic growth cannot be achieved and people's welfare is difficult to realize (Pramono and Prakoso, 2021).

The abundance of obstacles in Papua's development stemming from the region itself renders various government policies incapable of improving Papua's economic performance.

4.3. Strategies to improve economic performance in Papua

Papua's economic development strategy essentially aims to create maximum regional performance improvement. There are two criteria for realizing Papua's development goals: increasing in investment and industrial revitalization. Increased investment has contributed to economic development through foreign investment and domestic investment. While the criteria of industrial revitalization are expanding the number of industries and increasing the labour in the industry.

The results of in-depth interviews and ANP simulations show that the first strategy of development of regional economic performance is carried out through an increasing in investment (61.8 points) through increasing domestic investment in first place at 84.1 points and foreign investment in second place at 15.9 points. This strategy aligns with the previous regression results, which showed that domestic investors positively and significantly influence the increase in GDP and poverty reduction (see **Tables 4** and **5**).

The second strategy is industrial revitalization by 38.1 points through increasing the number of industries at 75.1 points as the first order and increasing the labour at 23.8 points as the second step (**Figure 6**), All ANP results have a consistency of 0 – 0.1 and a Kendal coefficient of concordance (*W*) of 52.69%, which means that all respondents agree with the above results with a strong agreement level.

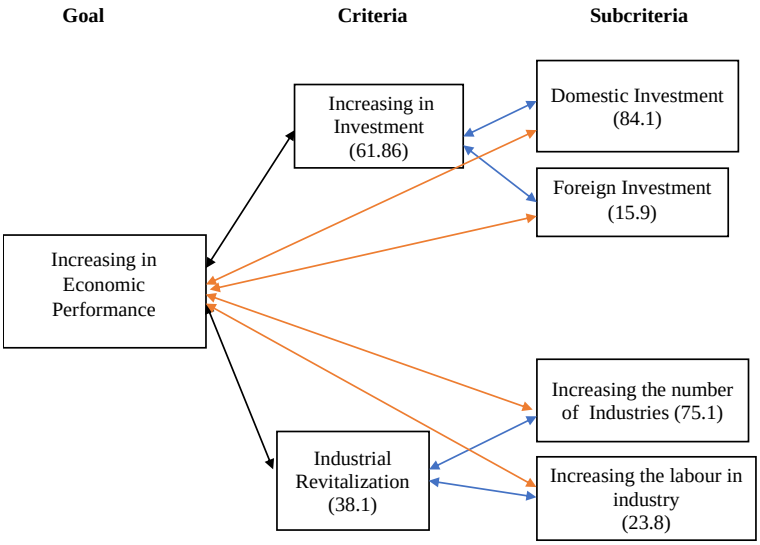


Figure 6. Increasing in economic performance strategy.

5. Conclusion

Economic development to improve regional financial performance is a must. In addition, the government has consistently worked with the private sector to realize these development goals through investment. The hope is, the investment will increase the number of industries and employment. In reality, the increase in GDP and the decrease in poverty in Papua are strongly influenced by domestic investment,

labor in the industrial sector, and the number of industries available. In contrast, foreign investment does not have a significant influence. It is suspected that some of the reasons include regional security problems, the lack of involvement of local workers in industries sourced from foreign funds, and increasing regulations related to Papua's economic development.

The strategy that must be carried out by the government related to improving economic performance is the first criterion of industrial improvement with the sub-criterion of increasing domestic investment, then foreign investment as the second sub-criterion. The second criterion is industrial revitalization, with an increase in the number of industries in the first sub-criterion and an increase in the number of workers in the following sub-criterion. In addition, the central and local governments need to improve security in Papua and improve the conditions of education and training for workers to be accepted in the industrial world based on foreign investment. Stimulating the increase in domestic industries by the central and local governments is imperative, given regulations supporting its success.

Author contributions: Conceptualization, DAR, YHS, SS and KMK; methodology, DAR and KMK; writing—original draft preparation, YHS; writing—review and editing, SS and KMK; supervision, SS; funding acquisition, DAR, YHS, SS and KMK. All authors have read and agreed to the published version of the manuscript.

Acknowledgments: The authors thank the National Research and Innovation Agency for providing the Post Doctoral Fellowship, Darma Persada University and Esa Unggul University for their support.

Conflict of interest: The authors declare no conflict of interest.

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