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The Analysis of High-Educated Workforce Migration in Indonesia

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Abstract The outflow of college graduates can impact the accumulation of regional human resources and its implications for regional economic and social development. This study aims to determine the effect of district or city real wages, economic growth, and employment opportunities on the migration of highly educated workers to industrial districts or cities. The research method employed panel data analysis with a fixed effect approach and descriptive analysis. The research data found that the district or city real wage variable significantly and positively affects the migration of highly educated workers to industrial area districts in Indonesia. Similarly, economic growth has a significant positive effect on their migration to these districts. However, the level of employment opportunities has an insignificantly positive effect on their migration. The low level of employment opportunities is not significantly caused by the lack of a highly educated workforce in the industrial area due to several factors other than the difference in the number of graduates at those education levels. It is also influenced by the higher availability of job openings for high school graduates or equivalents.

Keywords College Graduates, Labor Migration, Wages, Economic Growth, and Employment Opportunity Rate

1. Introduction

Controlling quality human resources has become a top priority in developing countries. The socioeconomic development of developing countries faces a distinct barrier: the high population growth rate [33]. The population growth rate mentioned in the above quote depicts the increasing number of people annually. Fertility (birth), mortality (death), and migration (population movement) are the three factors that affect the population growth rate [29].

In the context of human resource development (HRD), people move because they need to find ways to get around problems or a lack of things they need to improve their knowledge and skills, which can then be used as assets to increase their income potential and competitiveness on the job market [37]. There are two main ways to improve one's standard of living: by increasing educational attainment and by geographically changing economic conditions through migration [5]. Migration refers to the relocation of a population with the intention of settling from the area of origin to the destination area, surpassing political or administrative boundaries within a region.

The development of urban areas and industrialization in Indonesia has led to frequent population movement or migration, particularly from rural areas to cities, known as urbanization. The desire for a better life drives people to engage in population migration, including urbanization, or the movement of people from villages to cities. The differences in social and economic conditions and the availability of supporting facilities between rural areas and cities trigger urbanization in district and city areas, especially in industrial zones in Indonesia.

In the context of activity, industrialization has a significant impact on the transformation of employment structures [2]. Successful industrialization, in turn, can initiate the development of urbanization. The process of industrialization in rural areas is understood as a change in the economic structure of those areas, characterized by a shift in employment from the agricultural sector to the industrial sector [39]. This process of rural industrialization also leads to the transformation of economic sectors in rural areas into urban economic activities [39].

With the development of industries in Indonesia, the establishment of new industries in growing districts and cities has attracted a significant number of laborers and workers to migrate. Two factors—push factors and pull factors—influence people's decisions to migrate, according to Everett S. Lee (1996) [25]. Push factors are related to differences in economic growth and uneven development facilities between different regions. Factors such as high population density, limited job opportunities, increasing unemployment rates, income disparities between regions, poor economic conditions in the area of origin, and educational levels contribute to the push factors. On the other hand, pull factors are associated with the movement of

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labor from regions with low economic growth to areas with high economic growth, offering greater job opportunities, higher wages, favorable environmental conditions, and various facilities in the destination areas that enhance productivity for workers. Todaro (2006) states that individuals make migration decisions driven by the expectation of income differences between the area of origin and the destination. If the area of origin is unable to meet their needs, individuals will decide to migrate. In this regard, Ravenstein also explains that the pull factors for highly educated individuals include job opportunities, good infrastructure, higher wages, and a better quality of life [36].

Internal migration between regions often serves as a key driver of economic and social mobility for the population, particularly for young individuals with high educational qualifications. This is of great importance to consider, especially in the context of an increasingly global workforce, as it provides greater opportunities for individuals with strong human capital to move to areas with broader job prospects. At both regional and national levels, the presence of highly educated migrants significantly influences the human resources of a region, including its stock and quality, ultimately determining the potential for economic growth in that area. Industrial areas, which have historically been a primary destination for internal migration in Indonesia, also present significant opportunities to accelerate human resource development in those regions with the rapid growth of highly educated migrant populations moving to districts or cities.

Highly educated migrant workers are a population group that follows both paths. Utilizing their educational background, this group possesses capabilities, knowledge, and academic degrees that enable them to access various job opportunities aligned with their skills and aspirations in different regions, whether in their area of origin or elsewhere. Therefore, it can be assumed that this population group has great potential to achieve optimal returns on their human capital. From a regional development perspective, the migration of highly educated workers from one region to another has broad implications for the conditions of human resource development at the regional level. This is primarily related to the stock and quality of human resources in both the area of origin and the migration destination, as well as their influence on economic development in both regions.

For the migration destination areas, the accumulation of human capital brought by highly educated migrant workers is an important part of human resource development and economic growth in those regions [10] [47]. The presence of highly educated migrant workers contributes to economic acceleration through increased purchasing power and local economic growth. Additionally, the presence of migration by highly educated individuals also plays a role in enhancing knowledge among the local population, expanding human capital, and improving the availability and access to social services [9] [30]. Furthermore, a high accumulation of human capital in a region can provide better protection for that region when facing vulnerable economic situations [19].

The influx of highly educated migrants also has negative impacts on the migration destination areas. The negative impacts of the inflow of highly educated migrants may not be as clear as the positive impacts, but at least some population groups in the migration destination areas may potentially suffer losses with the arrival of highly educated migrants in their residential areas [17]. One of the negative impacts is the potential decrease in regional wages and the increase in prices of essential goods in the migration destination areas [7] [32]. The entry of highly educated workers, which would lead to an increase in labor supply and demand for basic needs, can have detrimental effects on the local economy. Furthermore, the presence of highly educated migrant workers with different socio-cultural backgrounds from the local population can result in regional diversity, which, if not well managed, may lead to conflicts and distrust among population groups [1] [32].

In Indonesia, highly educated individuals are generally concentrated in specific regions. This condition has resulted in development disparities between regions. In the context of Indonesia, these disparities are evident between the island of Java and regions outside Java, as well as between the western and eastern regions of Indonesia. This can be indicated by the fact that the provinces with the highest Human Development Index (HDI) are mostly located in western Indonesia. Conversely, the majority of provinces with the lowest HDI are in eastern Indonesia.

Considerations related to optimizing the return of human capital are key factors in making migration decisions and engaging in productive economic activities targeted by migrants in their destination areas. With current global development and prospects for future regional development, the link between labor migration dynamics and human resource development becomes crucial to examine, especially for individuals with high human capital.

However, existing migration studies generally examine population migration behavior as a one-off, linear process. However, an approach based on time-series aggregate movement between regions is needed for studying migration, as human capital and migration models should be understood as individual choices with lifelong consequences [21]. It is important to understand migration not only as a linear process aimed solely at maximizing economic benefits [11]. This is particularly crucial when examining the mobility behavior of highly educated individuals, as they have a wider range of options in the labor market and engage in repetitive mobility. Furthermore, it is observed that individuals with higher education tend to be more mobile during their early adulthood [8] [46].

Migrant workers have a strong tendency to engage in further migration, either returning to their place of origin (return migration) or moving to other areas (onward migration) [7]. Migration patterns that are unpredictable, adaptable, transient, circular, or repetitive in nature point to the emergence of liquid migrants [15]. Migrant groups

closely associated with such spatial mobility are skilled or highly educated migrants. Liquid migrants engage in migration to accumulate capital, such as academic abilities and diverse work experiences, which enhance their capabilities to move to other regions offering better economic opportunities.

Furthermore, the migration flow in Indonesia tends to be directed towards regions with higher levels of development, such as areas in Java or other regions in western Indonesia [45].

One important indicator of human resource development to be considered is educational attainment in a region. This is because education is a fundamental need for individuals in their efforts to improve their well-being. As a significant parameter to assess the condition and progress of an area, a good education system needs to be developed to create a high-quality human resource base. This can be achieved by improving the quality of education, expanding and equalizing access to education opportunities for all members of society, ensuring the effectiveness and efficiency of education provision, and meeting the necessary educational facilities and infrastructure.

The influx of highly educated migrant workers can have significant impacts on the society and economy of the receiving areas. These migrants can contribute to accelerating economic growth, promoting progress in the region, and strengthening cultural diversity. However, they can also bring challenges such as increased job competition and higher living costs in the area. Therefore, further research is needed to understand the pull factors behind high-skilled migrant workers' migration to industrial districts or cities in Indonesia.

The factors that contribute to migration include better job opportunities, higher income, education, quality of life, social security, and social connections. Everett S. Lee (1996) stated that one of the pull factors is related to the movement of labor from areas with low economic growth to areas with high economic growth. A region that offers comprehensive facilities such as government centers, education, healthcare, information services, transportation, and job opportunities, along with favorable environmental conditions that support individual productivity, creates a high interest in relocating to that area. Population migration occurs in order to obtain more productive employment with a higher income and access to public services necessary for enhancing work productivity. According to E.G. Ravenstein's theory, the pull factors for migration include better job opportunities and higher wages in the destination area.

Highly educated migration can impact economic growth in both the origin and destination areas. Highly educated migrants typically bring the skills, knowledge, and experience needed to advance specific economic sectors. On the other hand, the origin region may experience a loss of a highly educated workforce. Industrial districts or cities often offer numerous job opportunities, higher salaries, and better facilities compared to other areas. This makes them attractive destinations for highly educated workers seeking employment.

This study was conducted with the aim of determining the influence of minimum wages at the district or city level, economic growth, and employment opportunities on the inbound migration of highly educated workers to industrial districts or cities in Indonesia. The rapid influx of highly educated migrants to industrial districts or cities poses unique challenges for the migrants as they make decisions to migrate and face various dynamics in the destination area. The migrants also need to consider and understand the minimum wages, economic growth, and employment opportunities in each industrial district or city that will be their migration destination (Alias and Peng, 2012; ([12] [40]). The emergence of highly educated migrants certainly has an impact on the destination regions of their migration (Bon-jour et al., 2017).

The researchers selected industrial districts or cities as the migration destination areas because these regions offer better job opportunities, higher wages, supportive infrastructure, and conducive environments. The industrial districts or cities included in the study were 49 districts or cities in Indonesia, based on the list of industrial areas provided by the Ministry of Industry. The research adapted a modified model from the journal [12], incorporating the employment opportunity variable from [40], as well as adding the economic growth variable that also affects the migration of highly educated individuals based on the study by Maizam Alias and Tey Nai Peng (2012). In addition to the reference journals, the selection of minimum wages, economic growth, and employment opportunity used in this study is based on theories presented by Everett S. Lee and Ravenstein regarding the pull factors for migration. As this research focuses on labor, the minimum wages at the district or city level are measured using real wages. Secondary data obtained from the Central Bureau of Statistics (BPS), Bank Indonesia, and relevant government agencies for the 49 districts and cities from 2019 to 2021 were used in this study. Based on the background information provided, the objective of this study is to determine the influence of minimum wages at the district or city level, economic growth, and employment opportunities on the inbound migration of highly educated workers to industrial districts or cities in Indonesia.

This aspect adds uniqueness to this paper. The subsequent sections are organized as follows: Section 2 provides a literature review; Section 3 describes the methodology; Section 4 presents the results and discussion; and finally, Section 5 concludes the study.

2. Literature Review

Ravenstein's seven laws of migration [36] state that migrants tend to move relatively close distances and often migrate to larger cities. The urban population is predominantly composed of migrants from rural areas. Emigration tends to be higher than immigration. Significant

migration can have implications for return migration. Migrants who move long distances often choose to relocate to major cities. People residing in rural areas are more likely to migrate compared to those in urban areas. Women tend to migrate more than men.

Everett S. Lee [25] explained in his article titled "A Theory of Migration" that population mobility generally occurs when there are differences in the attractiveness of two regions. The volume of migration in a region corresponds to the level of regional diversity in that area. In both the origin and destination regions, there are positive (+), negative (-), and neutral (0) factors. Positive factors are those that provide advantageous conditions for residing in that area. For example, the presence of schools, job opportunities, security, infrastructure, and others On the other hand, negative factors contribute negative value to the respective area, such as unfavorable climate, noise, pollution, population density, and others.

Everett S. Lee's theory of push and pull factors, as well as barriers or obstacles to migration, has undergone further development [6]. In addition to the push and pull factors, Bodvarsson and Berg added the post-migration decision for migrants, whether to stay or leave the destination country (stay away). The factors that drive migration, attract migration, influence settlement, and determine the decision to leave the destination country can be illustrated more clearly in Figure 1, which relates to migration decisions.

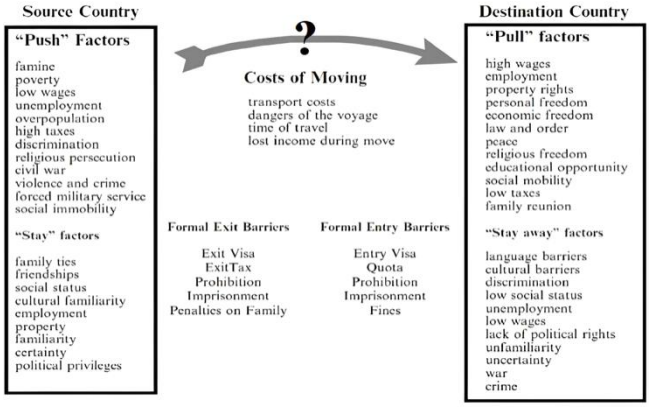

Figure 1. Migration Decision

3. Methodology

3.1. Type and Sources of Research

The type of research used by the researchers is quantitative. This research utilizes hypothesis testing or descriptive research, also known as explanatory research. Explanatory research is a research method that explains why something happens when limited information is available. This type of research can help enhance understanding of a particular topic, ascertain how or why certain phenomena occur, and predict future events. Explanatory research can be described as a "cause and effect" model that can depict patterns and trends in existing data and explore unexamined areas. For these reasons, explanatory research is often considered a type of causal research [34]. Therefore, explanatory research is a method that explains the relationship between independent variables and dependent variables. The data used in this study are derived from the Migrant Profile of the National Socioeconomic Survey (SUSENAS), the Central Bureau of Statistics (BPS), and relevant government agencies from 2019 to 2021. The Migrant Profile of SUSENAS aims to provide an overview of the size, level, patterns, and flow of migration. The independent variables in this research are employment opportunities, economic growth, and minimum wages at the district or city level. The dependent variable is the migration of highly educated workers to Indonesia. This migration data is obtained from the inbound migration of workers based on their level of education. The educational levels considered include Diploma, Bachelor's (S1), Master's (S2), and Doctorate (S3). These educational levels are chosen to understand the differences in education levels and how they impact factors such as employment, income, and social mobility. Additionally, it is important to comprehend how educational investment influences an individual's quality of life.

The limitation of this study is that it only focuses on the destination areas, specifically the industrial districts and cities in Indonesia. The research primarily focuses on highly educated migrant workers who enter the 49 industrial districts and cities based on the list provided by the Ministry of Industry [23]. The selection of these locations is based on the fact that these districts are special economic zones (SEZs) for industries and possess potential and advantages from geo-economic, geopolitical, or geostrategic aspects [24]. The data is processed using Microsoft Excel, Eviews 12, and Python software.

3.2. Method of Analysis

Panel Data is a combination of time-series data and cross-sectional data. This panel data is used to identify significant factors based on repeated observations on a particular subject over different time periods [14]. Generally, parameter estimation in regression analysis with cross-sectional data is conducted using the method of least squares, also known as Ordinary Least Squares (OLS). Statisticians often utilize this method to understand how a factor influences a specific issue periodically, such as migration, the minimum wage, economic growth, and so on. Panel data regression is an extension of multiple linear regression. Both methods are used to estimate the parameters of a regression model.

The regression model to be used in this study, based on a general model adapted with various simplifications [12], has the following structure:

$$Migration_{it} = \beta_0 + \beta_1 MWG_{it} + \beta_2 EG_{it} + \beta_3 JOR_{it} + e_{it} \quad (1)$$

Since the data in this study have different units, namely high-skilled labor migration (Migration) measured in

individuals, Minimum Wage of Districts/Cities (MWG) measured in Indonesian rupiah, Economic Growth (EG) measured in percentage (%), and Employment Opportunity rate (JOR) measured in percentage (%), data transformation using natural logarithm will be performed.

This research is supported by Eviews 12 software. The steps taken in this study are as follows:

1. Selection of the Best Model
   a. Chow Test
      The Chow test is a test used to determine which model to choose between the common effect model and the fixed effect model
   b. Hausman Test
      The Hausman test is a test used to select the best model between the fixed effect model and the random effect model.
2. Unit Root Test

The type of unit root test used in this panel data analysis is the Dickey-Fuller test (ADF). The results of the unit root test can be interpreted based on test statistics such as the ADF statistic or p-value. If the p-value is smaller than the predetermined significance level (e.g., 0.05), the null hypothesis is rejected, and the variable is considered stationary. If the p-value is larger than the significance level, the null hypothesis is not rejected, and the variable is considered non-stationary.

3. Classic Assumptions Test

Classical assumptions are a set of assumptions that must be met in classical regression analysis (OLS) to ensure the validity and reliability of the analysis's results. These assumptions provide an important foundation for generating unbiased and efficient estimates and producing correct inference results. The equation obtained from an estimation can be statistically valid if it satisfies the classical assumptions, which include those of multicollinearity, heteroscedasticity, autocorrelation, and normal distribution of data.

4. Significance Test

The process of significance testing involves calculating test statistics, such as z-values, t-values, or F-values, which are then compared to critical values determined based on the chosen level of significance. If the test statistic exceeds the critical value, the null hypothesis is rejected, and we conclude that there is a significant difference or relationship.

5. Drawing Conclusions from the panel data regression model for the factors influencing the migration rate of high-skilled workers to industrial districts in Indonesia based on the results obtained from the panel data regression analysis.

4. Result and Discussion

The initial step before data processing is to conduct descriptive statistics. The characteristics of each independent variable can be informed through descriptive statistics, such as the migration values and all independent variables that are presumed to have a significant impact on the changes in the migration of high-skilled workers to industrial districts in Indonesia from 2019 to 2021. The descriptive statistics used include the maximum, minimum, mean, and standard deviation of each variable, as displayed in the following table:

Table 1. Descriptive Statistic

Variables	Mean	Standard Deviation	observation	Min	Max
Independent Variable:					
Migration	3.305351	0.000176	147	3.305136	3.305566
Dependent Variable:					
MWG	0.519218	0.000023	147	0.519189	0.519246
EG	4.046327	14.245023	147	-11.030	161.840000
JOR	92.408163	2.594071	147	85.700	97.420000

The highest destination for migrants is East Jakarta, while the lowest destination for migrants in 2019 is South Bangka Regency. The highest real wages in 2019 are found in Karawang Regency, amounting to IDR 3,019,332.525. In 2020 and 2021, the highest real wages are found in Bekasi Regency, amounting to IDR 4,164,547.811 and IDR 4,365,348.456, respectively. The lowest real wages in 2019, 2020, and 2021 are found in Bantul Regency, amounting to IDR 934,750.8782, IDR 1,687,558.907, and IDR 1,663,134.617, respectively. There are 3 regencies with different economic growth compared to other regions, namely Morowali Regency, Konawe Regency, and Central Halmahera Regency. Bontang City had the lowest economic growth in 2019 (-2.15%), then Simalungun Regency (-11.03%) in 2020, and Bintan Regency (-3.89%) in 2021. The highest job opportunities in 2019 are in Semarang City with 97.42%, followed by 95.93% in Bantul Regency in 2020 and 96.17% in Mojokerto Regency. The lowest job opportunities in 2019 are in Serang Regency at 89.41%, in 2020 in Bogor Regency at 85.7%, and in Makassar City at 86.82%.

4.1. Choosing the Model

After analyzing the three types of models, the next step is to conduct tests to select one of these three models.

4.1.1. Chow Test

The Chow Test is conducted to determine which model is more appropriate, the pooled OLS or fixed effect model. The test results are as follows, using Eviews 12 software:

Table 2. The result of the Uji Chow

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	36.428482	(48,95)	0.0000
Cross-section Chi-square	435.940371	48	0.0000

Both the Cross-Section F and cross-section Chi-Square probabilities are 0.0000, which is smaller than a = 0.05, leading to the rejection of the null hypothesis. Therefore, it indicates that the Fixed Effect Model (FEM) is considered significant in testing the panel data and is the best model.

4.1.2. Hausman Test

The Hausman test is used to select the appropriate model between the random effect and fixed effect models. Here are the results of the Hausman test using Eviews 12: software:

Table 3. The results of the Hausman test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	12.872972	3	0.0049

The probability value for Cross-Section Random is 0.0049, which means the P-value is smaller than a = 0.05, thus accepting the null hypothesis. Therefore, it indicates that the Fixed Effect Model (FEM) is the best model to be used for the panel data in this research.

4.2. Unit Root Test

Here are the results of the unit root test for each variable:

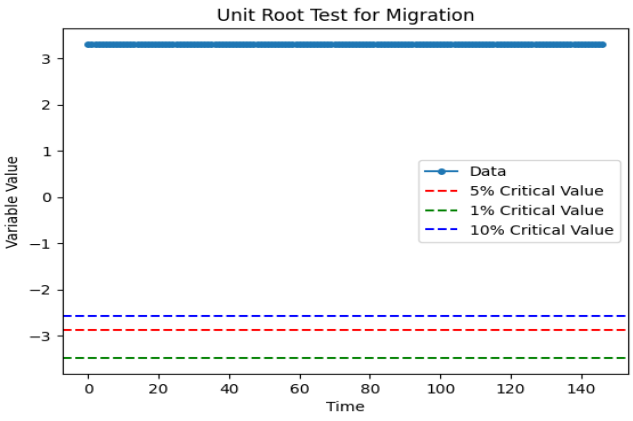

Figure 2. Unit Root Test for Migration

Unit Root Test for Migration:
ADF Statistic: -29216215611705.223
p-value: 0.0
Is Stationary: True

The very low value of the ADF statistic indicates the presence of a unit root, which means that the migration data is non-stationary. In the unit root test for migration, a p-value of 0.0 indicates strong evidence to reject the null hypothesis. Therefore, the migration data can be considered to have no unit root and be stationary. Based on the results of the unit root test, it can be concluded that the migration data is stationary.

Next, the results of the unit root test for the minimum wage in regency and city areas are as follows:

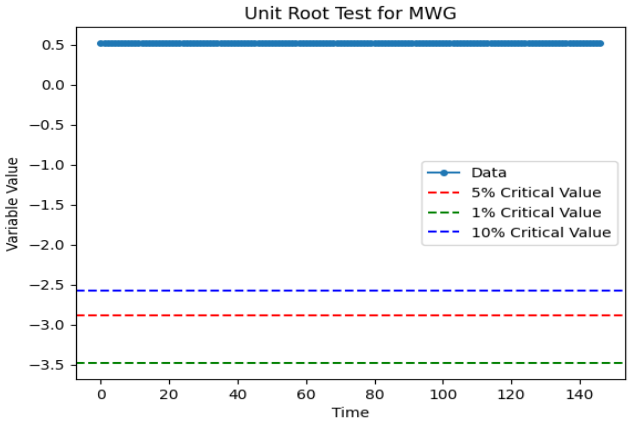

Figure 3. Unit Root Test for Minimum Wages (MWG)

Unit Root Test for MWG:
ADF Statistic: -17500004037656.887
p-value: 0.0
Is Stationary: True

The very low ADF statistic indicates the presence of a unit root, suggesting that the MWG data is non-stationary. In this case, the p-value of 0.0 indicates strong evidence to reject the null hypothesis. Therefore, the MWG data can be considered to have no unit root and be stationary. Based on the unit root test results, it can be concluded that the MWG data is stationary.

Next, the results of the unit root test for economic growth are as follows:

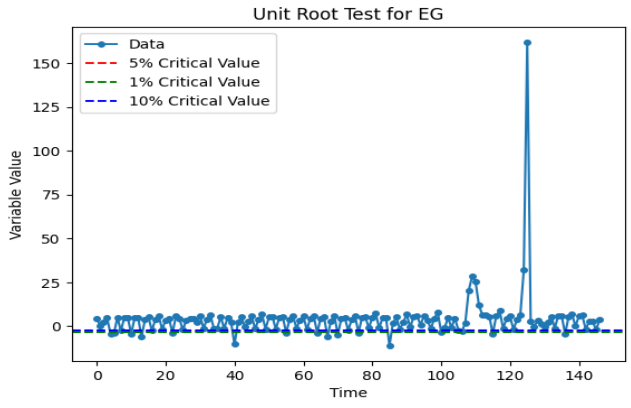

Figure 4. Unit Root Test for Economic Growth (EG)

Unit Root Test for EG:

ADF Statistic: -10.063851508844277
p-value: 1.3119440347880507e-17
Is Stationary: True

The very low ADF statistic indicates the presence of a unit root, suggesting that the EG data is non-stationary. In this case, the p-value is very low (less than the significance level of 0.05), indicating strong evidence to reject the null hypothesis. Therefore, the EG data can be considered to have no unit root and be stationary. Based on the unit root test results, it can be concluded that the EG data is stationary.

Next, the results of the unit root test for employment rate are as follows:

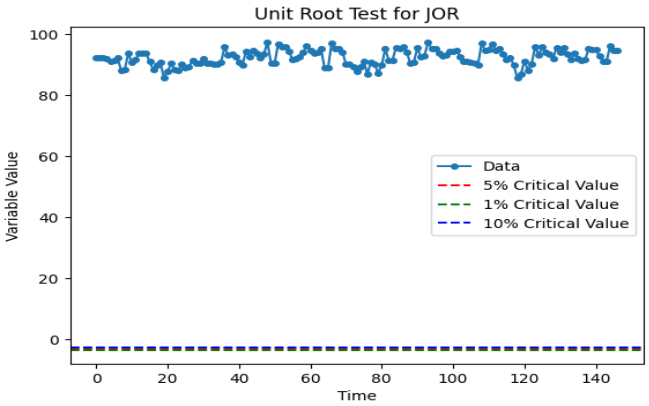

Figure 5. Unit Root Test for Job Opportunity Rate (JOR)

Unit Root Test for JOR:
ADF Statistic: -1.4252226530159884
p-value: 0.5701261244036759
Is Stationary: False

The ADF statistic value approaching zero indicates a weaker presence of a unit root, suggesting that the JOR data tends to be non-stationary. In this case, the p-value is relatively high (greater than the significance level of 0.05), indicating insufficient evidence to reject the null hypothesis. Therefore, the JOR data cannot be considered to have any unit root and is not stationary. Based on the unit root test results, it can be concluded that the JOR data is non-stationary.

4.3. Classical Assumption Test

4.3.1. Normality Test

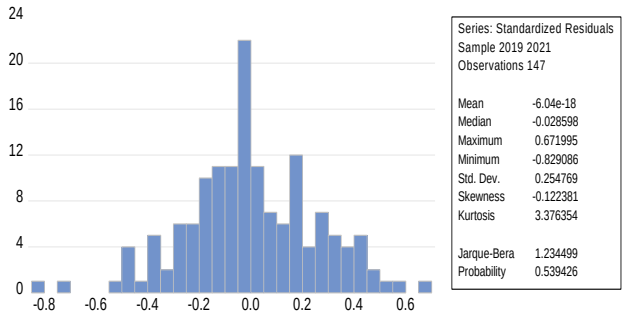

Figure 6. Normality Test

The purpose of the classical assumption test for normality is to determine whether the observed data come from a normally distributed sample or not.

Based on the normality test using the Jarque-Bera method and with the assistance of Eviews 12 software, we obtained a JB value of 1.234499, which is less than the critical value $\chi^2_{(0,05;2)} = 5.991465$ and a *p-value* = 0.539426 > 0.05. So, the decision is to accept them, which means that the data in the Fixed Effect Model (FEM) of the panel regression come from a sample with a normal distribution with a 95% level of confidence.

4.3.2. Multicollinearity Test

Multicollinearity can be detected using the sample correlation coefficient (*r*) method. The value of *r* in this study was obtained using Eviews 12 software and is displayed in the following table:

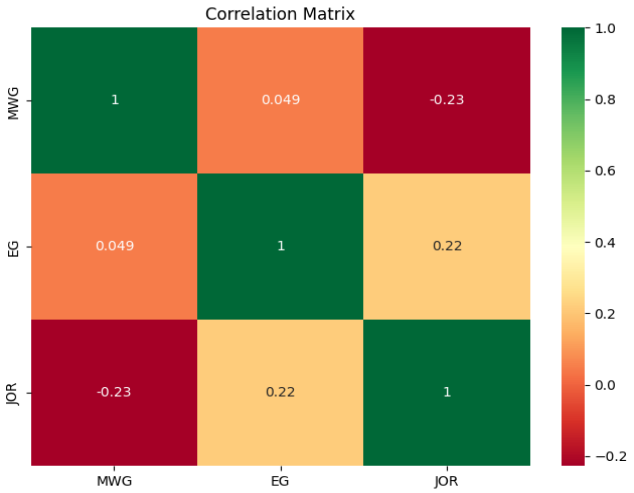

Figure 7. Correlation Matrix

According to Gujarati and Dawn, a value of |r| > 0.8 indicates the presence of multicollinearity between two different independent variables. Therefore, from the table above, all the values of r in each column are |r| < 0.8. Hence, all the independent variables in this study are free from multicollinearity issues.

4.3.3. Heteroscedasticity Test

Heteroscedasticity in FEM can be detected using the Glejser test method. The Glejser test values in this study were obtained using Eviews 12 software and are displayed in the following table.

Table 4. Heteroskedasticity Test Result

Independent Variable	Prob.	Decision
Minimum Wage for Regencies/Districts	0.9645	Absence of Heteroskedasticity
Economic Growth	0.2069	Absence of Heteroskedasticity
Employment Opportunity Rate	0.4377	Absence of Heteroskedasticity

The results of heteroscedasticity testing using the Glejser test indicate that the Minimum Wage of Districts and Cities (UMK), Economic Growth (PE), and Employment Opportunity Rate (TKK) variables do not exhibit heteroscedasticity. This is evidenced by the p-values of the Minimum Wage of districts and cities, Economic Growth, and Employment Opportunity Rate being greater than 0.05, leading to the acceptance of the null hypothesis (). Therefore, it can be concluded that the regression model does not experience heteroscedasticity.

4.3.4. Autocorrelation Test

The autocorrelation test for each variable using the sinusoidal pattern autocorrelation test is as follows:

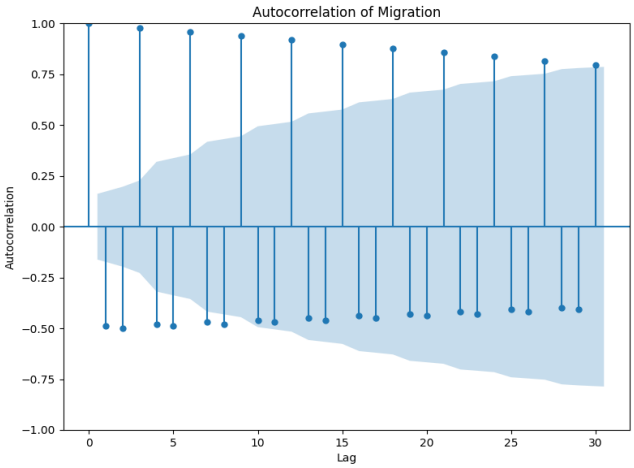

Figure 8. Autocorrelation of Migration

The Migration variable exhibits a strong negative correlation at lag 1 (-0.49). This indicates a negative relationship between the current value of the migration variable and its previous value at lag 1. Furthermore, although the correlation weakens as the lag increases, the autocorrelation at lag 30 (0.8) remains positive. This suggests a weak positive correlation between the current value of the migration variable and its value from a significantly earlier time period (lag 30).

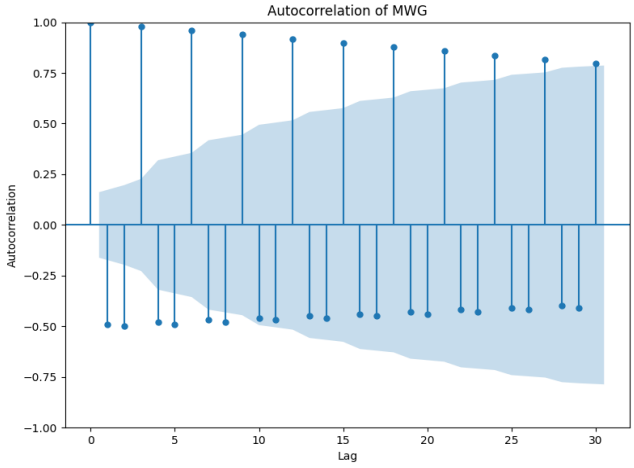

Figure 9. Autocorrelation of Minimum Wages (MWG)

The autocorrelation of the Minimum wage (MWG) variable exhibits a fairly strong negative correlation at lag 1 (-0.50). This indicates a negative relationship between the current value of the MWG variable and its previous value at lag 1. Furthermore, although the correlation weakens as the lag increases, the autocorrelation at lag 30 (0.78) remains positive. This suggests a weak positive correlation between the current value of the MWG variable and its value from a significantly earlier time period (lag 30).

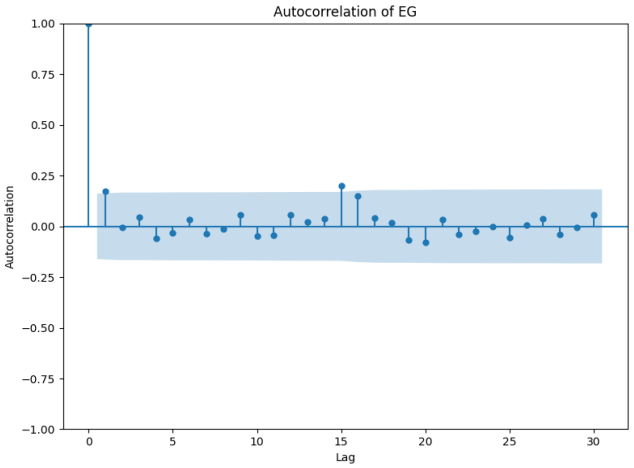

Figure 10. Autocorrelation of Economic Growth

The Economic Growth (EG) variable exhibits a strong positive correlation at lag 1 (0.23) and lag 15 (0.24). This indicates a positive relationship between the current value of the EG variable and its previous value at lag 1. Furthermore, although the correlation weakens as the lag increases, the autocorrelation at lag 30 (0.15) remains positive. This suggests a weak positive correlation between the current value of the EG variable and its value from a significantly earlier time period (lag 30).

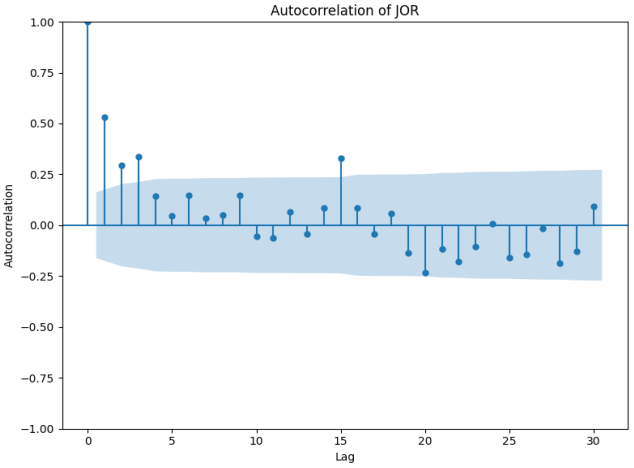

Figure 11. Autocorrelation of Job Opportunity Rate (JOR)

The Job Opportunity Rate (JOR) variable exhibits a strong positive correlation at lag 1 (0.5). This indicates a positive relationship between the current value of the JOR variable and its previous value at lag 1. Furthermore, although the correlation weakens as the lag increases, the autocorrelation

at lag 30 (0.1) remains positive. This suggests a weak positive correlation between the current value of the JOR variable and its value from a significantly earlier time period (lag 30).

4.4. Interpretation of the Best Panel Regression Model

The best panel regression model is the Fixed Effect Model (FEM) (7).

$$LOGMigration_{it} = 0.115312421287 + 0.485936336949MWG_{it} + 0.0067594700899EG_{it} + 0.00661838024521JOR_{it} + e_{it} \quad (2)$$

The results of the linear regression on the panel data above indicate that the constant has a positive value of 0.115312421287. This means that if the Minimum Wage of districts or cities, Economic Growth, and Employment Opportunity Rate are constant, then the inflow migration of highly educated labor to industrial areas in districts or cities will increase by 0.115312421287 percent.

The coefficient of the minimum wage of districts and cities (UMK) is 0.485936336949. This means that if the Minimum Wage in districts or cities increases by 1 percent, the average inflow migration of highly educated labor to industrial areas in districts or cities will increase by approximately 0.485936336949 percent, with other variables held constant. The coefficient of Economic Growth (PE) is 0.0067594700899. This implies that if Economic Growth increases by 1 percent, the average inflow migration of highly educated labor to industrial areas in districts or cities will increase by approximately 0.0067594700899 percent, with other variables held constant. The coefficient of the Employment Opportunity Rate (TKK) is 0.00661838024521.

4.5. Significance Test

4.5.1. Coefficient of Determination

Based on the coefficient of determination test, we obtained an adjusted R2 value of 0.936933. This indicates that approximately 93.6933 percent of the variation in the inflow migration of highly educated labor to industrial areas in districts or cities is influenced by the Minimum Wage of districts or cities, Economic Growth, and the employment opportunity rate. Meanwhile, approximately 6.3067 percent of the variation in the inflow migration of highly educated labor to industrial areas in districts or cities is influenced by other factors not examined in this study.

4.5.2. F Test

The simultaneous test is conducted to determine whether at least one independent variable has a significant effect on the dependent variable. Based on the F test statistics, we obtained an $F_{hitung} = 43.52970$, which is greater than the critical value. The P-value is 0.0000, which is less than 0.05. Therefore, we can conclude that we reject the null hypothesis, indicating that at least one predictor variable has a significant effect on the dependent variable. Hence, with a confidence level of 95%, the dependent variables collectively have a significant influence on the dependent variable.

4.5.3. t Test

The results of the partial test are presented in the following table:

Table 5. Partial Significance Test Results (t-test)

Variable	t-value	P-value
Minimum Wage for Regencies/Districts	2.237422	0.0276*
Economic Growth	2.614174	0.0104*
Employment Opportunity Rate	0.239511	0.8112

In the above table, the predictor variables that have a significant effect on the response variable in this study at a significance level of 5% are the minimum wage of districts or cities and Economic Growth, indicated by *. However, the Employment Opportunity Rate variable does not have a significant effect.

The Minimum Wage in districts and cities (MWG) has a t-value of 2.237422, and the probability value for the Minimum Wage in districts and cities (UMK) is 0.0276 < alpha 0.05. With the t-test result indicating a positive and significant effect, it can be concluded that the Minimum Wage in districts and cities has a significant individual (partial) influence on the inflow of highly educated labor migration to industrial districts and city areas in Indonesia. Therefore, any increase in the Minimum Wage in districts and cities will result in an increase in the inflow of highly educated labor migration to industrial districts or city areas in Indonesia.

Economic Growth (EG) has a t-value of 2.614174, and the probability value for economic growth (PE) is 0.0104 < alpha 0.05. With the t-test result showing a positive and significant effect, it can be concluded that Economic Growth has a significant individual (partial) influence on the inflow of highly educated labor migration to industrial districts and city areas in Indonesia. Therefore, any increase in economic growth will result in an increase in the inflow of highly educated labor migration to industrial districts and city areas in Indonesia.

The Job Opportunity Rate (JOR) has a t-value of 0.239511, and the probability value for the Job Opportunity Rate (TKK) is 0.8112 < alpha 0.05. This means that although the job opportunity rate in the industrial districts and city areas is increasing, it is not significantly influencing the decision of highly educated labor to migrate to those areas.

5. Discussion

a. Minimum Wage in the District or City and the Decision to Migrate

Based on the conducted tests, it has been found that the Minimum Wage in a district or city has a positive and

significant influence on the inflow of highly educated labor migration to industrial districts or city areas in Indonesia. This finding is supported by Everett S. Lee's migration theory. In that theory, Everett S. Lee states that one of the factors attracting migration is the presence of higher wages in the destination area. This aligns with David Ricardo's wage theory, which suggests that labor with higher skills and qualifications is less affected by minimum wages because they possess rare skills that are in demand in the labor market. They are likely to seek employment in areas with higher minimum wages, especially if their place of origin has lower minimum wages.

This research is supported by previous studies, namely [26], [41], [44], and Tarigan (2017), where the results showed that wages have a positive and significant influence on the in-migration of highly educated populations, especially in the industrial and service sectors that require specific qualifications and skills. The research findings also indicate that factors such as education level, gender, and age also affect the migration of highly educated workers to industrial areas. Additionally, the research findings show that there are differences in the impact of minimum wages on the migration of highly educated workers among regions in Indonesia. Other factors, such as immigration policies and industrial development, also need to be considered in understanding the influence of minimum wages on the migration of highly educated workers to industrial areas. This is consistent with Todaro's theory that wage levels differ between the place of origin and the destination. Immigrants estimate that the projected income in the destination area will be higher. The most important factors influencing migrants are the difficulty of obtaining opportunities in their place of origin and the potential for better income at their destination.

The field conditions are also supported by the National Labor Force Survey Data from February 2021, which shows that 49.67 percent of workers are still paid below the minimum wage. Almost half of the total workforce in Indonesia is paid below the standard. Out of 34 provinces, there are 11 provinces where the average real net wages are below the minimum wage. The increase in the minimum wage in industrial districts and city areas can have complex implications for highly educated migrants. On the one hand, the increase in the minimum wage can benefit highly educated migrants, as they may be able to earn higher wages and reduce the likelihood of low-wage exploitation. However, on the other hand, the increase in the minimum wage can also affect the competitiveness of industrial areas in those districts or cities, as companies in those areas may feel burdened by higher labor costs, potentially reducing investment and opening up new job opportunities. This can reduce job prospects for highly educated migrants. Additionally, highly educated migrants seeking employment in industrial areas may face challenges in competing with local workers who may have broader work experience and stronger connections with companies in those areas. This can diminish employment opportunities for highly educated migrants.

The current labor market conditions, based on the data obtained in this study, show that there is an increase in real wages in each of the 49 districts and cities included in the industrial areas every year. According to the report from the Central Bureau of Statistics (BPS), there is a positive correlation between education level and workers' wages, where higher education tends to result in higher wages. Workers with higher education degrees have higher average wages compared to other groups of workers. Conversely, workers with an elementary school education or below tend to receive lower wages. In 2021, the average wage of workers was IDR 2.74 million per month, which experienced a slight decrease compared to around IDR 2.76 million per month in 2020. However, when comparing based on education level, workers with higher education degrees have higher average wages, around IDR 3.99 million per month. This figure also experienced a decrease compared to the previous year, 2020, which was around IDR 4.1 million per month. Workers with elementary school education or below still receive the lowest wages, around IDR 1.65 million per month, with no change compared to the previous year. Meanwhile, workers with high school education have average wages ranging from IDR 2.62 million to IDR 2.69 million per month. Efforts need to be made to ensure decent employment with high wages for the entire population. In this regard, the role of the government is crucial. This aligns with the International Labour Organization's (ILO) campaign to advocate for decent work for all worldwide to ensure their livelihoods.

b. Economic Growth's Impact on Migration Decision

Based on the results of the analysis conducted, it is found that economic growth has a positive and significant influence on the decision of individuals with higher education to migrate to industrial districts or cities in Indonesia. This finding is supported by the migration theory of Everett S. Lee. The theory suggests that high economic growth in a region attracts highly educated labor migration to that region, particularly to cities or districts with industrial areas. The theory also explains that high economic growth in a region stimulates the development of industrial and business sectors that require a highly educated workforce, such as engineers, doctors, lawyers, and others. This research finding is also supported by Ravenstein's theory, which states that high economic growth in a new area attracts highly educated labor migration to that area. This is due to better job opportunities and higher wages in the region. Additionally, this is consistent with the theories presented by Vernon Ruttan, Michael Porter, and Paul Romer, known as the "Spillover Effect." These theories suggest that the presence of highly educated individuals in an area can enhance productivity and innovation in that area, indirectly contributing to positive economic growth in the surrounding region. In the economic context, spillover effects can occur in various aspects such as technology, innovation, knowledge, skills, and social influence. For example, if an area has innovative and

thriving industries, the companies in the vicinity can benefit from the technology and knowledge developed by those companies, which can enhance productivity and the quality of the workforce in that area and drive growth in related economic sectors.

This research is supported by previous studies, namely studies [38], [42], [16], and [49], where it was found that economic growth has a positive and significant influence on the in-migration of a highly educated workforce to districts or cities in industrial areas. Additionally, other factors such as infrastructure, population growth, and investment also have a significant influence on economic growth in those areas. This research also found the existence of spillover effects from districts or cities with high levels of migration of highly educated individuals to other districts or cities. This indicates that high-education migration can bring benefits to the receiving areas, as it leads to an improvement in the quality of human resources and increased investment in those regions.

The findings of this study align with the current situation, where Java Island has the highest population of migrant workers in Indonesia, accounting for 50.1 percent of the total lifetime migrants and 55.2 percent of the current migrants residing on Java Island. The Riau Islands (5.3%), Kalimantan Utara (4.8%), West Papua (4.1%), and DKI Jakarta (3.6%) are the five provinces in Indonesia with the highest percentage of incoming migrants in 2021, respectively. Additionally, the percentage of the Indonesian population based on the highest level of education attained experienced a slight decrease from 3.3 percent to 3.1 percent compared to the previous year. This census data is consistent with the findings and theories that lower education levels are associated with reduced migration rates, while higher education levels are correlated with higher migration rates. This is because individuals with higher education have the ability to obtain better job opportunities, which encourages them to migrate. The chosen destination areas are usually places that offer higher incomes based on their skills. Education has a significant impact on development, as it plays a role in transforming the lives of the poor by instilling skills, independence, and self-confidence. Higher education has a strong relationship with migration, as it influences people's perceptions of migration as a means to attain better income in more developed areas (Brockerhoff & Eu, 1993; Ikramullah, Shair, & Rehman, 2011).

The findings of this research are also consistent with real-world conditions, as seen from the available data in this study, where each district or city has different levels of economic growth. The achievement of high economic growth is closely related to the influx of highly skilled migrant workers into those areas, which has an impact on improving the quality of the workforce and can stimulate increased productivity and efficiency in sectors that require highly skilled labor. Increased investment by foreign companies that require highly skilled labor tends to choose to invest in countries that have an adequate labor supply. For example, the industrial areas in West Java, starting from Cikarang, Bekasi, and Karawang, have generated millions of job opportunities and achieved economic growth above 15 percent over the past 30 years. To this day, West Java remains the largest contributor to Indonesia's Gross Domestic Product (GDP) growth in terms of manufacturing. The transfer of knowledge and technology by migrants from more developed areas, who generally possess advanced knowledge and technology, can contribute to enhancing innovation and productivity in specific sectors in the districts or areas. This will lead to the emergence of spillover effects and trigger improvements in human resource quality in those areas, which, in turn, can enhance productivity and economic growth in the region. This is also in line with the virtuous circle theory, which suggests that developing industrial areas can create a virtuous circle where economic growth and employment opportunities mutually reinforce each other. Strong economic growth can attract investment and create new job opportunities, which, in turn, can increase the purchasing power of the population and further drive economic growth.

c. The Employment Opportunities Rate of Districts and Cities towards Migration Decisions

Based on the results of the test, it was found that the level of job opportunities has a positive but non-significant influence on the decision of individuals with higher education to migrate to industrial districts or cities in Indonesia. These findings do not align with the theories presented by E.G. Ravenstein or the Job Access Theory proposed by John F. Kain and John M. Quigley.

However, the findings of this research are supported by previous studies, such as those conducted by Jati and Pratiwi (2018), Nugroho and Yuliani (2020), [35] [50], where it was found that there is a positive but not significant relationship between job opportunities and the in-migration of highly educated workforce. Furthermore, the results of this research indicate that other factors such as the need for a better quality of life, an improved environment, the availability of infrastructure, and regional economic stability have a greater influence on the in-migration of highly educated workers to industrial areas.

Todaro's migration theory reveals the phenomenon of being trapped," where individuals who have migrated to large cities or specific industrial areas do not always find good job opportunities or higher wages. This can occur due to the high competition in the labor market of these large cities or industrial areas, making it difficult for incoming workers to find employment that matches their qualifications and experience.

The Central Statistics Agency's (BPS) data showing a high influx of highly educated migrant workers to industrial areas in various districts and cities provide evidence that the study's findings are consistent with the current field conditions. In fact, there has been an increase in this trend over the years. Several industrial areas in Indonesia, such as Cikarang Industrial Estate, Karawang Industrial Estate, Gresik Industrial Estate, and Batam Industrial Estate, offer

promising job opportunities for highly educated workers. These industrial sectors include automotive, electronics, pharmaceuticals, food and beverages, and various other industries. Data from the Ministry of Industry in 2021 shows that there are more than 4,300 companies operating in industrial areas throughout Indonesia, with a total investment of IDR 342 trillion and employing approximately 3.6 million workers. Therefore, based on the data used in this study, it can be concluded that industrial areas in Indonesia have the potential to absorb highly educated workers and make a significant contribution to the country's economy. This is also in line with the human capital theory, which suggests that the migration of highly educated individuals can enhance the quality of human resources in industrial areas. Highly educated human resources bring new skills and knowledge that can help improve productivity and innovation in industrial areas.

The employment rate refers to the opportunities for individuals to obtain jobs. Based on the data from this study, it is evident that the employment rate in industrial areas of districts and cities is very high. The highest employment rates are found in Semarang District at 97.42%, Bantul District at 95.93%, and Mojokerto District at 96.17%. According to the report from the Central Statistics Agency (BPS), the total labor force in Indonesia reached 138.2 million people in 2021. The majority, or 32%, of the labor force in Indonesia, has completed their secondary education (Sekolah Menengah Atas). In terms of educational background, the workforce in industrial areas is predominantly composed of high school graduates or equivalent, accounting for 51.11% of the workforce. Meanwhile, only 14.92% of the workforce has completed tertiary education. Additionally, 33.97% of the workforce has completed education up to junior high school or lower. The low presence of highly educated workers in industrial areas can be attributed to several factors. Apart from the difference in the number of graduates across educational levels, the availability of job openings is also skewed towards high school graduates or equivalents. Furthermore, the salary for workers with a high school education or equivalent is lower compared to college graduates. This becomes a consideration for companies aiming to reduce labor costs, especially for positions that require basic skills or entry-level jobs.

6. Conclusions

Based on the research results analyzing panel data regression on the factors influencing the migration of highly educated workers to industrial areas in Indonesia, the following conclusions can be drawn:

1. The minimum wage in regencies and cities has proven to attract the migration of highly educated workers to industrial areas in Indonesia.
2. Economic growth has proven to attract the migration of highly educated workers to industrial areas in Indonesia.
3. The employment rate has not proven to attract the migration of highly educated workers to industrial areas in Indonesia.

Based on the research results, the researcher recommends several suggestions for further research to obtain more comprehensive results, namely: First, involve stakeholders in industrial areas, such as companies, labor unions, local governments, and research institutions, in decision-making processes. Constructive discussions and dialogues can help understand the perspectives of various parties related to minimum wage increases and find a balance between worker protection and business sustainability. Second, integrating sustainability principles into the development of industrial areas to ensure sustainable economic growth Considering environmental impacts, natural resource management, and ecosystem protection can help maintain a balance between economic growth and environmental sustainability. Third, expanding job opportunities in areas outside industrial regions and cities to reduce the inclination of individuals to migrate This can be done by improving accessibility and infrastructure, such as increasing investment in non-manufacturing sectors (tourism, agriculture, fisheries, and other service sectors) and strengthening the informal sector (cooperatives and SMEs).

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