

# EDUCATED UNEMPLOYMENT IN WEST SUMATERA: DETERMINANTS DURING THE DEMOGRAPHIC BONUS PERIOD 2020-2024

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## ABSTRACT

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Indonesia has experienced a demographic bonus since 2012 and West Sumatera Province was among the earliest provinces to enter this phase. West Sumatera is expected to exit the demographic bonus in 2030, with its dependency ratio approaching 50. However, its workforce potential has not been optimally utilized, as reflected in the high level of open unemployment, especially among high school graduates or equivalent. This study aims to examine the unemployment rate of educated people of productive age in West Sumatera Province. Secondary data comes from the West Sumatera BPS for 2020-2024. The analysis uses a panel data regression approach. The model used was the Fixed Effect Model (FEM) with E-views software. The analysis showed that increases in the population dependency ratio, the contribution of the agricultural sector, the informal sector, and economic growth significantly reduced the educated unemployment rate. Conversely, the contribution of the industrial sector and wage increases actually increased educated unemployment. This study recommends that the government expand labor-intensive industries, provide skills training for graduates, and develop institutions for millennial farmers by strengthening agro-industrial areas capable of creating new jobs.

## Introduction

The demographic bonus is a strategic factor influencing the direction of national economic development policies (Wulandari Manik, Natasya Boru Giting, Aini, Salsabila, & Hidayat, 2025). This phenomenon reflects a demographic condition in which the proportion of the working-age population is significantly larger than that of the non-working-age population, creating a window of opportunity to accelerate economic growth through increased productivity and labor supply. Since 2012, Indonesia has experienced a demographic bonus, and West Sumatera Province was among the regions that entered this phase relatively early. However, this opportunity is not permanent, as West Sumatera Province is projected to exit the demographic bonus period by 2030 (Suwandana, Ruslan, & Asikin, 2025).

One important indicator that reflects the extent to which the demographic bonus can be utilized is the dependency ratio (Central Statistics Agency of West Sumatera Province, 2023). Based on Indonesia's population projections for 2020–2050, the dependency ratio of West Sumatera Province in 2025 reached 47.57, an increase of 0.48 points compared to 2020. This figure implies that every 100 individuals of productive age must support approximately 47 individuals of non-

productive age (BPS West Sumatra Province, 2023). Although this ratio still indicates a favorable demographic structure, the upward trend suggests that the window of opportunity is gradually narrowing. Therefore, optimizing labor market conditions becomes crucial to ensure that the demographic bonus translates into tangible economic benefits rather than becoming a demographic burden.

A large proportion of the working-age population has strong potential to drive economic growth, particularly when supported by well-managed human resources and effective labor market absorption. The successful utilization of the demographic bonus depends not only on demographic structure but also on employment conditions. Failure to capitalize on this opportunity may instead generate new economic challenges, particularly rising unemployment among the productive-age population (Thakur, 2012).

In the case of West Sumatra Province, the increasing dependency ratio indicates that the window of opportunity to optimally utilize the demographic bonus is becoming more limited. However, labor market dynamics in the region have not yet reflected the optimal use of this demographic advantage. Based on data from the Central Statistics Agency (BPS), the Labor Force Participation Rate (TPAK) reached 70.28 percent in August 2024, indicating a relatively high level of participation among the working-age population. Nevertheless, the Open Unemployment Rate (TPT) remained high at 5.75 percent in 2024, the highest among provinces on Sumatra Island. This condition highlights a structural imbalance in the labor market, where the high supply of labor is not matched by sufficient job creation, ultimately leading to persistent unemployment. Amid the demographic bonus momentum, West Sumatra also faces a critical challenge related to the low absorption of educated workers. A significant proportion of the unemployed population consists of senior high school and university graduates, categorized as educated unemployment (Central Statistics Agency of West Sumatra Province, 2023). This phenomenon reflects deeper structural issues, particularly the mismatch between educational outcomes and labor market needs. Paramitasari (2024) identified job–education mismatch as a key determinant of educated unemployment in Indonesia. Similarly, Yonanda (2023) found that the lack of work experience among fresh graduates contributes to horizontal mismatch, making them less competitive in the recruitment process and increasing their risk of unemployment.

Furthermore, structural changes in the labor market during the 2020–2024 period show that employment in West Sumatra has become increasingly dominated by the informal sector, accounting for more than 60 percent of total employment. This trend contrasts with government policies that prioritize the expansion of the formal sector to enhance economic competitiveness (Zeid, Alrayess, Ajwad, Soyta, & Rivera, 2024). The expansion of the informal sector has played a significant role in absorbing labor, particularly among young workers, although it is generally characterized by low productivity and limited job security (Maryati, Handra, & Muslim, 2021). The dominance of the informal sector is closely related to the economic structure of West Sumatra Province. Based on Gross Regional Domestic Product (GRDP) data at current prices, the agricultural sector contributed 21.94 percent to total GRDP in 2024, while the manufacturing sector accounted for only 8.28 percent.

This indicates that the regional economy is still heavily reliant on the agricultural sector, while industrial development remains relatively limited. According to Yustika (2000), a region can be considered to have entered the industrialization phase when the industrial sector plays a dominant role in driving economic growth. In line with this, Todaro & Smith (2015) explain that structural transformation involves a shift from agricultural to non-agricultural sectors, particularly manufacturing. The relatively low contribution of the industrial sector in West Sumatra suggests that the process of structural transformation is still incomplete.

Although the demographic structure of West Sumatra is dominated by the productive-age population, which theoretically provides a strong foundation for economic growth, the existing employment structure does not fully support this potential. The continued dominance of the agricultural and informal sectors, both of which are typically associated with lower productivity, indicates that job creation has not kept pace with the growing number of job seekers. As a result,

competition in the labor market has intensified, particularly among educated young individuals, leading to an increase in educated unemployment. This condition implies that the demographic bonus has not yet been translated into optimal economic gains. Therefore, strategic efforts are required to accelerate structural transformation toward more productive sectors, particularly labor-intensive industries, to ensure that the demographic bonus can be effectively utilized as a driver of regional economic development.

Previous studies have identified various determinants of educated unemployment. Baah-Boateng (2016) found that improvements in the agricultural and manufacturing sectors contribute to reducing educated unemployment. Guritno and Muljaningsih (2024) showed that minimum wage policies influence the level of educated unemployment, while Rahmania et al. (2019) found that economic growth reduces unemployment, although wage increases may have the opposite effect. In addition, Satriawan (2023) emphasized the role of the informal sector as a temporary buffer in reducing unemployment. However, most of these studies focus primarily on economic variables and have not explicitly incorporated demographic indicators, particularly the dependency ratio, as a key determinant in explaining educated unemployment.

This study differs from previous research, particularly Maryati et al. (2021), which adopted a demographic approach but used employment as the dependent variable. In contrast, this study focuses specifically on the open unemployment rate among educated individuals of productive age as the dependent variable. Therefore, this study aims to examine the influence of the demographic bonus, industrialization, wages, the informal sector, and economic growth on the unemployment rate of educated productive-age individuals in West Sumatra Province during the 2020–2024 period. The findings are expected to contribute to the literature by integrating demographic and economic perspectives, as well as providing policy-relevant insights for improving labor market outcomes at the regional level.

## Literature Review

### Educated Unemployment

Unemployment is a problem that has a negative impact on the economy and society (Sukirno, 2006:04). The relationship between wage levels and the number of workers needed by companies is known as labor demand. Therefore, labor demand can be defined as the number of workers needed by an employer at a given wage level over a specific period (Sholeh, 2007).

One-third of unemployed people, especially young people, have to wait approximately one year to enter the workforce, particularly in the formal sector (Allen, 2016). These individuals are known as "choosy educated seekers." Pratomo (2017) explains that high school/vocational high school/equivalent graduates differ from college graduates.

Educated unemployment occurs when individuals with secondary or higher education are not absorbed into the labor market despite being in the labor force. This phenomenon is often associated with an imbalance between educational output and labor market demand (Todaro & Smith, 2015). Several studies have shown that increasing education levels are not always accompanied by corresponding increases in job opportunities, especially in regions whose economic structures are not yet able to absorb a highly educated workforce (Psacharopoulos & Patrinos, 2018).

In Indonesia, educated unemployment has become a prominent issue as the number of secondary and tertiary education graduate increases. Research by the Statistics Indonesia (BPS) (2023) shows that the open unemployment rate for high school and university graduates is relatively higher than for primary education graduates.

### Demographic Bonus and the Workforce

In the concept of population economics, the demographic bonus is also interpreted as an economic benefit because the larger the productive-age population, the greater the savings of the productive population, which can spur investment and economic growth.

The demographic bonus is characterized by an increase in the proportion of the productive-age population, which theoretically can drive economic growth by increasing the workforce and productivity (Bloom, Canning, & Sevilla, 2003). However, the benefits of the demographic bonus depend heavily on the economy's ability to create adequate and high-quality jobs (Mason & Lee, 2011).

Indonesia's demographic dividend needs to be optimally utilized by improving the quality of human resources to drive economic growth. Entrepreneurship education plays a crucial role in preparing the younger generation to create jobs, thus creating an opportunity for economic progress through the emergence of more young entrepreneurs (Sawitri & Widarini, 2025).

## Method

This study uses the open unemployment rate of educated people of productive age as the dependent variable. Independent variables include the demographic bonus, industrialization, wages, the informal sector, and economic growth. All data comes from the Central Statistics Agency (BPS) of West Sumatra Province, specifically from the official BPS website and the 2020-2035 Population Projection publication of West Sumatra Province. The study covered 18 regencies/cities in West Sumatra Province from 2020 to 2024.

This study uses descriptive analysis to describe the development of educated unemployment among productive-age students and the dynamics of the variables influencing it in West Sumatra Province. Furthermore, this study applies panel data regression analysis to examine the influence of the dependency ratio, the contribution of the agricultural sector, the industrial sector, the informal sector, wages, and economic growth on the open unemployment rate of educated students of productive age in 18 regencies/cities in West Sumatra Province during the 2020–2024 period. Panel data regression is a combination of cross-sectional and time-series data (Baltagi, 2005). This study utilizes panel data from 18 regencies/cities in West Sumatra Province, comprising both cross-sectional and time-series data for five years, 2020–2024.

There are three approaches that can be applied to estimating panel data regression parameters: The Common Effects Model (CEM), the Fixed Effects Model (FEM), and the Random Effects Model (REM).

The panel data regression equation used is as follows.

$$PTTMit = \alpha + \beta_1 RKPit + \beta_2 INDit + \beta_3 TANIit + \beta_4 UPAHit + \beta_5 PEit + \beta_6 SIit + uit \quad (1)$$

where:

*PTTMit* = Open unemployment rate for educated young people in the district/city

*RKPit* = Population dependency ratio in the district/city

*INDit* = GRDP in the industrial sector of the district/city

*TANIit* = GRDP in the agricultural sector of the district/city

*UPAHit* = Average wage level of workers in the district/city

*PEit* = Economic growth in the district/city

*SIit* = Informal sector in the district/city

*i* = districts/cities in Indonesia, *i* = 1,2,3, ..., 18

*t* = research period, *t* = 2020-2024

*it* = composite residual of district/city *i* in year *t*

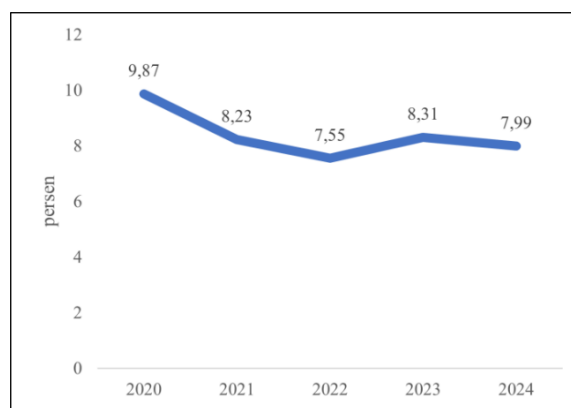
## Results and Discussion

### 1. Profile of Educated Unemployment Among Working-Age Persons in West Sumatra 2020-2024

The Open Unemployment Rate (TPT) is defined as the percentage of unemployed people compared to the total labor force and is an important indicator for measuring an economy's ability to provide jobs. One important aspect of analyzing the TPT is differentiating unemployment based on education level.

In this study, unemployment is categorized into two groups: unemployment among junior high school (SMP) and elementary school (SD) graduates and below, and unemployment among high school (SMA) graduates and above. This classification can reflect the level of disparity in labor absorption between educational groups.

In this context, educated unemployment refers to individuals with at least a high school education who are in the labor force but are not yet employed or are still seeking work (Mankiw, 2007). Generally, educated unemployment consists of recent graduates who are waiting for job opportunities that match their qualifications and expectations (Mulyono, 1997). This educated unemployment situation is a major concern in employment analysis, as shown in Figure 1.



Source: BPS (calculated)

Figure 1. Unemployment Rate of Educated Workers in West Sumatra Province Aged 15-64 Years 2020-2024

Figure 1 shows that the unemployment rate among educated working-age individuals fluctuated considerably during the 2020-2024 period. In 2020, there was a significant spike due to the COVID-19 pandemic. During the COVID-19 pandemic, various economic activities outside the home were restricted to minimize physical contact and prevent the spread of COVID-19. The government also implemented large-scale social restrictions (PSBB) in several regions. The socioeconomic conditions of the community were significantly impacted, resulting in numerous layoffs and reduced income (Ngadi, Meliana, & Purba, 2020). Following the post-COVID-19 economic recovery, the educated unemployment rate has tended to return to control, although it may increase in 2023. The increase in educated graduate unemployment is due to the failure of the workforce to be absorbed by the business world due to the job qualification requirements required by companies (Guritno & Muljaningsih, 2024). This has resulted in an increased time required for the workforce to find jobs that match their qualifications, leading to temporary unemployment.

Gross Regional Domestic Product (GRDP) at current prices for the industrial sector increased from 2020 to 2024. In 2020, the GRDP value of the industrial sector was IDR 20,907.53 billion and continued to increase to IDR 27,873.22 billion in 2024. Although nominal growth has occurred in the industrial sector, its contribution to total GRDP shows a downward trend. The industrial sector's contribution is dominated by the food and beverage industry, the textile and clothing industry, and

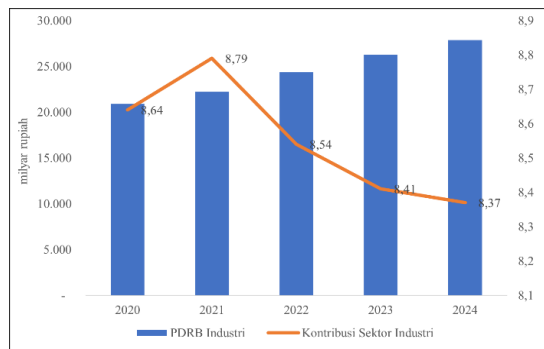


Figure 2. Gross Regional Domestic Product at current prices for the industrial sector 2020-2024

the non-metallic mining industry. The manufacturing industry is one of the leading sectors of the economy, spurring growth in other sectors. The manufacturing sector plays a crucial role in job creation due to its high labor demand, thereby improving community welfare (Pratiwi et al., 2023).

## 2. Determinants of Educated Unemployment in West Sumatera

The best model was selected using the Chow and Hausman tests (Table 1). The best model was the Fixed Effects Model (FEM). Based on the selected model, a residual variance-covariance structure test was performed, indicating a cross-sectional correlation. Therefore, Seemingly Unrelated Regression (SUR) was used, which accommodates the assumptions of homoscedasticity and non-autocorrelation (Greene, 2012).

Table 1. model selection output summary

Keterangan	Uji <i>Chow</i>	Uji <i>Hausman</i>	Uji LM	Uji $\lambda$ LM
Statistik Uji	6,3715	26.2490	44,0080	183,6228
Nilai Kritis	$F(0,05;17,66)$ =1,9134	$\chi^2(0,05;6)$ =12,592	$\chi^2(0,05;17)$ =27,587	$\chi^2(0,05;153)$ =181,398
p-value	0.0000*	0.0002*	0.0354*	0.0000*
Keputusan	Tolak $H_0$	Tolak $H_0$	Tolak $H_0$	Tolak $H_0$

Source: Eviews 12

The resulting model meets the assumptions of normality and non-multicollinearity. The R-square value is 0.8962, meaning that 89.62 percent of the unemployment rate among educated people of productive age in West Sumatera Province can be explained by the independent variables used in the model, while the remainder is explained by other variables or factors not included in the model. The dependency ratio, industrial sector GRDP, agricultural sector GRDP, average worker wages, economic growth, and the informal sector significantly influence the unemployment rate among educated people of productive age in Indonesia from 2020 to 2024. Population growth, particularly among the working-age group, directly impacts labor market dynamics. A surge in the workforce without a corresponding increase in job opportunities will lead to an imbalance between labor supply and demand (Junaidi & Zulfanetti, 2016). This situation risks creating an unavailable labor force, leading to an increase in open unemployment. In this study, the population is described

using the dependency ratio, which also reflects the demographic dividend phenomenon. The dependency ratio variable has a negative and significant effect on the educated unemployment rate, with a coefficient of -0.7315.

This indicates that the higher the burden of the non-productive population on the productive-age population, the lower the educated unemployment rate tends to be. Increasing economic pressures within households (for example, an increase in the number of dependent family members) will encourage educated graduates to enter the job market quickly to help meet family needs. In this situation, graduates no longer wait for the ideal job but tend to be more open to various types of employment, including in the informal sector, temporary work, or jobs that do not fully match their educational background.

This finding aligns with Satriawan (2023), who stated that young graduates often take temporary jobs as an adaptive strategy while waiting for more suitable job opportunities. Therefore, an increasing dependency ratio can accelerate the transition of educated graduates into the workforce and reduce the educated unemployment rate.

Table 2. Statistical summary of the fixed effects model using seemingly unrelated regression

Variabel	Koefisien	Standard Error	t-statistic	p-value
C	20,4093	24,9195	0,8190	0,4157
RKP	-0,7315	0,2403	-3,0436	0,0034*
IND	0,9804	0,3853	2,5441	0,0133*
TANI	-1,5740	0,2472	-6,3667	0,0000*
UPAH	3,7574	1,1571	3,2471	0,0018*
PE	-0,5571	0,0465	-11,9605	0,0000*
SI	-0,0986	0,0238	-4,1360	0,0001*
<i>R-squared</i>	0,8962		<i>F-statistic</i>	24,7993
<i>Adjusted R-squared</i>	0,8601		<i>Prob (F-statistic)</i>	0,0000

\*) Significance at the 5 percent level

Source: Eviews version 12

Structural change is characterized by a shift in the economic structure in West Sumatra. This is characterized by a shift from the agricultural sector to the industrial sector. Interestingly, different results are shown for the industrial sector contribution variable, which has a direct relationship with educated unemployment, with a coefficient of 0.9804. This means that the increasing role of the industrial sector in West Sumatra is actually accompanied by an increase in the educated unemployment rate of productive-age workers. This finding indicates that the industrial sector in this region has not been able to optimally absorb the educated workforce. One reason is the industrial sector's character, which is still dominated by capital-intensive, rather than labor-intensive, industries. As a result, although industrial output has increased, the demand for labor, especially educated labor, has not experienced a comparable increase.

Furthermore, SMEs in West Sumatra also face technical challenges, such as low production efficiency, high dependence on capital and raw materials, and a relatively small labor contribution to output. This reinforces the indication that the industrial sector in West Sumatra has not been able to become the primary driver of educated labor absorption (Agustin & Satrianto, 2024). This finding aligns with Marelli, Signorelli, & Tyrowicz (2012), Tomic (2018), and Putri & Suhartini (2024), which show that an increase in the industrial sector's contribution is in line with an increase in the unemployment rate. Meanwhile, the agricultural sector's contribution significantly impacts the unemployment rate of educated workers of productive age. 1 percent increase in the agricultural sector's contribution will reduce the educated unemployment rate of productive age workers by 1.5740 percent, assuming other variables remain constant.

Veriyanto (2022) found that the agricultural sector is a leading and strategic sector for the economy of West Sumatra Province and significantly influences labor absorption in the region. This finding aligns with Suparman, Sutomo, Anwar, & Olilingo (2024), who stated that increasing the contribution of the agricultural sector plays a significant role in reducing the open unemployment rate in Indonesia. This study, using a panel data regression model, found that increasing the agricultural sector's GRDP and the farmer's exchange rate contributed to the unemployment rate decline. This is in line with research by Satriawan (2023), which shows that the agricultural sector serves as a temporary transitional space for educated workers who have not yet been absorbed into the formal sector. The agricultural sector serves as a temporary solution while waiting for job opportunities that match their education.

This study shows that the informal sector plays a role in reducing the educated unemployment rate among the productive-age group, with a regression coefficient of -0.0986. This means that as the informal sector increases, the educated unemployment rate among the productive-age group tends to decrease by 0.0986 percent, assuming other variables remain constant. This finding reinforces the view expressed by Knox, Bressers, Mohlakoana, & De Groot (2019), that the informal sector significantly influences unemployment. The informal sector serves as a temporary employment option for individuals awaiting employment opportunities in the formal sector.

Wage variables have an impact on the increase in the educated unemployment rate among the productive-age group. Based on estimates, every 1 percent increase in wages will lead to an increase in the educated unemployment rate of the productive-age group by 3.7574 percent, assuming other variables remain constant. This finding indicates that wage increases do not necessarily encourage the absorption of educated labor, especially if they are not accompanied by increases in labor productivity or efficiency. According to Sukirno (2005), wage increases will increase labor costs. Wage increases tend to increase company costs, which in turn encourages companies to reduce their workforce. Wage increases generally result in higher operational costs, thus encouraging companies to reduce their workforce. In line with Mankiw's (2007) theory, increasing the minimum wage encourages companies to increase requirements in the employee selection process.

Consequently, new graduates without work experience are at risk of unemployment. This research finding aligns with Guritno & Muljaningsih (2024), who stated that minimum wage increases have an impact on increasing educated unemployment in West Java. This is in line with research by Depi, Yulmardi, & Hardiani (2020), which found that wage increases will lead to an increase in the educated unemployment rate in Muaro Jambi Regency. Kim & Lim (2018) found that minimum wage increases can reduce labor demand and contribute to increased unemployment.

The economic growth variable is associated with a decrease in the unemployment rate among educated people of productive age, with a regression coefficient of -0.5571. This means that a 1 percent increase in wages will result in a 0.5571 percent decrease in the unemployment rate among educated people of productive age, assuming other variables remain constant. This is consistent with research by Rahmania et al. (2019), which found that increased economic growth in Padang City will reduce educated unemployment. This finding aligns with research by Kilishi & Adebowale (2020), who found that increased economic growth leads to a decrease in the unemployment rate in the short term, while the long-term decline in unemployment tends to be influenced by economic institutions.

This is in line with research by Hong, Thi, Ha, & Ngoc (2014) and Kitov, Dynamics, & Kitov (2020), which found that accelerated economic growth has a direct impact on reducing unemployment, accompanied by supporting policies such as maintaining macroeconomic stability and encouraging investment in labor-intensive sectors.

Fixed-effect models assume differences in characteristics between individuals (Gujarati & Porter, 2009). The individual effects included in the error component are assumed to be constant over time and not directly measured in the model. Consequently, each individual will have a different intercept while the slope remains the same. Individual differences indicate comparable

inter-object heterogeneity. The highest individual effect is found in Pasaman Regency, at 44.8228. This means that, if the independent variables in the model are assumed constant, Pasaman Regency has the highest unemployment rate among educated people of productive age in West Sumatra Province.

## Conclusion

Based on the results and discussion in this study, several conclusions were drawn. The first conclusion is that the unemployment rate of educated people of productive age in West Sumatra fluctuated from 2020 to 2024. Meanwhile, the GRDP in the agricultural sector and wages experienced an upward trend from 2020 to 2024. Meanwhile, the dependency ratio, GRDP in the industrial sector, and the informal sector showed a downward trend from 2020 to 2024. The analysis shows that the increase in the population dependency ratio, the contribution of the agricultural sector, the informal sector, and economic growth significantly reduced the educated unemployment rate.

Conversely, the contribution of the industrial sector and increasing wages actually drove an increase in educated unemployment. This study is limited in its analysis area coverage because it only covers 18 regencies/cities in West Sumatra Province. Mentawai Islands Regency was not included in the estimation due to its relatively high Relative Standard Error (RSE) value for the educated unemployment variable of productive age, potentially biasing and unrepresentatively. Several recommendations from this research are:

1. Regional governments need to optimize the demographic dividend by expanding job transition training programs for new graduates, enabling educated graduates to quickly enter the job market and reduce unemployment.
2. Regional governments need to reorient industrial policies toward developing labor-intensive sectors based on local potential so that industrial growth aligns with increased absorption of educated workers.
3. The informal sector needs to be strengthened through entrepreneurship training, access to capital, and business digitalization so that it can function optimally as a temporary buffer for educated workers before they enter the formal sector.
4. The agricultural sector is a major contributor to the economy in West Sumatra Province. Transformation to agro-industry can be a solution to absorb educated workers. Develop agro-industrial areas that combine the agricultural sector with the processing industry to create added value and new jobs.
5. Wage setting policies must be aligned with increased labor productivity through skills improvement programs and incentives for companies that recruit new graduates.

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