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# THE EFFECT OF INVESTMENT, WORK FORCE, AND EDUCATION LEVEL ON THE REAL GROWTH OF GRDP IN THE BANGKA BELITUNG ISLANDS

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**Abstrak.** The objective of this study is to examine the impact of investment, workforce, and education level on the real Gross Regional Domestic Product (GRDP) growth in Bangka Belitung Province, both individually and collectively. The research adopts a quantitative descriptive approach, utilizing panel data regression analysis as the research method. Time series data from BPS Bangka Belitung Islands is employed for the study. The findings of this research are as follows: 1) There is a significant simultaneous effect of investment, workforce, and education level on the real GRDP growth in Bangka Belitung Islands Province. 2) There is a significant partial effect of investment, workforce, and education level on the real GRDP growth in Bangka Belitung Islands Province. 3) Among the three variables under investigation (investment, workforce, and education level), the variable with the most dominant influence on the GRDP of Bangka Belitung Islands is the Labor Force variable. In conclusion, this study confirms that investment, workforce, and education level collectively and individually contribute significantly to the real GRDP growth in Bangka Belitung Islands Province. Moreover, the Labor Force variable emerges as the most influential factor among the three variables. These findings provide valuable insights for policymakers and stakeholders in devising strategies to promote sustainable economic growth in the region, emphasizing the importance of investment, workforce development, and education in fostering economic progress in Bangka Belitung Province.

**Keywords:** Investment; workforce; education level on real GRDP growth of Bangka Belitung.

## INTRODUCTION

National development is a series of sustainable efforts that cover the entire life of society, nation, and state to achieve national development goals. This is by the Preamble of the 1945 Constitution which is to protect the whole nation and all of Indonesia's bloodshed. The implementation of this development involves all aspects of national life, such as political, economic, socio-cultural, and defense and security aspects in a planned, comprehensive, directed, integrated, gradual and sustainable manner. One of the goals of National Development is to improve the welfare of the people, so to achieve this goal the Government implements Economic Development.

Development is defined as an effort or a series of planned growth and change efforts carried out consciously by a nation, state, and government, toward modernity in the context of nation-building (Kato et al., 2021).

According to (Effendi, 2002) development is "an effort to increase all resources that are carried out in a planned and sustainable manner with the principle of equal and fair use."(Dewi, 2015) In this case, it can be said that development is oriented towards community development, where education occupies a primary position to open people's insight and awareness of better directions and ideals.

Development progress in the economic sector is measured by economic growth. Indicators that can be used to view and measure economic growth are 1) Gross Domestic Product (GDP), namely the number of final goods and services produced in one period, 2) Per Capita GDP or Per Capita Income, and 3) Income Per Hour Work (Sukirno, 2000).

Regional development is part of national development based on regional autonomy by Regional Autonomy Law No. 32 of 2004, which is implemented to improve people's welfare and is carried out with economic development in the region. The success of the development of a region can be seen from the level of economic growth. Therefore, each region always sets a high economic growth rate target in its regional development plans and goals. High and sustainable economic growth is the main condition for the continuity of economic development. The implementation of economic development in Indonesia has always been oriented toward success in the economic sector. The measure of the success of development in Indonesia is the level of economic growth.

**Table 1.** Economic Growth Rate by Province on Sumatra Island during 2015 – 2021 (in percent)

| Province | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|
| Indonesia | 3,52 | 3,72 | 3,79 | 3,93 | 4,27 | -3,03 | 2,52 |
| Aceh | -2,61 | 1,38 | 2,31 | 2,79 | 3,45 | 0,71 | 1,36 |
| North Sumatra | 3,81 | 3,94 | 3,95 | 4,06 | 3,61 | -1,84 | 1,36 |
| West Sumatra | 4,23 | 4 | 4,07 | 3,95 | 3,14 | -2,33 | 2,17 |
| Riau | -2,24 | -0,28 | 0,24 | -0,01 | 2,51 | 6,03 | 1,44 |
| Jambi | 2,44 | 2,65 | 2,93 | 3,07 | 4,46 | 0,27 | 2,34 |
| South Sumatra | 2,98 | 3,65 | 4,16 | 4,7 | 4,11 | 0,53 | 2,28 |
| Bengkulu | 3,44 | 3,63 | 3,38 | 3,42 | 4,49 | -1,7 | 1,88 |
| Lampung | 3,95 | 4,01 | 4,09 | 4,21 | 4,18 | -7,43 | 1,67 |
| **Kep. Bangka Belitung** | **1,89** | **1,95** | **2,35** | **2,37** | **3,95** | **-2,33** | **3,52** |

| Province | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|
| Kep. Riau | 3,03 | 2,12 | -0,69 | 1,83 | -0,08 | 4,77 | 0,49 |

Source: BPS Babel, 2023

Table 1 shows data on the economic growth of the Bangka Belitung Islands province for the last 7 years which has tended to decline and is relatively lower compared to Lampung province but relatively better compared to Riau and Riau Islands provinces. This is interesting to study considering that the province of Kep. Bangka Belitung with an area of 82,724.54 km2. is a potential area in the mining sector such as tin, kaolin, granite, and sea sand. In addition to metal and energy mineral commodities, this area also has potential industrial mineral resources which have the potential to be developed commercially.

To support regional economic development efforts, local governments need to make policies that support mutually beneficial investment for local governments, the private sector, and the community. The growth of a healthy and competitive investment climate is expected to spur the development of investment that is mutually beneficial to regional development. To see the development of the realization of Domestic Investment (PMDN) and Foreign Investment (PMA) in the Bangka Belitung Islands Province, can be seen in the following table:

**Table 2.** Development of PMDN and FDI Investment Realization in the Bangka Belitung Islands in 2011 – 2021

| Year | PMDN | | PMA | |
|---|---|---|---|---|
| | Project (Unit) | Investment (Billion rupiah) | Project (Unit) | Investment (million US $) |
| 2011 | 7 | 514,4 | 48 | 146,0 |
| 2012 | 4 | 533,5 | 30 | 59,2 |
| 2013 | 11 | 608,2 | 50 | 112,4 |
| 2014 | 7 | 615,5 | 34 | 105,0 |
| 2015 | 28 | 1.023.7 | 72 | 82,7 |
| 2016 | 60 | 2.202,0 | 93 | 52,7 |
| 2017 | 58 | 1.734,7 | 86,0 | 153,1 |
| 2018 | 123 | 3.112,9 | 79,0 | 46,3 |
| 2019 | 374 | 2.915,2 | 88,6 | 119,0 |
| 2020 | 972 | 1.863,8 | 48,4 | 312,0 |
| 2021 | 1.431 | 3.677,4 | 44,7 | 144,0 |

*Source : https://www.bps.go.id/site/resultTab, accessed on April 26, 2023*

Table 2 shows FDI investment in the Bangka Belitung Islands has fluctuated and tends to increase, while PMDN tends to increase from year to year. The proportion of PMDN and FDI investments and the decline in investment growth in the Bangka Belitung Islands does not mean that economic development is running slowly and vice versa, because what is important is not the amount of investment in terms of money or the number of projects, but how efficient or productive the investment is.

In addition to investment, the growth of the working-age population can have a very complex impact on employment conditions. The more population of the

workforce means the greater the human resources that are active in economic activities so that they can have a positive impact on regional development. However, if population growth is not followed by a balanced level of employment, it will have an impact on the unemployment rate and will also have an impact on development activities.

**Table 3.** Population 15 Years and Over by Most Activities in the Bangka Belitung Islands Province, 2011 – 2021

| Year | Working Age Population | Workforce | Working | Open unemployment | Not the Labor Force | TPAK | TPT |
|---|---|---|---|---|---|---|---|
| 2011 | 899.719 | 577.539 | 555.258 | 22.281 | 322.180 | 64,19 | 3,86 |
| 2012 | 924.448 | 606.298 | 585.493 | 20.805 | 318.150 | 65,58 | 3,43 |
| 2013 | 948.683 | 620.270 | 597.613 | 22.657 | 328.413 | 65,38 | 3,65 |
| 2014 | 973.192 | 636.959 | 604.223 | 32.736 | 336.233 | 65,45 | 5,14 |
| 2015 | 998.120 | 665.842 | 623.949 | 41.893 | 332.278 | 66,71 | 6,29 |
| 2016 | 1.022.955 | 705.173 | 686.830 | 18.343 | 317.782 | 68,93 | 2,60 |
| 2017 | 1.047.683 | 699.017 | 672.618 | 26.399 | 348.666 | 66,72 | 3,78 |
| 2018 | 1.068.371 | 718.586 | 692.646 | 25.940 | 349.785 | 67,26 | 3,61 |
| 2019 | 1.084.957 | 728.021 | 701.958 | 26.063 | 356.936 | 67,10 | 3,58 |
| 2020 | 1.104.219 | 738.637 | 699.881 | 38.756 | 365.582 | 66,89 | 5,25 |
| 2021 | 1.121.078 | 738.617 | 701.441 | 37.176 | 382.461 | 65,88 | 5,03 |

Source: bps.go.id, accessed on 26 April 2023

Table 3 can be explained that residents who are included in the category of the working-age population are residents aged 15 years and over. The working-age population according to their activities can be divided into 2 (two), namely the Work Force (AK) and Non-Work Force (BAK). In 2021, the working-age population in the Bangka Belitung Islands Province is 1,121,078 people, 65.88 percent of whom are included in the labor force, and 34.12 percent are not in the labor force.

## LITERATUR REVIEW

Kuznets (Todaro & Smith, 2006), economic growth is an increase in the long-term capacity of the country concerned to provide various economic goods to its population. The increase in the capacity itself is determined or made possible by progress or technological, institutional (institutional), and ideological adjustments to various existing demands. Kuznets also stated that there are at least six characteristics or characteristics of the process of economic growth that are found in almost all countries that are now developed countries or developed regions when speaking in the context of the regional economy.

According to (Samuelson et al., 2021) (Runtunuwu & Kotib, 2021), investment includes adding capital stock or goods in a country, such as building production equipment, and inventory items within one year. Investment is a step to sacrifice consumption in the future.

(Case et al., 1994) that if the capital stock remains while the workforce

increases, the new workforce tends to be less productive than the old workforce. This decline in productivity was called diminishing returns (per unit of input), and it worried Thomas Malthus, David Ricardo, and other early economists.

Education is one of the keys to the development of Human Resources (HR), namely building dynamic, productive, skilled hardworking human resources, mastering science and technology supported by industrial cooperation and global talent. The direction of human resource development is one of the 7 national development agendas for 2020-2024, namely increasing quality and competitive human resources. Improving the quality and competitiveness of human resources is expected to produce the next generation who are healthy, intelligent, adaptive, innovative, skilled, and with character. Education is one of the keys to the development of Human Resources (HR), namely building dynamic, productive, skilled hardworking human resources, mastering science and technology supported by industrial cooperation and global talent (Rusdiana, 2022).

Since the implementation of decentralization in 2001, the responsibility of local governments to provide educational services to their population has increased. The authority to manage primary and secondary education has been fully transferred from the central government to provincial and district governments.

## MATERIALS AND METHODS

The research method used is an explanatory study or hypothesis testing study which aims to explain and test hypotheses about the relationship between variables. The relationship described is causal (cause and effect) (Silalahi, 2012).

In this study, a causal relationship was analyzed from the research variables, namely investment, workforce, education level, and their influence on the real growth of GRDP.

In this study, secondary data was used from 2010 – 2020, which consisted of two dependent variables, namely the real GRDP growth (Y), as well as three independent variables, namely investment demand (X1), increase in the workforce (X2), and education level. (X3) in the Bangka Belitung Islands Province.

This research uses a panel data regression analysis technique (Pooled Data). Panel data regression is a development of linear regression with the Ordinary Least Square (OLS) method which has specificity in terms of the type of data and the purpose of data analysis. In terms of data types, panel data regression has data characteristics that are cross-sectional and time series.

Regarding data adequacy, the OLS (Ordinary Least Square) method requires that the amount of data used must be greater than the sum of all the variables involved in the model (Gujarati et al., 2008), with data processing using the Eviews program Version 12.0.

## RESULTS AND DISCUSSION

The results of selecting the model using the best analytical test are presented in full by the estimation results of Common

Effects, Fixed Effects and Random Effects as follows:

**Table 4**. Estimation Results of CEM, FEM and REM

| Dependent Variable Log(PDRB?) | Common | Fixed | Random |
|---|---|---|---|
| **Constanta ( C )** | | | |
| Coefficient | 6,509568 | 13,52803 | 12,94584 |
| Std. Error | 1,102964 | 1,293726 | 1,249907 |
| t-Statistic | 5,901887 | 10,45664 | 10,35744 |
| Prob. | 0,000000 | 0,000000 | 0,000000 |
| **LOG(AK?)** | | | |
| Coefficient | 0,814362 | 0,009654 | 0,009514 |
| Std. Error | 0,093053 | 0,003698 | 0,00368 |
| t-Statistic | 8,751577 | 2,610361 | 2,585078 |
| Prob. | 0,000000 | 0,0111 | 0,0117 |
| **LOG(INV?)** | | | |
| Coefficient | 0,003812 | 0,316693 | 0,361236 |
| Std. Error | 0,006653 | 0,101745 | 0,098142 |
| t-Statistic | 0,572943 | 3,112606 | 3,680751 |
| Prob. | 0,5684 | 0,0027 | 0,0004 |
| **PENDIDIKAN** | | | |
| Coefficient | -0,002492 | -0,019033 | -0,018143 |
| Std. Error | 0,003788 | 0,002393 | 0,002343 |
| t-Statistic | -0,657825 | -7,955321 | -7,743151 |
| Prob. | 0,5127 | 0,000000 | 0,000000 |
| R-squared | 0,516022 | 0,932197 | 0,695673 |
| Adjusted R-squared | 0,496133 | 0,923089 | 0,683166 |
| F-statistic | 25,94448 | 102,3511 | 55,62444 |
| Prob(F-statistic) | 0,000000 | 0,000000 | 0,0000 |
| Durbin Watson Stat | 0,560796 | 2,249943 | 2,0643 |

Source: Results of data processing

Based on the model specification tests that have been carried out from the two analyses using the likelihood test, the Hausman test both suggest using the Fixed Effect Model and the Random Effect Model, so an LM test is held to determine which model should be used and from the comparison of the best selection test, the regression model is used in the model is the Random Effect Model.

Based on the model specification tests that have been carried out and from the comparison of the best values, the panel data regression model used is Random Effect. In previous tests, the model has passed the classical assumption test, so the results obtained after estimation are consistent and unbiased. The following table shows the results of estimated data with a total of 7 districts/cities during the 2010 - 2020 period.

**Table 5.** Model Estimation Results

| | | | | |
|---|---|---|---|---|
| Dependent Variable: LOG(PDRB?) | | | | |
| Method: Pooled EGLS (Cross-section random effects) | | | | |
| Date: 07/04/22 Time: 19:08 | | | | |
| Sample: 2010 2020 | | | | |
| Included observations: 11 | | | | |
| Cross-sections included: 7 | | | | |
| Total pool (balanced) observations: 77 | | | | |
| Swamy and Arora estimator of component variances | | | | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| C | 12.94584 | 1.249907 | 10.35744 | 0.0000 |
| LOG(INV?) | 0.009514 | 0.003680 | 2.585078 | 0.0117 |
| LOG(AK?) | 0.361236 | 0.098142 | 3.680751 | 0.0004 |
| PENDD? | -0.018143 | 0.002343 | -7.743151 | 0.0000 |
| **Random Effects (Cross)** | | | | |
| _BANGKA—C | 0.191406 | | | |
| _BELITUNG--C | -0.165267 | | | |
| _BANGKABARAT--C | 0.276385 | | | |
| _BANGKATENGAH--C | -0.113417 | | | |
| _BANGKASELATAN--C | -0.271717 | | | |
| _BELITUNGTIMUR--C | -0.217060 | | | |
| _PANGKALPINANG--C | 0.299670 | | | |
| **Effects Specification** | | | | |
| | | | **S.D.** | **Rho** |
| Cross-section random | | | 0.238601 | 0.9050 |
| Idiosyncratic random | | | 0.077303 | 0.0950 |
| **Weighted Statistics** | | | | |
| R-squared | 0.695673 | Mean dependent var | | 1.521414 |
| Adjusted R-squared | 0.683166 | S.D. dependent var | | 0.137957 |
| S.E. of regression | 0.077653 | Sum squared resid | | 0.440192 |
| F-statistic | 55.62444 | Durbin-Watson stat | | 2.064300 |
| Prob(F-statistic) | 0.000000 | | | |
| **Unweighted Statistics** | | | | |
| R-squared | 0.241014 | Mean dependent var | | 15.64882 |
| Sum squared resid | 4.481825 | Durbin-Watson stat | | 0.202750 |

From the estimation results above, a panel data analysis model can be made of the factors that influence GRDP in Regencies/Cities in the Bangka Belitung Islands Province which can be concluded with the following equation:

(Y)= f(Ln(X1), (X2), (X3))

So that the panel data regression equation is obtained as follows:

$$Log(Y) = \beta 0 + \beta 1*Ln(X1) + \beta 2*(X2) + \beta 3*(X3) + et$$

Log(GDP) = 12.94584 – 0.009514*Log(INV) + 0.361236* (AK) - - 0.018143*(TPENDD) + et

The estimation results above can be interpreted as follows:

LOG(PDRB_Bangka) = 0,1914 + 12,9458 + 0,0095*LOG(INV_BANGKA) + 0,3612*LOG(AK_BANGKA) - 0,0181*PENDD_BANGKA

LOG(PDRB_BELITUNG) = -0,1652 + 12,9458 + 0,0095*LOG(INV_BELITUNG) + 0,3612*LOG(AK_BELITUNG) - 0,0181*PENDD_BELITUNG

LOG(PDRB_Bangkabarat) = 0,2764 + 12,9458 + 0,0095*LOG(INV_BANGKABARAT) + 0,3612*LOG(AK_BANGKABARAT) - 0,0181*PENDD_BANGKABARAT

LOG(PDRB_Bangkatengah) = -0,1134 + 12,9458 + 0,0095*LOG(INV_BANGKATENGAH) + 0,3612*LOG(AK_BANGKATENGAH) - 0,0181*PENDD_BANGKATENGAH

LOG(PDRB_Bangkaselatan) = -0,2717 + 12,9458 + 0,0095*LOG(INV_BANGKASELATAN) + 0,3612*LOG(AK_BANGKASELATAN) - 0,0181*PENDD_BANGKASELATAN

LOG(PDRB_Belitungtimur) = -0,2170 + 12,9458 + 0,0095*LOG(INV_BELITUNGTIMUR) + 0,3612*LOG(AK_BELITUNGTIMUR) - 0,0181*PENDD_BELITUNGTIMUR

LOG(PDRB_PANGKALPINANG) = 0,2997 + 12,9458 + 0,0095*LOG(INV_PANGKALPINANG) + 0,3612*LOG(AK_PANGKALPINANG) - 0,0181*PENDD_PANGKALPINANG

β0 = 12.94584 which means that if all the independent variables (Investment, Labor Force, and Education) are considered constant or do not change, then the GDP elasticity will be 12.94584.

β1 = 0.009514 which means that when the investment elasticity increases by 1%, the GRDP elasticity increases by 0.009514.

β2= 0.361236 means that when the elasticity of the Labor Force increases by 1 person, then the elasticity of GRDP increases by 0.361236.

β3 = -0.018143 which means that when the education level increases by 1 percent, the GDP elasticity decreases by 0.018143.

In the estimation model above, there is a cross-sectional effect in each district/city on GRDP in the Bangka Belitung Islands Province. The district/city that has the highest positive cross-sectional effect is Pangkalpinang City with a coefficient value of 0.299670 followed by West Bangka District with a coefficient value of 0.276385, followed by Bangka District with a coefficient value of 0.191406. While the districts/cities that have the highest negative cross-sectional effect are South Bangka Regency with a coefficient value of -0.271717, East Belitung Regency with a coefficient value of -0.21706, Belitug Regency with a coefficient value of -0.165267, and Central Bangka with a coefficient of -0.113417.

Of the three research variables, namely Investment, Workforce, and Education Level, the variable that has the most significant effect on the GRDP of the Bangka Belitung Islands is the Labor Force variable with a coefficient value of 0.361236.

## CONCLUSIONS

In conclusion, the panel data regression analysis conducted in the Bangka Belitung Islands Province provides valuable insights into the factors influencing the Gross Regional Domestic Product (GRDP) of the region. The selected Random Effects Model proves to be the best-fitting model for the analysis. The estimation results reveal a regression equation with coefficients that offer meaningful interpretations. The constant term indicates the GRDP elasticity when all other variables are held constant, and the coefficients of Log (INV), Log(AK), and PENDIDIKAN provide information on the impact of investment, labor force, and education on GRDP, respectively. Additionally, the analysis uncovers cross-sectional effects within the districts/cities of the province, highlighting the areas with the highest positive and negative effects. Notably, the Labor Force variable emerges as the most influential factor affecting the GRDP. Overall, this analysis underscores the significance of investment, labor force, and education in fostering economic growth in the Bangka Belitung Islands.

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