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THE ROLE OF EDUCATION TOWARDS ECONOMIC GROWTH: EVIDENCE FROM INDONESIA

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Abstract

Education is an important variable in economic activity since competent human resources are originated from good quality education. Human resources are primary input in Neoclassical Production Theory, so that this research mainly aims to estimate the impact of education, labor, and foreign direct investment towards the economic growth in Indonesia. The average length of school time is employed as the education variable. The research data are in the forms of panel data consisting of 34 provinces in Indonesia in the period of 2006 until 2019. Based on the estimation results, the selected model is random effect model. The main findings indicate that education is proved to be significantly positive towards the economic growth. Labor and foreign direct investment are also proved to be significantly positive towards the economic growth in Indonesia. Therefore, it requires strategic policies for quality-oriented education improvement and literacy program to all corners of Indonesia.

Keywords*: education; economic growth; panel data.*

JEL Classification*: I25, I21, H4*

INTRODUCTION

Community education status can support national economic performance (see Afzal et al. 2017; Cezar et.al, 2009; Mariana, 2015; Mercan & Sezer, 2014). The effectiveness of education can be seen in access to education and education levels, the high level of education will form a qualified workforce as human capital in development (Yumusak, Bilen, and Ates 2013). Economists argue that technology transfer is needed to reduce the educational gap between rich and poor countries (Cezar et.al, 2009). According to Havaa & Erturgut (2010), the development of science and technology has transformed human life, especially workforce skills. Skills gained from education encourage high levels of productivity. A statement by Kakar, Khilji, and Khan (2011) is in line with the concept where education increases economic growth through creativity, productivity, skills, and competence.

The influence of education on economic performance is a crucial issue where researchers highlight the number of schools being built to improve the quality of education in both developed and developing countries (Abdullah, 2013; Truong, Ogawa, & Sanfo, 2021). Investment in human capital in the form of education is a necessity to encourage economic development (Hamdan et.al, 2020). Mercan & Sezer (2014) explained in detail the influence of education to increase per capita income and reduce unemployment. This explanation proves the real influence of education on sustainable economic development. Human capital plays a major role in the long term to advance life and increase added-value.

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Table 1 Formal Education Participation in Indonesia (%)

Years Old School Enrollment	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
7-12	97.53	97.94	98.34	98.83	98.57	98.98	99.08	99.11	99.17	99.21
13-15	87.79	89.61	90.62	94.32	94.25	94.79	94.98	95.23	95.43	95.52
16-18	57.69	61.30	63.64	70.13	70.26	70.68	71.20	71.82	71.92	71.44
19-24	14.47	15.94	20.04	22.74	22.77	23.80	24.67	24.29	23.28	22.53

Source: Statistics Indonesia, 2021

Table 2 Illiteracy Rate in Indonesia 2011-2020

Years old Illiteracy Rate	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
10	6.80	6.28	5.46	4.39	4.27	4.19	4.08	3.93	3.70	3.62
15	7.56	7.03	6.08	4.88	4.78	4.62	4.50	4.34	4.10	4.00
15-44	2.31	2.03	1.61	1.24	1.10	1.00	0.94	0.86	0.76	0.80
45	18.15	17.17	15.15	12.25	11.89	11.47	11.08	10.60	9.92	9.46

Source: Statistics Indonesia, 2021

Table 1 showed the condition of distribution of formal education participation in Indonesia according to the age range. Trend of data showed an increasing in school partisipation from 2011 – 2020. Literacy level is important as a social indicator. From tabel 2, the data showed an increasing Indonesian literacy. In the development economy, one of the issues to be studied is human capital in production, especially education. The hypothesis in several studies confirmed that there was a strong influence of education on productivity and economic performance. The studies were conducted using different measurements of educational variables, such as study period, literacy rate, availability of learning facilities, access to primary to secondary education, and access to higher education, so that study results vary from country to country. Indonesia as an emerging country has a very wide area with challenges in providing education to reduce educational disparities in all regions in Indonesia. This study aimed to estimate the influence of education, labor, and capital on the gross regional regional domestic product in 34 provinces in Indonesia for the period 2006-2019. This study contributed to investigate the influence of education data at the provincial level in Indonesia using the panel data method with extensive and complete data.

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LITERATURE REVIEW

In the 1960s and 1970s, the concept and issue of human capital emerged, which was initiated by experts explaining the importance of education as the main element of human capital. In the production process, education can be performed with job training or seminars/workshops (Afzal et al, 2017). Based on Neoclassical Economic theory, production requires basic inputs, namely capital, labor, and land, to increase the use-value of goods and services. Labor productivity determines average production, where different amounts of production require various factors of production in different quantities. Labor is the main input in the production system because it has many characteristics such as leader, manager, expertise, skills, and ideas. Thus, there is a strong influence of labor on production. One method of providing quality labor is through education, both formal and non-formal so that productivity can be measured by the quality of education. The increase in education as the main prerequisite for increasing productivity is reflected in national output, so as to create sustainable economic growth.

Afzal et al, (2017) found that education had a positive and significant influence on Pakistan's economic growth in the long term. Meanwhile, Hamdan et al (2020) stated that large investments in education had no significant influence on economic growth in Saudi Arabia. Although education is an element forming human capital, Abdullah (2013) found that education had no direct correlation with Malaysia's economic growth. However, higher education had an influence on Romania's economic performance through the development of science and the use of technology for innovation in the production process (Mariana, 2015). Mercana & Sezerb (2014) found that education investment had a positive influence to encourage economic growth in Turkey because education is a long-term investment with special attention from the Turkish government.

Economists argue that basic inputs such as labor and capital are needed in the economy. Solow (1956) added technology as a supporting factor. This was refined by Mankiw, Romer & Weil (1992) by adding human capital as an economic input. Furthermore, human capital can be developed properly through education (Lucas, 1988; Grossman and Helpman, 1991; Romer, 1990; Rivera-Batiz and Romer, 1991). Education as a long-term investment is important to boost economic performance by adding value and increasing productivity. Basically, education drives public services through a professional workforce for companies, public companies, and government services. Thus, the Cob-Douglas Production Function:

$$Y_t = AK_t^{\propto}[(1+\gamma)^t L_t]^{1-\propto} K_t^{\pi} \in_t^p$$

$\gamma \geq 0$, $0 < \alpha < 1$, $A > 0$; Y_t is economic output, K_t is capital, L_t is labor, and A is technology use in t period, ϵ_t^p is production disturbance in t period.

Afzal et al (2011) tested causality and cointegration between education and economic output in Pakistan and found that higher education had the most significant influence on economic growth. Therefore, it is necessary to invest heavily in the development of higher education. Meanwhile, a study in Sub-Saharan Africa by Glewwe, Mai¨Ga, and Zheng (2014) found that education had no influence to boost economic performance. Agasisti & Bertoletti (2020) described that the addition of

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higher education institutions can encourage regional economic performance through increasing human capital and encouraging innovation in regional economic development. A study explored the education sector based on Neoclassical Economy, Ganegodage & Rambaldi (2011) found that education investment had a positive influence but not too high. Education is often associated with productivity, but Abdullah (2013) explained that the education sector in Malaysia had no influence on economic performance. Mercana & Sezer (2014) found that the Turkey government spending on education is able to boost productivity and increase Turkey's economic growth.

METHODOLOGY

This study estimates macroeconomic variables and education indicators in 34 provinces in Indonesia for the period 2006-2019. The dependent variable was gross regional domestic product per capita as a proxy for economic growth. The independent variables were labor using data on the number of workers, education using the average study period data, and capital using foreign direct investment data. To get a valid estimator, all variables were transformed to log-natural.

Table 3 Operational Definition of Variable

Variables	Description	Source
GRDP growth (GRDPG)	Gross regional domestic product per capita per province.	Statistics Indonesia
Labor (LB)	Number of workers in each province (people).	Statistics Indonesia
Foreign direct investment (FI)	Total of foreign investment in million USD. Data for each province.	Statistics Indonesia
School (SC)	Average study period at the provincial level (years).	Statistics Indonesia

This study used static panel data estimation with balanced panel based on Neoclassical production theory. Data were analyzed through three main models: pooled OLS, fixed-effect model, and random effect model. Selection of the best model used Chow Test, Hausmann Test, and Lagrange Multiplier Tests. The estimated model is as follows:

$$GRDPG_{it} = \alpha_0 + \beta_1 LB_{it} + \beta_2 FI_{it} + \beta_3 SC_{it} + \varepsilon_{it} \quad (1)$$

Equation 1 expresses the Pooled OLS or Common Effects Model (CEM), equation 2 shows the Fixed Effects Model (FEM), and equation 3 shows the Random Effects Model (REM).

$$GRDPG_{it} = \alpha_{0+} \alpha_1 D_{ni} + \beta_1 LB_{it} + \beta_2 FI_{it} + \beta_3 SC_{it} + \varepsilon_{it} \quad (2)$$

$$GRDPG_{it} = \alpha_0 + \beta_1 LB_{it} + \beta_2 FI_{it} + \beta_3 SC_{it} + w_{it} \quad (3)$$

The α_0 is the intercept while β_1, β_2, β_3 are the parameters/slope of the model. In addition, the 'i' is the cross-section of 34 provinces while 't' is a time series of period 2006-2019. The use of panel data in econometric estimation has many advantages such as a higher amount of data to be estimated so as to be more informative, a greater degree of freedom so as to be more efficient, and being able to detect and

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measure unobservable effects in a pure cross-section or pure time-series so that the parameters generated are more accurate and closer to the actual value.

RESULTS AND DISCUSSION

Panel data estimation was carried out to get the best estimator in order to explain the influence of education on economic growth in 34 provinces in Indonesia. Initial information and data characteristics can be seen in descriptive statistics including the mean, minimum value, maximum value, and standard deviation presented in Table 4.

Table 4 Descriptive Statistics

	LGRDP	LLABOR	LFDI	LSCHOOL
Mean	11,441	14,912	4,973	2,068
Median	11,420	14,856	5,157	2,070
Maximum	14,424	17,419	9,203	2,403
Minimum	7,9412	12,687	-1,609	1,721
Std. Dev.	1,285	1,027	2,199	0,123
Skewness	0,245	0,611	-0,654	0,061
Kurtosis	2,640	3,125	3,127	3,165
Observations	446	446	446	446

Source: Secondary data (processed)

Table 5 Panel Data Estimation

Variables	Pooled OLS	Fixed Effects	Random Effects
LB	19,656(0,033)***	2,833 (0,137)***	9,838 (0,061)***
FI	17,825 (0,016)***	17,260 (0,016)***	18,054 (0,015)***
SC	6,069 (0,242)***	4,898 (0,628)***	4,732 (0,425)***
Constant	-3,545 (0,724)***	-0,976 (2,179)	-9.460 (-1.20)
Adj R-square:	0,78	0,85	0,61
F-statistics	534,892***	73,534***	237,126***
Chow Test	213,436***		
Hausman Test		6,507*	
LM Test		740,779***	
Observation	446	446	446

Source: Author's estimation
Note: () denotes t-statistics; ***, ** and * are 1%, 5% and 10% respectively.

Based on Pooled OLS model estimation, labor had a significant influence on gross regional domestic product. This indicates the workforce effectiveness in Indonesia. Statistics Indonesia's data (2020) showed the highest labor participation rates were in Bali (74, 32%), East Nusa Tenggara (73.11%), and Papua (72, 16%). Meanwhile, the lowest labor participation rates were in South Sulawesi (63.40%), North Sulawesi (63.42%), and DKI Jakarta (63.81%). To improve the workforce

quality, especially people with low education, the Indonesian government launched various programs to improve skills, both technology-based and skills-based. Capital had a positive and significant influence on gross regional domestic product. Positive and significant capital indicated the use of targeted investment. This condition can increase investor confidence to encourage the industrial sector in Indonesia. Education had a positive influence meaning that education in Indonesia is well structured and provides a fit output for the industrial sector.

Based on the Fixed Effect model estimation, labor had a significant influence on gross regional domestic product. Based on Statistics Indonesia (2020), there was a fairly even distribution of labor force participation both in urban and rural areas. The labor force participation rate in urban areas was 65.91%, while in rural areas was 53.13%. Capital and education also had a positive and significant influence. In order to create sustainable development, it is necessary to increase regional investment. Equitable education both in quality and quantity in all provinces in Indonesia requires standardization of education covering curriculum, facilities and infrastructure, learning media, and technology.

Based on the model selection test, the random effect model was the best model based on the significant Breusch-Pagan value on the LM Test. Based on the Random effect model estimation, labor had a significant influence on gross regional domestic product. Productivity is related to the hours worked. According to Statistics Indonesia (2020), the population working with the highest excess working hours were Gorontalo (33.17%), East Kalimantan (32.73%), and DKI Jakarta (30.86%). The workforce in Indonesia is productive in both the formal and non-formal sectors. Capital had a significant and positive influence on gross regional domestic product. Increased investment is needed for regional development to drive the leading sectors of each province. Innovative programs and streamlining the bureaucracy will increase investment promotion for both international and domestic investors. Education had a significant and positive influence on gross regional domestic product. The integrated learning process leads to an improvement in the quality of human capital, however, the biggest challenge is the equitable education throughout Indonesia so that development can also be carried out evenly. This is in line with a study by Mariana (2015) showing that education had a significant influence on economic growth in Romania through skill improvement and technological innovation. Investment in education had also proven to be able to boost productivity in Turkey and had an impact on increasing income (Mercan & Sezer, 2014). Unlike Hamdan et al (2020), education in Saudi Arabia had no influence on the economic output.

CONCLUSION

Education as a determinant in economic development. Education encourages increased human capital as a long-term investment in the economy. Empirical evidence in various countries shows positive and negative influences between education and economic performance. Education in Indonesia is divided into 3 main categories, basic education, secondary education, and higher education. Education in terms of infrastructure and quality is still not equitable in all provinces in Indonesia. The literacy rate in Indonesia was quite low and is still a crucial issue. Based on the results, there was a significant influence on economic growth in 34 provinces in

Indonesia. The positive coefficient shows the higher and the better the education, the more it encourages economic growth. Foreign direct investment as a proxy for capital had a positive influence on economic performance and labor also had a positive influence on economic growth in 34 provinces in Indonesia during 2006-2019. Thus, the results are in accordance with the Neoclassical theory where capital, labor, and education are the key variables in production activities.

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