

THE IMPACT OF EDUCATION ON REGIONAL ECONOMIC PERFORMANCE IN INDONESIA

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Abstract: *Theoretically, there is a two-way relationship between human development and economic performance. The strength between these relationships depends on other social and economic variables. This research aims to investigate the impact of education to regional economic performance. The study utilizes a panel dataset of 30 provinces in Indonesia over the period 2005–2015. The estimation result shows that primary education level, that has become universal attribute to Indonesian, is not statistically significant to regional performance. In contrast, there is a positive and significant evidence of the impact of secondary education and tertiary education levels to the economic performance. Furthermore, we also employ a descriptive statistic to the annual labor survey dataset to gain a deeper understanding on the impact of education to the regional economy through the response of Indonesia's labor market. The results reveal that there are shifts in the structure of labor force due to change on labor's education attainment. Also, looking at the wage gap between the education levels and the time needed to find a job, we find that there is a subtle evidence of skill mismatched in the labor market.*

Keywords: *Education, regional economics, labor market, wage gap*

1. Introduction

The Neo Classical Economic Growth Theory states that economic growth depends on the development of the factors of production, namely: capital, labor and technology (Sukirno, 2001). Theoretically, the factors that determine the productivity of production are physical capital, natural resources, and technological development. In addition, one factor that is very important in determining productivity, namely; human capital (human capital). Human capital is the capital needed by workers, obtained through education or training (on the job training) to support work experience (Mankiw, 2003). Human capital is needed to support the ability to produce goods and services and increase productivity. The larger the workforce, which means a high population growth rate, the greater the national income and the higher the economic growth (Todaro, 2006). Thus, scholars often associate human capital with the education attainment. In developing countries, the belief that education attainment is a driver of growth has become the underlying reason behind the expansion of education. The OECD countries have undergone a massive expansion in education, and there is apparent evidence of

education convergence. However, there is no suggestion of acceleration of growth in these countries (Prichett 2006).

Another important indicator of economic growth is the level of education. Education is one of the main assets that need to be fulfilled in order to carry out sustainable development. With quality human capital, it is believed that economic performance will also be better. Benhabib & Spiegel, (1994) have found a weak relationship between growth and increase in human resources measured in terms of educational attainment. Efforts to increase school enrollment began in the early 1970s and resulted in a sharp increase in school attainment and income in Indonesia (Duflo 2001). The Indonesian government has implemented a regional autonomy system since 2001. With this regional autonomy system, each region has greater responsibility in the provision of public goods and economic development, especially in the education sector. However, the capacity of regions to improve education delivery is still very limited and the capacity of each region is still limited in the management of the education sector. In Indonesia, education convergence is a important political issue. Unequal access to education is said to be the primary source of income inequality across regions (Wicaksono, Amir, and Nugroho 2017). The effort to increase school enrollment has been started in early 1970'and resulting a sharp incline in Indonesian school attainment and income (Duflo 2001). Following this success, in 1994 the government extended the 6-years compulsory schooling to nine years. Moreover, in 2003 the amendment of constitution mandated 20% of national budget to be spent on education improvement. In the field of higher education, the vision includes increasing the proportion of higher education graduates in the population up to fivefold in 2025. (Negara & Benveniste 2014)

However, although the school attainment across regions is increasing rapidly and moving towards convergence, the regional gap in Indonesia remains palpable. Aghion et al. (2009) explained that that each types of human capital have a distinct impact on the economic activity depends on how close the economy is to the technology frontier. Highly educated workers are more substantial for the growth of regions close to the frontier due to necessary adaptation of technology. Therefore, the objective of the study is to determine the impact of different level of education to regional performance in Indonesia. This study of the contribution of human capital provides an initial and further analysis of economic conditions in Indonesia. Several researchers have conducted empirical research on the contribution of human capital in Indonesia (Brata, 2002), (Saepudin, 2011), and (Farah & Sari, 2014) at the provincial level in Indonesia. Meanwhile, another research was conducted by (Silva & Sumarto, 2015) at the regency and city level throughout Indonesia. When human capital becomes one of the factors that has a central role, the government can then issue policies capable of increasing and accelerating the accumulation of human capital. This research specifically tries to analyze the impact of each level of education in an area with different characteristics. As a reference for future studies, we also visited the Indonesian labor market to see the impact of the rapid growth in educational attainment of the workforce on the labor market.

2. Research Methods

The study utilizes a secondary database of the annual provincial survey conducted by Indonesia's Central Bureau of Statistics. The collected data is a panel dataset of 30 provinces in Indonesia from 2005 to 2015. At present, there are 34 provinces in Indonesia. However,

since the four youngest provinces, Riau Island, North Maluku, West Papua and North Kalimantan have some data limitation, we merge this province to their provenance provinces. Thus, we combine the data of Riau Islands with Riau; North Maluku with Maluku; West Papua with Papua Papua; and North Kalimantan with East Kalimantan. Thus, our dataset consists of an 11-year panel data of the 30 provinces in Indonesia.

This type of research uses quantitative research that uses numerical data or numbers. The analysis technique used is economic growth, panel data regression and dummy variables, which are supported by existing quantitative data. The data was processed using Microsoft Office Excel 2013 software and Statistics EvIEWS 9 software. The researchers analyze the effect of education on regional economic activity by adopting Tallman and Wang (1994) model, that is by dividing labor input based on the level of education that they have completed. The specific model of this study is as follow:

$$\ln Y_{it} = \beta_0 + \beta_1 \ln GFCF_{it} + \beta_2 \ln L_{it} + \beta_3 PEL_{it} + \beta_4 SEL_{it} + \beta_5 TEL_{it} + \epsilon_{it}$$

The depended variable (Y) is the natural log of real Gross Regional Domestic Product (GDRP)

The independent variables consist of six variables. Following the Solow Growth model, $\ln L$ is the natural log of the number of labor force as proxy of labor in the economy, whereas the natural log of real gross fixed capital formation ($\ln GFCF$) is the proxy of capital stock. We use gross fixed capital formation as the proxy of capital stock because of the lack of data regarding capital stock at the provincial level (Wibisono 2004).

The other four variables are TFP variables representing the education attainment of the labor force. We use the this to measure human capital because it is considered a better measure of a province's human capital level than school enrollment rates or the student-teacher ratio (Chi, 2008). As the measurement, we use the percentage of labor that has obtained each level of education in the total labor force. To get a clear result of the impact of each level of education to economic growth, we calculate the share of labor that has already obtained the primary education (PEL) by summarizing the shared labor whose highest education attainment are primary, secondary and tertiary education. As well as for calculating the total percentage of labor that obtained the secondary education (SEL) we summarize the percentage of labor with the secondary and tertiary education degree. For the total percentage of labor that obtained a tertiary education (TEL) and the total percentage of uneducated labor (UEL) is used in the estimation as a reference.

The study will utilize the panel data method and the hypothesis for the model is as follow:

- H_0 : Level of education has no significant and positive impact on regional economic growth.
- H_a : Level of Education has a significant and positive impact on regional economic growth.

We conducted the regression in two stage, the main study and the exploratory study. In the main study, first, we do the regression of regional economic activity, GFCF and labor force following the basic Solow model. Then, in we compare it with our model which include the level of educations as a proxy of the human capital to reduce the TFP. In addition, we conducted an exploratory study on the different impacts of human capital in the different region in Indonesia.

3. Results And Discussion

a. Result of the Main Study

Table 1. Comparison between estimation result of basic Solow model and our model.

Dependent Variable: Gross Regional Domestic Product		
Independent variable	Basic Solow Model (1)	With Level of Education Inserted (2)
_cons	4.098*** (0.119)	12.84*** (1.178)
Labor Force	0.898*** (0.088)	0.317*** (0.081)
Gross Fixed Capital Formation	0.080*** (0.007)	0.037*** (0.007)
Primary Education	-	-0.003 (0.02)
Secondary Education	-	0.017*** (0.002)
Tertiary Education	-	0.015*** (0.005)
Uneducated	0 (omitted)	0 (omitted)
F-Prob	0.00	0.00
R-square	0.71	0.82

Notes: *** Significant at 1%, ** significant at 5%, * significant at 10%

Source: Author's calculation using STATA 16

The empirical result, as presented in Table 1, shows that the relationship between labor force and GRDP is positive and significant, and so do the relationship between Gross Fixed Capital Formation (GFCF) and Gross Regional Domestic Product (GDRP) GFCF and GRDP. We found that before we introduce human capital variables to the equation, every 10% increase in the number of the labor force will generate 8.9% increase in GRDP. Also, every 10% increase in GFCF will increase the GRDP by 0.8%.

However, after we include the human capital variables, the coefficient of the labor force and GFCF in declining. Now, every 10% increase in the labor force will bring GDRP up to, 3.1% and every 10% increase in GFCF will bring GDRP up to 0.37%. This result is as expected. The decrease in the impact of the labor force on regional economic growth once the human capital variables are taken into account is up to 65%.

For the educational variable, we found that the relationship of Primary education level to GRDP is insignificant, whereas the secondary education level and higher education level has a significant positive impact on GRDP. According to this study, an increase of 10% of the share of labor completing secondary education level will increase GRDP by 0.17% and an increase of 10% of the share of labor completing tertiary education level will increase GRDP by 0.15%.

The results of this study indicate that in general, education has an influence on gross regional domestic income in Indonesia. Based on this research, it provides recommendations to policy makers, especially policy makers at the provincial and district / city levels, to give more attention to improving the quality of education in the regions. Because the higher the quality of human resources, as indicated by the higher level of education, the economy in that area will be able to grow better.

Using the growth accounting framework shows that their contribution to overall economic growth can be found by multiplying the share of the labor force. It should be noted that the quality of the workforce is a broader variable than education. If the growth rate of the total factor productivity itself depends on the rate of change in educational attainment, then the calculation of growth will be understood to be true that education contributes to economic growth in a country.

Education is part of an investment that will provide benefits. By involving the human element in investment analysis, there are good ideas in developing the mind to make education and training separate when compared to conventional economic theory. Through education, it is expected to be able to produce quality human resource output which is one of the main assets in an economic development process. With education, it is hoped that human capital investment will be able to provide benefits in increasing the intrinsic value of human resources. An important factor in developing human resources, especially in relation to the quality of the workforce, is through the education and training system. For newly developing regions, emphasis needs to be made through improving literacy rates. Likewise training and skills building are more important than higher education provision. Skills provision programs should be aimed at the informal sector both in urban and rural areas, in addition to increasing skills in the industrial sector and the tertiary sector.

One of the difficulties that occur in measuring the effect of education (which is proxied by the level of educational attainment or length of education) on the level of economic growth is the time lag problem. Because the effect of education cannot be seen directly in a year. The impact of education may only be felt after several years after an increase in educational attainment has occurred. Studies that have been conducted in several developed countries show that the time that shows the relationship between increasing educational attainment and economic growth takes a long time. However, that does not mean that education is not an important factor in a country's economic growth. Because education is an effort to increase human capital capacity which is useful for economic development.

To obtain quality human resources through education, it is necessary to develop an educational indicator. Educational indicators can be expressed through two approaches to indicator development, first are macroeconomic indicators and second are microeconomic indicators. On the macro indicators that get more emphasis are the aspects of education funding, the ratio of teachers to students, the ratio of classes to students, the ratio of books in the library to students, the ratio of administrative staff to students.

All of these indicators reflect the amount of educational input in relation to the education process itself. Then on the other hand, several indicators emerge which can also be used to assess education performance which is measured to assess the extent to which education is sustained in a certain area. Thus, the school enrollment rate (enrollment rate), test rate, dropout rate, education continuity rate based on education level, and so on are indicators of education output. Meanwhile, from the aspect of the micro criteria, the average monthly

household education expenditure can be used as an input indicator, and the percentage of individuals who are able to enter an education level as an output indicator.

b Exploratory Study

Table 2. Estimation result of the impact of human capital on regional economic activity based on Average GRDP growth rate

Dependent Variable: Gross Regional Domestic Product		
Independent variable	Regional characteristic	
	High growth	Low growth
_cons	10.37*** (1.186)	13.96*** (2.506)
Labor Force	0.4518*** (0.081)	0.2972* (0.177)
GFCF	0.0557*** (0.008)	-0.002 (0.013)
Primary Education	-0.0002 (0.002)	-0.0041 (0.004)
Secondary Education	0.0149*** (0.002)	0.0220*** (0.007)
Tertiary Education	0.0145** (0.005)	-0.0005 (0.012)
Uneducated	- (omitted)	0 (omitted)
F-Prob	0.000	0.000
R-square	0.9043	0.6234

Notes: *** Significant at 1%, ** significant at 5%, * significant at 10%

Source: Author's calculation using STATA 16

First, Table 2 presented the empirical result of the impact of human capital in regions that belong to different group based on their average growth rate. We define high growth regions as the regions where the average GRDP growth rate from 2011 to 2015 is above the average national growth, that is 5.42%, and vice-versa.

The estimation result indicated that in the regions that experienced high growth, both tertiary education level and secondary education level is substantial to the regional growth, however in the regions that experienced lower growth, only secondary education level and the size of the labor force that are significant to growth. Moreover, we also notice that GFCF only have a significant impact in regions that have high growth.

Second, we also calculated the impact of human capital on regional economic activity based on their agriculture, manufacture and service activity shares to GRDP. The estimation result is as follow:

Table 3. Estimation result of the impact of human capital on regional economic activity based on agriculture, manufacture and service activity shares to GRDP

Dependent Variable: Gross Regional Domestic Product			
Independent variable	Regional characteristic		
	More Agriculture	More manufacture	More Service
_cons	10.028*** 2.023	16.860*** 1.097	8.0243*** 2.173
Labor Force	0.4963*** 0.141	0.0393 0.071	0.6405*** 0.152
GFCF	0.0322*** 0.010	0.0678*** 0.012	0.02432*** 0.009
Primary Education	-0.0016 0.003	-0.0009 0.003	-0.0010 0.003
Secondary Education	0.0111*** 0.004	0.0163*** 0.003	0.0111*** 0.004
Tertiary Education	0.0231*** 0.009	0.0204*** 0.005	0.0211*** 0.008
Uneducated	0 (omitted)	0 (omitted)	0 (omitted)
F-Prob	0.000	0.000	0.000
R-square	0.8052	0.9098	0.7873

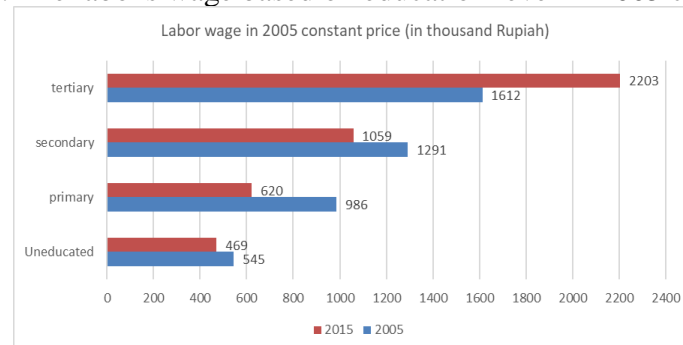
Notes: *** Significant at 1%, ** significant at 5%, * significant at 10%

Source: Author's calculation using STATA 16

As depicted in Table 3, we found that the secondary and tertiary education levels are the significant human capital variables in every characteristic of regions. However, we notice that in more manufacture regions, there's no apparent impact of the labor force to GRDP.

Third, we went further to seek any evidence of the impact of labor's education level to the Indonesian Job Market by analyzing the wage gap based on labor's education levels. Figure 1 shows the comparison of the average wage of workers in each level of education between 2005 to 2015.

Figure 1. The labor's wage based on education level in 2005 constant price



As expected, Figure 1 shows that the higher the level of education of labor, the higher the income they received. What we found interesting is that the real wage for uneducated workers and workers with secondary and primary education is lower in 2015 than in 2005. In contrast, in the case of higher education, we see substantial progress in the wage with higher education. The average real wage of workers with tertiary education in 2015 is 37% higher than it was in 2005.

This increase might be a signal that there is a shortage supply of college-educated workers in labor market. The factor that may be affected by the increase of higher education graduates wage is the shift of people who sit in managerial position from foreigner to local. When workers with high skill are not as abundant as now, firms used to employ a foreigner to sit in managerial position. However, with the growth of local workers with higher education, it is more efficient for firms to give the managerial position to local people rather than keep employing foreigner. Therefore, now, educated workers has a broader range of payment, and some with high payment can pull up the average income and make it look larger. Another factor is that as the companies grew and the use of technology became more prominent, thus, the demand of high skilled labor increased.

Lastly, for more in-depth information on Indonesia's labor market supply, we refer to analyze the change in the meantime needed by workers to find a job between 2005 and 2015. The labor's survey provides us with the data of the length of time of employed worker to find their current job and the length of time of currently unemployed workers have been spent to looking for a job. The result is as shown in table 4

Table 4. The time needed for workers to find a job (in days)

Education Level	Currently Employed			Currently Unemployed		
	2005	2015	Change	2005	2015	Change
Uneducated	6	8	33%	13	19	46%
Primary Education	18	12	-33%	42	34	-19%
Secondary Education	19	21	11%	114	96	-16%
Tertiary Education	11	21	91%	33	164	397%

The data in both years shows that as the level of education gets higher, the time needed for workers to find a job tend to increase, which is as expected. However, the waiting time for currently employed uneducated workers is 33% longer. Furthermore, in 2005 the average time for uneducated workers to endure without a job is 13 day, whereas in 2015 they have to endure 19 days without a job.

However, the most worrisome is the time needed for the higher education graduates to find a job which not only the longest among other category but also has grown a significantly longer in time. Whereas the waiting time is almost two-timed longer for workers that currently employed, from 11 days to 21 days, there is 397% increase of jobless times for unemployed higher education graduates between 2005 and 2015.

The reasoning behind this additional waiting time might be simply because more fierce competition and more time needed to match the job with the workers due larger candidates pool. However, the 397% increase of jobless times for unemployed college's graduates between 2005 and 2015 might be signaling another problem often found in emerging country that pushing higher education massification, the labor market skilled mismatched. The increase in jobless time of unemployed HE means that in 2015 the workers have spent without any

result at average of 5.5 month while looking for a job, whereas the HE graduates that currently employed can find a job within 21 days. Thus, it is likely the inability to find a job in such longer period was because the certain workers cannot meet the skill demand of the employees and therefore cannot compete with other candidates.

4. Conclusion

- 1) The level of basic education which has become a universal attribute of Indonesian is statistically insignificant towards regional performance.
- 2) Secondary education and higher education have a positive and significant effect on economic performance.
- 3) The impact of education on the regional economy through the Indonesian labor market response. Shifts in the structure of the workforce due to changes in the educational attainment of the workforce, the wage gap between the level of education and the time it takes to get a job, there is a skills mismatch in the labor market.
- 4) Further research, it is better to use a better estimation of physical capital considering that the actual physical capital data is not available. In addition, this study only uses labor education attainment data as a measure of human capital whereas there are many more measures that can be used to estimate human capital. So, we also recommend future studies to use various measures of human capital.

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