Analysis of Human Capital on Economic Growth and Labor Demand in Indonesia

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ABSTRACT

The effect of human capital on economic growth has been an issue since the existence of endogenous growth theories that include human capital as a factor of production. Likewise with the influence of human capital on labor demand. Different results from the theory are sometimes found, especially in the case of developing countries. Research that using workers' variables by calculating the underemployment rate is still rarely conducted in Indonesia. This study uses labor data in Indonesia at the provincial level from 1996 to 2018. The labor variable used takes into account open unemployment and underemployment rates. Educational variables are used to proxy human capital. Using the simultaneous equation model, we find a significant relationship between human capital factors on economic growth and labor demand. The higher the education level of the workforce, the greater the influence donated on economic growth.

Keywords: Demand Labor, Economic Growth, Education, Human Capital, Simultaneous Equation

I. INTRODUCTION

Economic growth in general can be defined as an increase in the ability of an economy to produce goods and services. Economic growth is one of the important indicators in conducting an analysis of economic development that occurs in a country, where economic activity that will generate additional community income in a given period can be demonstrated. Economic growth is also expected to cause an increase in people's income. This capacity growth is based on technological progress and the institutional and ideological adjustments it demands (Kuznets, 1973). Their economic growth is an indication of the success of economic development. In addition, economic growth in a country can be a measurement to see or analyze how far the level of economic development in the country.

The neo-classical growth theory was developed by Robert M. Solow (1956) where the model used assumed the variable of technological progress, investment, and population growth as an exogenous variable. The input variables used are capital and labor. This theory continues to develop, until one of them appears to be endogenous growth theory.

Endogenous growth theory is the development of neoclassical growth theory developed by Romer, which states that economic growth is a result of the economic system itself, where the source of long-term growth through variables contained in the model (endogenous), especially related to technology. Romer (1989) also researches and develops a theoretical framework about the role of human capital in endogenous growth models. The model built shows the long-term growth rate is endogenously determined, because of the externalities, the

equilibrium growth rate may be lower than the optimal one. The initial literacy rate also affects subsequent investment levels, and indirectly influences growth rates. Endogenous economic growth is an economic model that optimizes the country's internal potential. This model prioritizes human resources with the power of science, natural resources, technological assets, and institutions.

To increase economic growth, capital and labor are needed. Capital is the stock of assets that plays a role in providing the flow of goods and services, which contribute to human welfare. Simply put, capital is used to produce other goods and services. This capital is called manufactured capital or physical capital. In its development, the concept of capital underwent several expansions, one of which was the four-capital model by Ekin (1992), where capital was divided into four types, namely physical capital, natural capital, human capital, and social capital.

Human capital can be defined as humans who are seen as a form of capital, where capital is defined as a factor of production used to produce goods and services without consuming them during the production process. Humans have a role in all economic activities, such as production and consumption. Human capital can also be defined as a set of skills possessed by workers in the economy (Blanchard 2013). An economy that has many highly skilled workers tends to be more productive than an economy where most workers do not have literacy skills.

Labor with knowledge or called human capital becomes a factor of production which has a vital role. Economic growth can no longer rely on factors of production in the form of money and land capital, but there has been a shift where human capital is a key production factor to achieve sustainable economic growth and a weapon for a country to win global competition. This is because human capital can continue to be increased, so productivity can be

maintained and even increased. Human capital can also give birth to new discoveries, which can also support productivity.

In the production process, the high productivity of workers can be shown through the level of education that has been successfully completed, where the assumption used is the higher the level of education of workers, the more knowledge they have so as to increase productivity.

Analysis that explains the effect of human capital on economic growth has been done by many researchers. It was initiated by Romer (1989) who investigated the theoretical framework for thinking about the role of human capital in endogenous growth models. Empirical findings indicate that the initial literacy rate influences subsequent investment levels and indirectly growth rates. A similar conclusion is produced by Benhabib and Spiegel (1994) in their research that examines the impact of human capital on total factor productivity growth. The conclusion obtained is that human capital affects growth through two mechanisms, namely directly affecting the rate of technological innovation produced domestically and through the speed of technology adoption from abroad.

The influence of human capital on economic growth in the short and long term in developing countries has been investigated by Mehrara and Maysam (2013) and Adeyemi and Ogunsola (2016). Research by Adeyemi and Ogunsola aims to determine the relationship between human capital development and short-term and long-term economic growth in Nigeria. In the long run, a negative relationship was found between school participation at the primary level, school participation at a high level, public spending on health in economic growth in Nigeria. Whereas in the short term, a positive relationship was found between secondary school participation in the previous year, life expectancy, public expenditure in the education sector, gross capital formation on

economic growth. Mehrara and Maysam also conducted a study to look at the relationship between human capital approached through education and investment on economic growth using panel data for 101 developing countries. A strong relationship was found between investment and economic growth in education in these countries.

Human resource development, specifically the achievement of higher education, gives high hopes to the economic benefits generated, in the form of increased welfare. Education has a positive role in efforts to improve welfare. The level of education of the Indonesian population in the period 2011 to 2018 showed an improvement in which the number of people who had a low level of education, namely the population who had never/never attended school, did not finish elementary school and with the level of primary school education tended to decline. While the population with college/diploma and university education levels has increased. The large number of labor force and the higher level of education are potential factors of production that can improve the Indonesian economic growth.

II. METHODS AND MATERIAL

This study uses a unit of analysis at the provincial level in Indonesia. The data used are secondary data released from the Central Statistics Agency, which consists of annual data with a time span from the period 2006 to 2018. The study used panel data and simultaneous equation models. Panel data is a combination of cross-section and time series data, while simultaneous equations are models in which there is more than one regression equation, where the equations are related to one another. There are two types of variables in the simultaneous equation model, namely endogenous and predetermined variables. Endogenous variables are variables that are determined in the model, while predetermin are variables that are determined outside the model. Predetermin variables are divided into two categories,

namely exogenous variables which are exogenous now (exogenous at present) and exogenous lagged exogeneous, and lagged endogeneous variables.

Economic growth is approached through the production side, so the dependent variable used is the GRDP as an output variable. The variable used to represent human capital is the number of workers based on the level of education completed. The number of workers employed is the percentage of the number of workers minus the number of open unemployment and underemployment of the total labor force. The concepts of open unemployment and underemployment rates follow the concepts used by BPS. Open unemployment rate is the percentage of the number of open unemployment to the total labor force. Open unemployed workers are the labor force who does not have a job and is looking for work, the labor force who does not have a job and prepares a business, the labor force who does not have work and does not look for work because it is not possible to find work, and the labor force who already has a job, but has not yet start working. Half the unemployed are the labor force who work under normal working hours (less than 35 hours a week), and are still looking for work or are still willing to accept work.

The model used to analyze the effect of human capital on economic growth in Indonesia in 2006-2018 is as follows:

$$LnGDRP_{it} = \alpha_0 + \alpha_1 Emp\_SMP_{it} + \alpha_2 Emp\_SMA_{it} + \alpha_3 Emp\_PT_{it} + \alpha_4 s\_PMTB_{it-3} + \alpha_5 LnIBS_{it} + \alpha_6 g\_LF_{it} + \mu_{1it}$$

where Emp_SMP is ratio percentage of employment with education level below senior and vocational high school to total provincial labor force, Emp_SMA is ratio percentage of labor with education level senior and vocational high school to total provincial labor force, Emp_PT is ratio percentage of labor with education level above senior and vocational high school to total provincial labor force, s_PMTB is share

of gross fixed capital formation to GRDP, IBS is number of large and medium-sized industries, and g_LF is labor force growth.

Labor demand is approached through the variable employment. Human capital in this equation uses the variable number of the workforce with senior high school education levels and the workforce with diploma and tertiary education. Another variable used is the GRDP as a variable that explains output and average wages. The model used to analyze the effect of human capital on labor demand in Indonesia in 2006-2018 is as follows:\

$$\text{EMP}_{it} = \beta_0 + \beta_1 \text{LF\_SMA}_{it} + \beta_2 \text{LF\_PT}_{it} + \beta_3 \text{LnGRDP}_{it} + \beta_4 \text{LnWAGE}_{it} + \mu_{2it}$$

where LF_SMA is ratio percentage of labor force with education level senior and vocational high school to total provincial labor force, LF_PT is ratio percentage of labor force with education level above senior and vocational high school to total provincial labor force, GRDP is Gross Regional Domestic Product, and WAGE is labor average wage.

III.RESULTS AND DISCUSSION

The general method for identifying simultaneous equation models is to use order conditions. But it is possible that not all endogenous and exogenous variables in the model appear in every structural equation. To perform order conditions, first we identify endogenous and predetermined variables used in the equation system, namely M is number of endogenous variables in the model, m is number of endogenous variables contained in the equation, K is number of predetermined variables in the model, and k is number of predetermined variables contained in the equation. The general procedure for determining the identification of each structural equation in a simultaneous equation: if $K\text{-}k < m\text{-}1$, then the equation is overidentified, if $K\text{-}k = m\text{-}1$, then the equation is exactly identified, and if $K\text{-}k > m\text{-}1$, then the equation is underidentified.

Table 1. Model Identification using Order Condition

Model	K-k	m-1	Identifikasi
Economic Growth	9-6=3	1-1=0	*Over Identified*
Labor Demand	9-3=6	2-1=1	*Over Identified*

The results of the identification of the model used in this study showed that the equation was identified over identified, as listed in Table 1, so it could be continued using Three Stage Least Square (3SLS). Three Stage Least Square is a method that is applied to all equations in the model at the same time and provides an estimate for all parameters simultaneously. This method was developed by Theil and Zellner following on from Two Stage Square (2SLS). 2SLS is a method of estimating a single equation, so it belongs to the first category, the limited information method. This 3SLS procedure will produce more efficient parameter estimates than 3SLS (Juanda, 2009).

Table 2 show results of economic growth model. Variables of human capital, which is divided into workforce with basic education level, workforce with secondary education level, and workforce with higher education level, all of them significantly affect economic growth. Workers with higher education levels have the greatest coefficient, which is 0.0323882, indicating that the influence of human capital factors on economic growth is greatest given by workers with higher education levels.

Table 2. Result of Model Economic Growth Estimation

Variable	Coefficient	*Std. Error*	z-Stat	*Prob*
Emp_SMP	0.0204241***	0.0070724	2.89	0.004
Emp_SMA	0.0251117***	0.0095523	2.63	0.009
Emp_PT	0.0323882***	0.0146013	2.22	0.027
s_PMTB$_{t-3}$	0.0032373	0.0036156	0.90	0.371
lnIBS	0.5905216***	0.0189876	31.10	0.000
g_LF	0 .0181976**	0.0097112	1.87	0.061
Constanta	13.46803 ***	0.5175855	26.02	0.000
R²		0.7369		
Prob(F-stat)		0.0000		

Note: *** statistically significant 1%,
    ** statistically significant 5%

This result is in line with research conducted by Pelinescu (2015) where the conclusion produced is that there is a positive relationship between economic growth and human capital represented by the level of education. Adeyemi and Ogunsola (2016) also concluded that in the short term, a positive relationship was found between human capital and gross capital formation on economic growth.

The number of large and medium industries and the growth of the labor force also affect economic growth, while investment has not been able to show its effect on economic growth in the model used. The factor that showed the greatest influence on economic growth was the number of large and medium-sized companies, with a coefficient of 0.5905216. Labor force growth showed the smallest contribution among all influential variables, with a coefficient of 0.0181976. Increase in number of large and medium-sized industrial companies will increase output in the region, due to the production of these companies. The growth of the labor force will also increase labor stock, as a factor of production, so that when absorbed in the labor market it will also increase output.

Table 3 shows the estimation results of the model used to see the effect of human capital on labor demand. F -test results with a probability value of 0.000 indicate that the variables in the model can explain the effect of human capital on labor demand. R² value of 0.2811 can be interpreted as variables in the model able to explain labor demand as much as 28 percent, while the rest is explained by other variables that are not in the model.

Table 3. Result of Model Labor Demand Estimation

Variable	Coefficient	*Std. Error*	z-Stat	*Prob*
LF_SMA	0.069399**	0.034252	0.034252	0.043
LF_PT	0.410928***	0.0816216	0.0816216	0.000
LnGRDP	0.644084***	0.2196108	0.2196108	0.004
LnWAGE	4.334413***	1.044204	1.044204	0.000
Constanta	2.500615	14.90982	14.90982	0.867
R²		0.2811		
Prob(F-stat)		0.0000		

Note: *** statistically significant 1%,
    ** statistically significant 5%

Human capital factors in this model, namely the labor force with education level senior and vocational high school and the labor force with education level above senior and vocational high school both show a significant relationship to employment. The effect of a higher level of education will facilitate the labor force in obtaining work as evidenced by the greater coefficient of the labor force variable with education level above senior and vocational high school, that is equal to 0.410928 compared to the labor force variable with education level senior and vocational high school with a coefficient of 0.069399.

This shows that the labor force group with higher education level is more interested in the labor market compared to the workforce group with secondary education level. This result in line with research Lavrinovicha et al (2015) which states that the labor force with a higher level of education will be more competitive in the labor market. The effect of education on labor in the labor market has also been proven, where the higher the level of education, the faster the workforce will find work in the labor market.

The increase in demand for goods and services will also increase production by firm, which will increase the need for factors of production. Demand for labor as one of the factors of production will also increase. This is in accordance with the estimation results generated by the model, where GRDP has a significant effect on labor demand. Likewise with wages. The increase in wages will affect the increase in labor supply. Increase in labor demand by firm will make employment rise.

IV. CONCLUSION

Human capital is proven to have a significant effect on economic growth, where the level of education of the workforce can increase economic growth. This is evidenced by the greater influence of labor with education levels above high school compared to labor with high school education levels and workers with education levels below high school. Workers with high school education also have a greater influence compared to workers with education levels below high school.

In the labor demand model, human capital also shows significant results in increasing labor demand. This is evidenced by looking at the labor force group with senior high school education and labor force group with education above senior high school. Workforce groups with higher levels of education show a greater influence, which means these labor force groups are more in demand by firms to be employed in the production process.

This conclusion confirm the importance of the education factor as one approach to human capital, because the level of education completed is proven to affect economic growth and employment in the labor market. Other variable approaches besides education level as one of the other human capital factors can also be added in further research.

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