



Growth accounting model in Indonesia

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ABSTRACT

Based on growth accounting model, economic growth can be approximated by capital accumulation, human capital, labor, and total factor productivity. In this study, total factor productivity as a residual. This study used World Bank Indicator data from 1990 to 2021. This study stated that capital and labor have positive impact to economic growth, although human capital has not impact to economic growth. Human capital has not impact in t period. This is because it needs lag to everyone in implement value from human capital investment.

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INTRODUCTION

The year 1990 was an era of recovery from the old order era. During this era, the government paid attention to improving welfare through economic and social development. The government restored economic, social and political stability and rehabilitated the domestic economy. Efforts made at that time were controlling inflation, reducing the government's financial deficit, strengthening the industrial sector, and preparing the Rencana Pembangunan Lima Tahun (REPELITA). These efforts were supported by conditions where there was political and economic stability, better human resources, and better world economic and political conditions. As a result, the recovery efforts were successful. Economic policies during the New Order period did result in a process of rapid economic transformation and a high rate of economic growth, but with high economic costs and fragile economic fundamentals. This was due to the poor condition of the national banking sector and Indonesia's growing dependence on foreign capital, including loans and imports. In the end, Indonesia was hit by a major economic crisis, beginning with the rupiah exchange rate crisis against the US dollar in mid-1997. As a result, investors withdrew their funds. Eventually, the bath currency depreciated to its lowest value of 28.20 baths per US dollar. The crisis in Thailand spread to Indonesia and several other Asian countries and was the beginning of the financial crisis in Asia. Bank Indonesia (BI) intervened. However, the intervention had no effect, the value of the rupiah against the US dollar continued to be depressed and weakened until it reached 11,000 rupiahs per US dollar, which was originally only 2,500 rupiahs per US dollar. Finally, Indonesia requested financial assistance from the International Monetary Fund (IMF) as was done by Thailand, the Philippines and South Korea. The efforts that had been made were not able to save Indonesia, but instead

exacerbated the crisis, which was originally only a rupiah crisis turned into an economic crisis (Tambunan, 2014). As a result, the Indonesian economy contracted by 13.12%.

In 2000 the Indonesian economy began to improve and managed to score another growth of 0.79%. After the crisis, Indonesia's economy stabilized and had an increasing trend. However, in 2008 there was a crisis in the United States due to bad loans in the housing sector. This crisis spread to Indonesia and made the Indonesian economy experience a slowdown and only scored 4.62% in 2009. The stronger economic foundation caused the impact of the economic crisis to be less profound than the economic crisis in 1997/1998. Although the crisis returned to Indonesia in 2011, namely the crisis in Europe, the economy remained stable despite the slowdown. Indonesia's economy contracted again in 2020. This is due to the Covid-19 that entered Indonesia in early March 2020. The contraction that occurred reached 2.07%. However, the impact of Covid-19 did not last long, because Indonesia returned to positive growth of 3.69%. To know in depth about economic growth in a country, growth accounting is needed based on theory (Mankiw Gregory et al., 1992). Based on this theory, economic growth is determined by the accumulation of capital, human capital, labor, and Total Factor of Production (TFP).

Studies on growth accounting have been conducted in many countries. (Jefferson, 2016), (Grandes Kerlleñevich & Frizzera, 2020), (Cette et al., 2022), (Haque, 2019), (Gong, 2020), (Sinha & Sinha, 2022), (Bacovic, 2021), (Crafts & Woltjer, 2021), (Sequeira & Morão, 2020), (del Río & Lores, 2021), (Malik & Masood, 2020), (Mahmoudi, 2021), dan (Nkoro & Uko, 2019). (Malik & Masood, 2020) conducted a study in MENA (Middle East and North African) countries. The results of his study state that capital/physical capital has a positive and greater effect when compared to labor, Total Factor Productivity (TFP) has a negative effect (except Tunisia), while human capital has no effect on economic growth. Another case with (Nkoro & Uko, 2019) who conducted a study in Nigeria. The results of his study show that all variables, both capital growth, labor, and Total Factor Productivity (TFP) are positively correlated with economic growth. (Mahmoudi, 2021) conducted a study in Iran. As a result, capital plays a significant role in economic growth. Steady state of effective capital is 4.27.

Therefore, this study will identify factors that can affect economic growth based on the growth accounting model. It is expected that both capital, human capital, and labor have a positive effect on economic growth. Of the three, it can be seen which influence is the largest. Later, the variable with the greatest effect will be optimized to boost economic growth.

RESEARCH METHOD

Variables and Measurement

All data used in this study comes from the World Bank Indicator with data range from 1990 to 2021.

The dependent variable, namely economic growth (in percent)

Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

Independent variables, consisting of:

(a). Capital (in percent) outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. (b). Human Capital (in percent) using

the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers. (c). Labor (in number of people) using labor force comprises people ages 15 and older who supply labor for the production of goods and services during a specified period. It includes people who are currently employed and people who are unemployed but seeking work as well as first-time job-seekers. Not everyone who works is included, however. Unpaid workers, family workers, and students are often omitted, and some countries do not count members of the armed forces. Labor force size tends to vary during the year as seasonal workers enter and leave.

Model Specifications

To determine economic growth in a country, growth accounting is needed based on the theory (Mankiw Gregory et al., 1992). The equation as follows:

$$Y = f(K, H, A, L) \quad (1)$$

$$\frac{\partial Y}{\partial Y} \cdot \frac{dy}{dt} = \frac{\partial F}{\partial K} \cdot \frac{dK}{dt} + \frac{\partial F}{\partial H} \cdot \frac{dH}{dt} + \frac{\partial F}{\partial A} \cdot \frac{dA}{dt} + \frac{\partial F}{\partial L} \cdot \frac{dL}{dt} \quad (2)$$

$$\dot{Y} = F_K \cdot \dot{K} + F_H \cdot \dot{H} + F_A \cdot \dot{A} + F_L \cdot \dot{L}. \quad (3)$$

If all equations are divided by Y, then:

$$\frac{\dot{Y}}{Y} = \frac{F_K \cdot \dot{K}}{Y} \cdot \frac{K}{K} + \frac{F_H \cdot \dot{H}}{Y} \cdot \frac{H}{H} + \frac{F_A \cdot \dot{A}}{Y} \cdot \frac{A}{A} + \frac{F_L \cdot \dot{L}}{Y} \cdot \frac{L}{L} \quad (4)$$

Where $\frac{F_K \cdot \dot{K}}{Y} = \alpha$; $\frac{F_H \cdot \dot{H}}{Y} = \beta$; $\frac{F_L \cdot \dot{L}}{Y} = 1 - \alpha - \beta$ and $\frac{F_A \cdot \dot{A}}{Y} \cdot \frac{A}{A} =$ Total Factor Productivity (TFP),

so:

$$\frac{\dot{Y}}{Y} = (\alpha) \frac{\dot{K}}{K} + (\beta) \frac{\dot{H}}{H} + TFP + (1 - \alpha - \beta) \frac{\dot{L}}{L} \quad (5)$$

where the Total Factor of Production (TFP) in the equation above is the residual, thus:

$$PDBt = \beta_0 + \beta_1 \text{Capital Formation}_{t-1} + \beta_2 \text{Secondary School}_{t-1} + \beta_3 \text{Labor}_{t-1} + \varepsilon_t \quad (6)$$

In accordance with the theory, the expected values of β_1 , β_2 , and $\beta_3 > 0$ mean that capital formation, secondary school, and labor have a positive impact on economic growth.

Analysis Method

The method of analysis used is multiple regression analysis by looking at the relationship between the independent variables, namely capital formation, secondary school, and labor with the independent variable, namely economic growth.

RESULTS AND DISCUSSIONS

Using the model specification in the previous discussion, the following output is generated:

Table 1. Capital and labor

Variabel	Coefficient	Probability
d(Capital)	0.876167	0.0193
d(Human Capital)	0.059986	0.8564
Log(Labor)	0.245155	0.0000

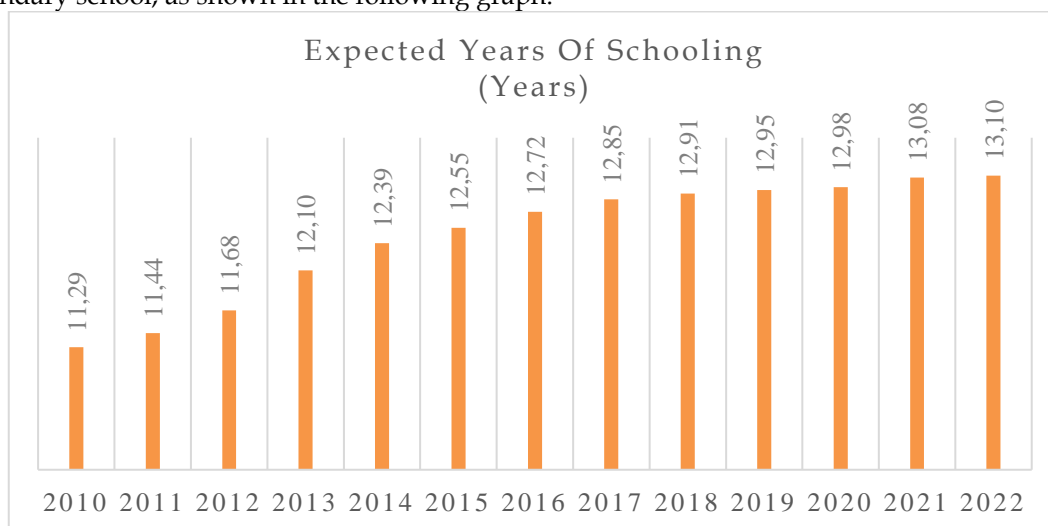
Source: processed (EViews Software, 2022)

Based on the results above, it can be concluded that Capital and Labor have a positive effect on economic growth, while human capital has no effect on economic growth. Human Capital has no effect in period t. This is because there needs to be a lag for someone to be able to enjoy the results of an investment in human capital. For example, to be able to get a job, one must pass the waiting time, so that human capital will affect economic growth in t + 1. Capital has the biggest role in

boosting economic growth. Capital can be in the form of fixed assets. Examples of fixed assets include infrastructure development.

Infrastructure is the driving force of a country's economy and therefore infrastructure development contributes to national development. This activity is reflected in the construction sector where according to the Indonesian Standard Industrial Classification (KBLI) construction is an economic activity in the form of general construction and construction of building works and civil buildings. The role of the construction sector itself is quite large in the structure of Indonesia's Gross Domestic Product (GDP) at least in the last 10 years where the average contribution reached 10.53%. As for the first quarter of 2022, its contribution reached 10.42% of the national GDP. The government's efforts in infrastructure development are carried out by allocating the state budget for infrastructure as well as various policies that can accelerate its development. The Ministry of Public Works and Public Housing is one of the ministries/institutions that receives the largest state budget allocation. In 2021, the Ministry of PUPR received an APBN of 161.3 Trillion. This budget has an increasing trend every year both in terms of allocation and realization as part of the government's commitment to accelerate infrastructure development so that basic community services are guaranteed. The budget is allocated to water resources management programs, connectivity infrastructure, housing and settlement development and various other related activities (PUPR, 2022).

In addition to capital, the factor that also boosts economic growth is human capital. The expected years of schooling in Indonesia has an increasing trend from year to year. In 2022, the expected length of schooling for Indonesians is 13.10 years. This means that Indonesians are increasingly aware of the importance of education, so they want to continue their education to secondary school, as shown in the following graph:



Source: (Badan Pusat Statistik, 2017)

Figure 1. Expected length of schooling for Indonesians

Labor is no less important as capital in creating national economic growth. Indonesia is currently experiencing a demographic bonus phenomenon, where the number of productive age population (15-64 years old) is greater than the non-productive age population (under 15 years old and over 64 years old). This phenomenon is predicted to continue from 2030 to 2040 (Bappenas Press Release, 2017). This means that Indonesia has an abundant supply of labor. If it can be managed well by the government, then this workforce will become capital to boost Indonesia's economic growth.

CONCLUSION

Based on the model (Mankiw Gregory et al., 1992) of growth accounting, economic growth is determined by the accumulation of capital, human capital, labor, and total factors of production. In this study, total factors of production are considered as residuals. The results of this study state that capital and labor have a positive effect on economic growth, while human capital has no effect on economic growth. Human capital has no effect in period t . This is because there needs to be a lag for a person to be able to enjoy the results of an investment in human capital. For example, to be able to get a job, one must pass the waiting time, so that human capital will affect economic growth in $t + 1$. Capital has the biggest role in boosting economic growth. Capital can be in the form of fixed assets. Examples of fixed assets include infrastructure development. Infrastructure is the driving force of a country's economy and therefore infrastructure development contributes to national development. Apart from capital, the factor that also boosts economic growth is human capital. The expected years of schooling in Indonesia has an increasing trend from year to year. In 2022, the expected length of schooling for Indonesians is 13.10 years. This means that Indonesians are increasingly aware of the importance of education, so they want to continue their education to secondary school. Labor is no less important as capital in creating national economic growth. Indonesia is currently experiencing a demographic bonus phenomenon, where the number of people of productive age (15-64 years) is greater than the population of unproductive age (below 15 years and above 64 years). This phenomenon is predicted to continue from 2030 to 2040 (Bappenas Press Release, 2017). This means that the supply of labor in Indonesia is abundant. If it can be managed properly by the government, then this workforce will become capital to boost Indonesia's economic growth. Suggestions for future research, it is necessary to use the Human Development Index variable with the latest method in proxying the human capital variable, because it has not been used in this study due to data limitations.

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