The Economy of Indonesia: Driven by Physical or Human Capital?

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Abstract

This study aims to analyze whether economic growth in Indonesia is driven by physical or human capital using panel data analysis consisting of all provinces over the last nine years. The estimation results show that the Indonesian economy is more likely to be driven by physical than human capital. The formation of human capital that has a significant positive effect on economic growth is health. However, the education variable represented by the mean years schooling has no significant effect on economic growth when including the control variable in the research model. To improve the quality of education, the state requires the government to provide substantial educational spending. However, the budget has not been used optimally so that the expected achievements of graduates are not achieved. In addition, education spending has not met the criteria for quality spending. In contrast to education spending, an increase in health spending will increase economic growth by improving the quality of health and life expectancy. A healthier society will have a high level of productivity that impacts the regional and national economy.

Key words : Physical Capital, Human Capital, Education, Health, Economic Growth.

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INTRODUCTION

The questions about a macroeconomic situation such as why some countries are rich and others poor, why do countries grow, and how government policies in promoting economic growth are classic questions and are still relevant and important to be discussed (Romer, 2018). There are many thinkers and writers who discuss this big question, some of which are well known, including Smith (1776) who wrote the book "An Inquiry into the Nature and Causes of the Wealth of Nations", Marx (1867) in "Capital: A Critique of Political Economy", Diamond (1997) in "Guns, Germs, and Steel: The Fates of Human Societies", and Acemoglu & Robinson (2012) in "Why Nations Fail: The Origins of Power, Prosperity, and Poverty".

Economists and organizations from different parts of the world are debating and each one of them offers theories for the developing countries as a generic recipe in response to economic backwardness. One of the recipes offered is globalization. With globalization, there will be interactions between countries in the economic, political, social, cultural, and environmental fields. In the economic field, globalization is characterized by the flow of international trade, money, capital, technology, and labor. Globalization would increase interdependence between countries.

Indonesia as a small open economy country is very dependent on the global economic climate. It is the reason why in economic development planning, the government always considers external conditions. In an open economy, as it is today, economic contention between superpowers greatly impacts developing countries, especially through trade flows, capital, and technology. Other than having to deal with external problems, Indonesia

still has ponderous and complex internal problems especially since it is trapped in a group of lower-middle-income countries, and losing to its neighboring countries such as Malaysia and Thailand which have entered into the group of upper-middle-income countries. With a relatively low GDP per capita, Indonesia is faced with poverty and relatively high inequality problems. The number of poor people is still relatively high, 27.54 million (10.19%) from 269.60 million people in September 2020. This figure is still relatively high in absolute terms and is quite concerning, even though in 2019 (before the Covid-19 pandemic) the poverty level less than 10%. 56.30% of the 27.54 million poor population is spread in rural areas, and 43.70% is spread in urban areas (BPS-Statistics Indonesia, 2020). Oxfam and INFID's research stated that the assets of the four richest people are equal in value to the merging of wealth of 100 million poor people in Indonesia. It means, the high average economic growth enjoyed only by several people in Indonesia. Credit Suisse also reported similar data that 1% of Indonesia's richest people-controlled 45% of total wealth in 2019 (welfare inequality 83.3%). Meanwhile, the wealth of 40% of the poor people only reached 3.7% in 2019 (Global Wealth Report, 2019).

One of the efforts to overcome this problem is by increasing the domestic income which is driven by investment both from abroad and domestic (Nurkse, 1953). On condition that the domestic savings supply is not enough, attracting foreign investment is done to earn the fund. In a variety of macroeconomic literature, the classical view always emphasizes that to achieve high economic growth, it requires the capital accumulation gained from physical capital investments such as transportation, communication, manufacturing facilities and other facilities that can support the economy (Solow, 1956, 1962). The formation of physical capital accumulation could increase economic productivity thereby increasing

economic growth (Sarel, 1996). The latest empirical research results exhibits a positive relationship in the formation of physical capital in economic growth as found by Shuaib & Ndidi (2015) in Nigeria, Ali (2015) in Pakistan, Gibescu (2010) in several European countries, Ghosh (2019) in Japan and South Korea, and Boamah et al., (2018) in 18 Asian Countries. However, there are other empirical studies that have found different results. Akalpler & Adil (2017) examined the economy in Singapore and found that physical capital accumulation has no impact on economic growth in the long run. This happens because the formation of physical capital is not intended for productive activities, so it does not give value to the economic performance of the country. Thus, an increase in physical capital reduces the number of resources available for productive

use. Rani & Kumar (2019) examined the BRICS group of countries and found that physical capital formation had no influence on economic growth in several countries, namely Brazil, India, and China. The study of Meyer & Sanusi (2019) found that capital formation had no impact on economic growth in South Africa.

Figure 1 shows an indication of the relationship between GDP per capita and the ratio of gross fixed capital formation (GFCF) to GDP in 152 countries in 2020. Visually, countries with high GFCF ratios do not always have high per capita income. Countries with high per capita income generally have a ratio of GFCF to GDP in the range of 20% to 30%, but there are olso many countries that have low per capita income at that ratio. In some ASEAN countries, Indonesia has the highest GFCF to GDP ratio of around 32% but has a lower per capita income compared to Singapore, Malaysia, and Thailand
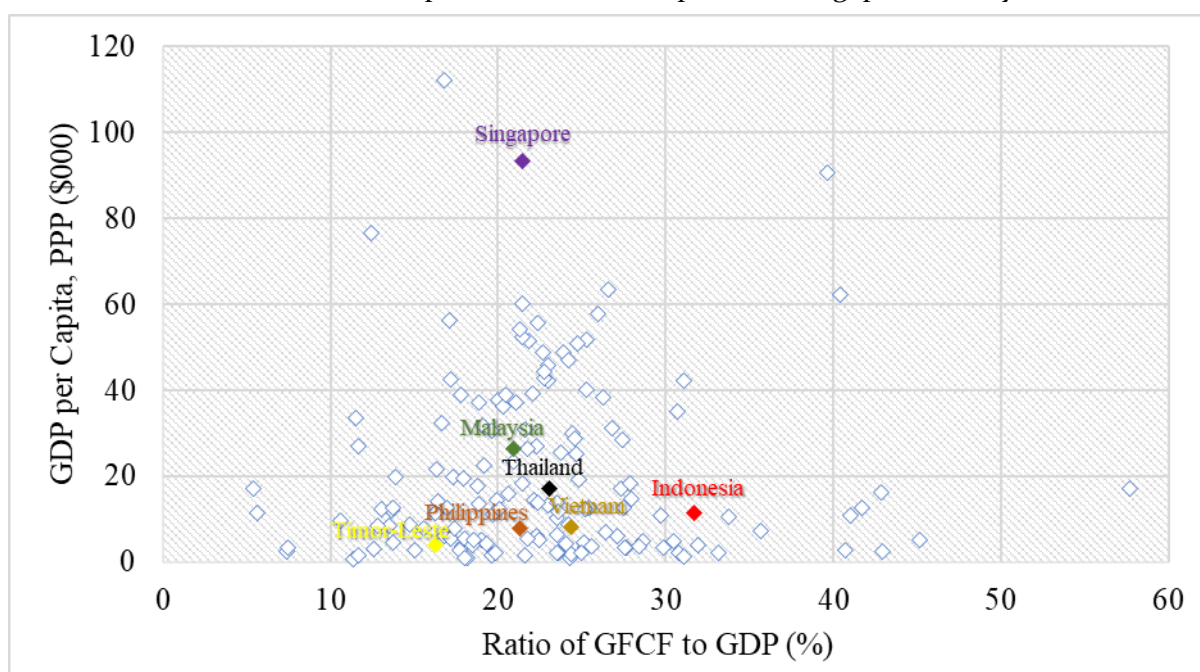
Note: Certain countries are labeled for illustrative purposes
Source: World Bank, 2020 (data processed)

Figure 1. Indications of the Relationship between GFCF and GDP per Capita

In addition to the investment of physical capital, human capital investment will also provide fundamental economic benefits in the long run. On the other hand,

the advantages of this investment mostly require time to be realized and rarely considered by the community. It is one of the reasons why policymakers are not prioritizing

programs in order to support the formation of human capital (Kraay, 2018). Heckman (2003) pleaded economic performance can be improved by increasing more in human capital and creating a highly educated labor force. The economic performance can be improved by making-even the returns on both physical and human investment. Human capital has a high rate of return. This high rate of return on human capital can be achieved by liberating the labor market, removing regional disparities in wages and access to education, and unlocking human capital markets to fund the human capital formation. Increasing the government's spending can also boost the human capital.

Research showing that human capital is an important factor in economic growth was initiated by several researchers, (Uzawa, 1965; Razin, 1972; Mincer, 1984; Lucas, 1988; Romer, 1990; and Mankiw et al., 1992). In the latest literature that investigates the relationship between human capital and economic growth, different results are found. Oyinlola & Adedeji (2019) found a positive result of human capital on the inclusivity growth in Sub-Saharan Africa. Raheem et al., (2018) in their research using panel data from 18 countries showed that increasing government spending toward education and health will increase growth in GDP per capita. Meanwhile, research by Wei (2008) in China and Tahir et al., (2022) in Brunei Darussalam showed that there is no significant correlation between human capital and economic growth. They suspect that human capital has an indirect effect through physical capital. It implies the increase in regional growth gaps, which happens because physical capital investment resumes to gather fast in the east, and greater human capital reserves, as the result of that, encouraging substantial economic growth in the east.

The issue of developing human resources in Indonesia has come under the spotlight of the people, where the government is deemed biased towards physical capital investment. This is not surprising when the World Bank (2020) publishes Indonesia's human capital index occupying 96th position out of 174 countries in the world. In ASEAN. Indonesia is inferior to Singapore (1), Vietnam (37), Malaysia (63), and Thailand (65). Figure 2, visualizing the relationship between the human capital index (HCI) and GDP per capita. The tendency is, when the human capital index is high, GDP per capita is also high.
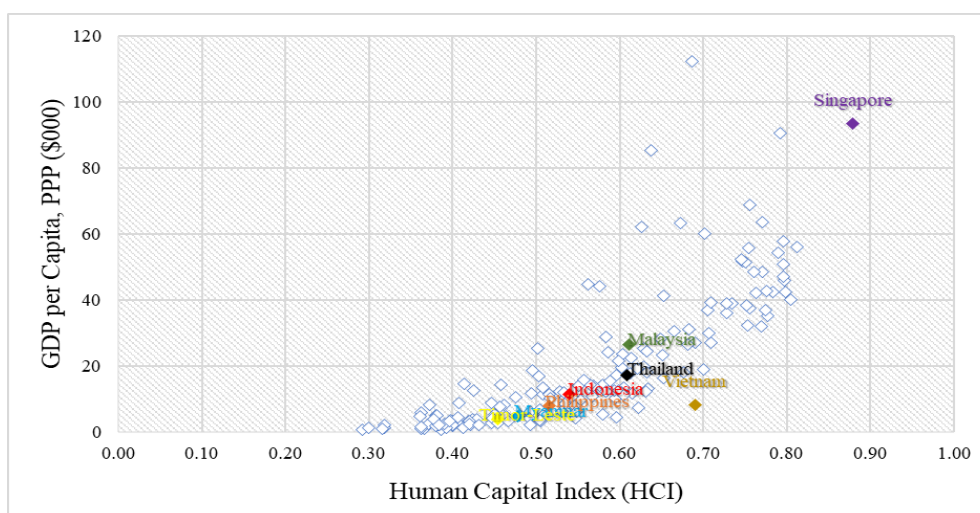
Note: Certain countries are labeled for illustrative purposes
Source: World Bank, 2020 (data processed)

Figure 2. Indications of the Relationship between the HCI and GDP per Capita

Both physical capital and human capital are considered to take part in a large role in driving economic growth. Galor & Moav (2004) developed a growth theory that captures the substitution of the accumulation of physical capital with the accumulation of human capital as the main engine of growth throughout the development process. They stated that in the early stage of the Industrial Revolution, inequality caused by accumulation of physical capital, which is the main resource in economic growth, caused the distribution of the resources to the capital owners whose marginal propensity to save is high. However, at a later stage of development, when returns of human capital increase due to the integration between physical capital and skills, human capital becomes the main motor of economic growth.

Amiruddin et al., (2019) conducted a study with panel data to find human and physical capital are interrelated. Increase in physical capital is considered to influence the accumulation of human capital and conversely. Physical capital investment positively influences human capital accumulation, but the impact of investment in human capital on physical capital accumulation is not similar. The results show that in order to collect physical capital that depends on resource constraints, low-income countries must focus mostly on basic education while high-income countries must invest in secondary education and mainly in

tertiary education. Li et al., (2015) conducted research in China after the reform using panel data that found that physical and human capital contributed to economic growth, caused by physical capital accumulation and increased labor productivity. Similar results were also found by Pomi et al., (2021) in Bangladesh where both human capital and physical capital can contribute to economic growth in different time dimensions, but their respective efficiency varies.

Based on this background, the authors are interested in examining more deeply the effect of physical and human capital on the growth of Indonesia economy. Whether investment in physical capital and human capital jointly encourage economic growth, or whether there is a bias against one of them. The findings from this study are expected to be a reference for the government in determining the direction of the Indonesia economy.

METHOD

This research uses secondary data in the form of time-series data from 2010-2018 and cross-section data from 33 provinces in Indonesia. The data was obtained from BPS-Statistics Indonesia. In literature studies, data and information are obtained from international and national journals, books, and other scientific literatures. Table 1 details the variables used in this study.

Table 1. Research Variables

No.	Variable	Information
1	grdp_c	Gross regional domestic product per capita at constant prices (=2010)
2	gfcf_c	Gross fixed capital formation per capita
3	Hci	Human capital indeks
4	Edu	Mean years schooling
5	Health	Life expectancy at birth
6	hc_er	Ratio of human capital expenditure to total

No.	Variable	Information
		expenditure
7	edu_er	Ratio of education expenditure to total expenditure
8	health_er	Ratio of health expenditure to total expenditure
9	Ict	Information & communication technology indeks
10	Toi	Trade openness indeks
11	P	Inflation (obtained from the GRDP deflator)
12	Pmw	Provincial minimum wage
13	Unemp	Open unemployment rate
14	Pop	Total population

Source: BPS-Statistics Indonesia (2010-2018)

The hci variable value is a standardized result calculated as a geometric mean with the formula √ (education _ index * health _ index). The education and health index calculations refer to the formulations issued by UNDP and BPS-Statistics Indonesia. The education index in this study was formed from edu variables, while the health index was formed from health variables. Furthermore, this research also formed ict variables which were also calculated using geometric averages. This variable consists of the percentage of households that use computers, the percentage of residents who use mobile phones, and the proportion of individuals who use the internet. Finally, the trade openness index variable is proxied by the sum of exports and imports as a ratio of Gross Regional Domestic Product (GRDP) at constant prices (=2010). In addition to using the variables in Table 1, this study is also supported by secondary data sourced from Bank Indonesia and the World Bank, namely GDP per capita, PPP (2020) and Human Capital Index in 2020.

The effect of physical and human capital on Indonesia's economic growth can be analyzed using the panel data regression analysis method consisting of a combination of cross-section data (33 Provinces) and time-series (2010-2018). Provincial expansion after 2010 will be combined with the main province. Data processing is performed using Microsoft Excel 365 and STATA 15 software.

According to Verbeek (2017), there are two advantages of using panel data models over time-series or cross-section data only. By combining time-series and cross-sections data, the number of observations data becomes more. In panel data, the marginal effect can be seen from the time and individual dimensions, so the parameters measured will be more precise than other models. Another advantage of the panel data model is that it reduces identification problems. Panel data is better at identifying and measuring effects that simply cannot be overcome in cross-section or time-series data only. Panel data can control the heterogeneity of individuals so that the estimation made can explicitly include the element of individual heterogeneity. The same thing was also conveyed by Ekananda (2018) who stated that estimating on panel data simultaneously could predict individual characteristics by taking into account the dynamics between time of each variable. Therefore, the estimation results of the panel data model are more comprehensive and cover things that are closer to reality.

Generally, the panel data model can be written as follows (Nachrowi, 2018):

$$y_{it}=\alpha+\beta y_{it}+\varepsilon_{it} \tag{1}$$

Where: i = 1, ..., N (cross section) and t = 1, ..., T (time series dimension).

Parameter estimation in the panel data model can be estimated using Pooled Least Square (PLS), Fixed Effect Model (FEM) and Random Effect Model (REM) techniques (Gujarati, 2021).

The PLS model is a simple regression technique by combining cross section and time series data as a single observation which is used to estimate the model using the Ordinary Least Square (OLS) method. According to Baltagi (2008), this model is commonly known as the common effect estimation model which is also referred as a model without individual influence. The panel data model can be expressed in the following equation:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \qquad (2)$$

In contrast to PLS, the FEM model assumes that differences between individuals can be accommodated from differences in intercepts. This estimation model is often also called the Least Squares Dummy Variable (LSDV) technique. Individual effects can be captured by entering a dummy variable into the model using the following OLS method:

$$Y_{it} = \alpha_i D_i + \beta X_{it} + \varepsilon_{it} \qquad (3)$$

Furthermore, in the REM model, differences in individual characteristics and time are accommodated in the error of the model, unlike FEM which is accommodated in intercepts. This technique also considers that errors may correlate across time series and cross-sections.

$$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}; \varepsilon_{it} = u_{it} + v_{it} + w_{it} \qquad (4)$$

Where: $u_{it} \sim N(0, \delta u2)$ is cross section error component, $v_{it} \sim N(0, \delta v2)$ is time series error component, $w_{it} \sim N(0, \delta w2)$ is a combination error component. It is also assumed that individual errors are uncorrelated with each other as well as their combination errors. The REM can save the use of degrees of freedom and not decrease the amount as is done on a fixed-effect model. This causes that the parameters which are the estimation results will be efficient. The more efficient the model, the better result it gets.

This study adopts and modifies the model used (Azam & Ahmed, 2015). We use gdfcf_c, hci, edu, health, hc_er, edu_er, and health_er as independent variables. The variables ict, toi, p, pmw, unemp, pop, and dummy for island (di) are used as control variables. Meanwhile, the grdp_c variable is used as the dependent variable. The grdp_c, gdfcf_c, pmw, and pop variables are expressed in natural logarithmic form. There are ten variations of the model formulated to estimate this effect.

RESULTS AND DISCUSSION

In determining the analysis technique used in panel data regression, there are three types of testing that must be performed. The first test is to do the Chow test. The Chow test is performed in determining the best technique used between PLS or FEM techniques. The decision to use FEM technique if the Chow test results show the F-probability value of the cross-section is less than the confidence level. Next, in the second test, the Hausman test was performed in choosing whether FEM or REM is better in panel data regression. The decision to use FEM or REM can be seen from the probability value of Chi Square (Chi²). If the Chi² probability is less than the confidence level then use FEM, and if the probability is more than the confidence level then use REM. Finally, the Lagrange Multiplier (LM) test is performed to choose whether REM or PLS is better. If the calculation result of the LM value is greater than the Chi² table, the model to be used is the REM model and vice versa. Table 2 shows the selection of the best panel data model result for the ten developed models. Based on the test results, the best model chosen is FEM for the whole model.

After determining the best model with a model selection test, the estimation results are then obtained using FEM to be able to explain the determinant of economic growth in

Indonesia. The way to interpret the results in the panel data regression model is not different from the multiple regression interpretation. First, an interpretation of the R-squared (R^2) value is performed which shows how much the independent variable can explain precisely the dependent variable, the rest is explained by other variables outside the model. Based on Table 2, the R^2 values from model 1-10 range from 0.7772 to 0.9470. This shows that the independent variables chosen together in each model can explain the diversity of economic growth of at least 77.72 percent. F-test results on all models indicate that all independent variables simultaneously have a significant influence on GRDP per capita.

Tabel 2. Results of Panel Data Model Estimation

Independent Variable	Description	Dependent Variable: ln_grdp_c → Gross regional domestic product per capita at constant prices (= 2010)									
		Coefficient									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ln_gfcf_c	Gross fixed capital formation per capita	0.7713***			0.5500***	0.5093***	0.2753***			0.259***	0.2351***
		(0.0190)			(0.0349)	(0.0363)	(0.0326)			(0.0351)	(0.0338)
hci	Human capital indeks		0.0897***		0.0312***			0.0193***		0.0106*	
			(0.0030)		(0.0043)			(0.0059)		(0.0055)	
edu	Mean years schooling			0.1968***		0.0796***			0.0155		-0.0054
				(0.0274)		(0.0224)			(0.0244)		(0.0226)
health	Life expectancy at birth			0.1483***		0.0580***			0.0787***		0.0608***
				(0.0186)		(0.0155)			(0.0132)		(0.0124)
hc_er	Ratio of human capital expenditure to total expenditure							-0.0019**		-0.0001	
								(0.0009)		(0.0008)	
edu_er	Ratio of education expenditure to total expenditure								-0.0028***		-0.0013
									(0.0010)		(0.0009)
health_er	Ratio of health expenditure to total expenditure								0.0021		0.0037***
									(0.0014)		(0.0013)
ict	Information & communication technology indeks						0.0052***	0.0041***	0.0043***	0.004***	0.0042***
							(0.0010)	(0.0013)	(0.0013)	(0.0012)	(0.0012)
toi	Trade openness indeks						0.0011***	0.0016***	0.0016***	0.0011***	0.0012***
							(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
p	Inflation (obtained from the GRDP deflator)						0.1484**	0.3152***	0.2382***	0.1447**	0.0963*
							(0.0597)	(0.0609)	(0.0588)	(0.0600)	(0.0577)
ln_pmw	Provincial minimum wage						0.1236***	0.1466***	0.1353***	0.1217***	0.1163***

| Independent Variable	Description	Dependent Variable: ln_ grdp_c → Gross regional domestic product per capita at constant prices (= 2010)									
		Coefficient									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
							(0.0225)	(0.0248)	(0.0236)	(0.0228)	(0.0218)
unemp	Open unemployment rate						-0.0032	-0.0048**	-0.0035	-0.0033	-0.0023
							(0.0022)	(0.0025)	(0.0023)	(0.0022)	(0.0021)
ln_pop	Total population						-0.5655***	-0.7617***	-0.7653***	-0.5788***	-0.5980***
							(0.0517)	(0.0507)	(0.0477)	(0.0523)	(0.0500)
di	Dummy variable for island (1=Java, 0=others)						0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
							(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
c		3.2598***	4.8892***	-1.4959	3.395***	1.0181	15.1880***	19.2087***	15.0396***	14.9495***	12.0458***
		(0.1736)	(0.1788)	(1.0949)	(0.1596)	(0.8477)	(0.9271)	(0.8318)	(1.0984)	(0.9508)	(1.0962)
Number of observations		297	297	297	297	297	297	297	297	297	297
R-Squares		0.8623	0.7772	0.8077	0.8856	0.8903	0.9400	0.9282	0.9369	0.9409	0.9470
F-Statistic		1646.37***	917.43***	550.16***	1013.66***	706.03***	501.64***	366.28***	341.41***	404.39***	375.54***
Model Selection Criteria											
- Chow test (p-value cross-section Chi²)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
- Hausman test (p-value cross-section random Chi²)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
- Lagrange Multiplier test (p-value Breush-Pagan Chibar²)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Decision		FEM	FEM	FEM	FEM	FEM	FEM	FEM	FEM	FEM	FEM

Note: *** $p < 0,01$; ** $p < 0,05$; * $p < 0,1$; parentheses are the standard error

Source: Author's calculation uses Stata 15

The partial estimation results show that physical capital which is proxied using GFCF has a significant positive impact on economic growth for the whole model. In the first model, it is seen that if GFCF increases by 1%, then economic growth increases by 0.77%, but the effect is corrected to 0.23% when incorporating other variables into the model. These results are in line with modern economic theories and other empirical research findings such as those conducted (Shuaib & Ndidi, 2015; Ali, 2015; Gibescu, 2010; Ghosh, 2019; and Boamah et al., 2018). This result is different from the findings of Azam & Ahmed (2015) research which found that the GFCF did not significantly affect economic growth.

Physical capital plays a significant task in the Indonesian economy. The display in Figure 3 makes it easy to map GFCF per capita and GRDP per capita by province. There is a tendency that provinces that have a high per capita GFCF will have a high per capita GRDP. The provinces of DKI Jakarta is superior among other provinces, followed by East Kalimantan, Riau Islands, and Riau Province. These four provinces have GFCF per capita and GRDP per capita above the national average. The DKI Jakarta Province is the center of physical capital investment because it is the country's capital and economic center of Indonesia. Meanwhile, the other three provinces are rich in petroleum and natural gas resources, as well as plantation products which have an attractiveness for investors to invest their capital in these provinces.
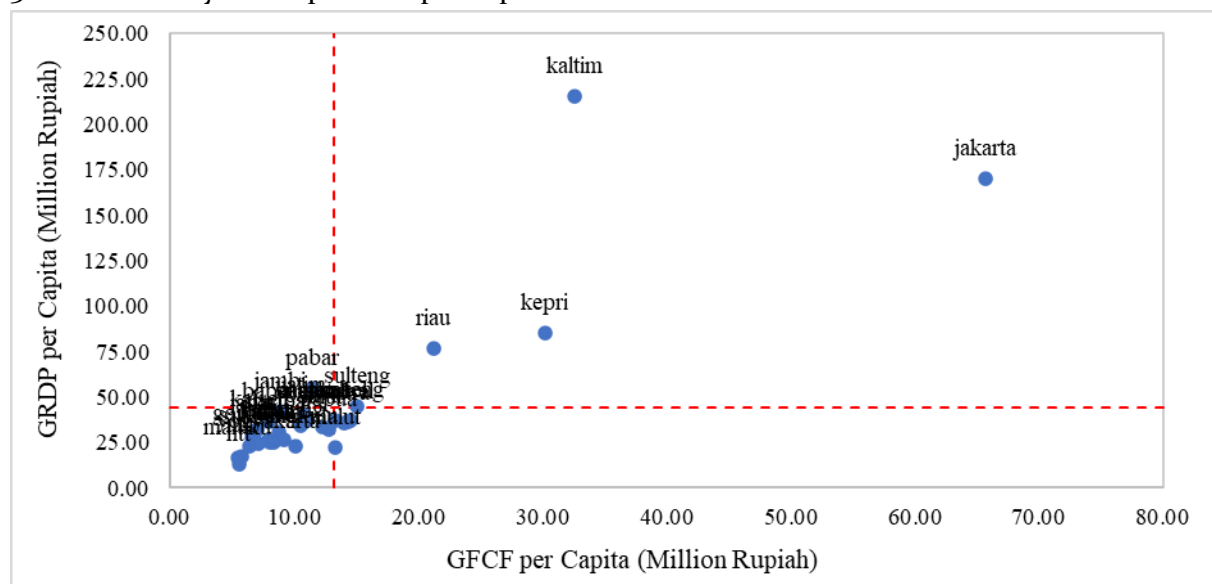
Source: BPS-Statistics Indonesia, 2020 (data processed)

Figure 3. Map of GFCF and GRDP per Capita Distribution by Province (2020)

Given the important role of physical capital in development, the Indonesian government needs to provide more detailed GFCF data for equitable investment at the national and regional levels. The availability of GFCF data in Indonesia is insufficient so it must be detailed. The more detailed and comprehensive GFCF, the more investment can get in and will be distributed evenly. With a more detailed structure, the government can find out which investments still need to be touched. If GFCF data can be seen by sector in more detail, then policymakers can find out the amount of capital-intensive investment.

Thus, investment policies can also be directed to industries that have less capital. In addition, a more detailed GFCF also makes it easier for policymakers to find out more in detail about domestic and foreign direct investment.

Next, we discuss whether human capital has a stake in economic development. Human capital seems to play a rather complex role in understanding economic growth in Indonesia. By using the human capital index variable which is a combination of education and health elements, it is seen that human capital has a significant positive impact on economic growth at a confidence level of 1% for models 2, 4, and 7, and 10% in model 9. When this human capital index is analyzed in more detail, it turns out that life expectancy is dominantly affecting economic growth for the whole model. These results are similar to the findings of Adeleye et al., (2022) in Middle East North African (MENA) countries and Khan & Chaudhry (2019) who conducted research in developing countries. Meanwhile, the education variable represented by the mean years schooling only had a significant positive influence on the model that did not involve other control variables. Empirically, there are interdependencies of various variables in the dynamics of the world economy, especially Indonesia. Unfortunately, in this dynamic, education has not had a real macro effect.

The role of the state in encouraging human capital is important so that Indonesian have high quality and income. One of the roles of the state in building human capital is to provide a mandatory, namely education and health spending. The estimation results show that the ratio of human capital expenditure to total government expenditure has a negative effect on economic growth. This is as the result of the negative impact of education spending being stronger than the positive impact of health spending. In Indonesia, spending on human capital development has

been regulated in the 1945 Constitution of the Republic of Indonesia, with education and health budgets set at 20% and 10%, respectively. This budget is quite large but has not had a significant effect on the economy. This indicates that education spending has not been optimal in terms of budget absorption so that the achievements of graduates where the average length of school has only reached 8.48 years has not approached the expected level, which is 12.98 years (BPS-Statistics Indonesia, 2020).

Furthermore, there are indications that education spending also does not meet the quality spending category. For instance, the 2018 Program for International Student Assessment (PISA) study result put Indonesia in the position of 70 out of 78 countries in the comparison of reading skills, mathematics, and science performance. This ranking, no better than 2015, is ranked 64th of 72 countries. Empirical findings from this study are similar to those of Mihaela et al., (2017) which stated that changes in the level of education expenditure do not have the expected results in the quality of education in most of the countries studied. Thus, the ability of Indonesian children in education is still far behind, compared to other countries. The government needs to redesign inclusive and sustainable human development so that all Indonesian youth are well educated and can compete globally.

In contrast to education spending, an increase in health spending will increase economic growth through improving the quality of health and life expectancy. A healthier society will have a high level of productivity that impacts the regional and national economy. These results are alike to the empirical findings of Piabuo & Tieguhong (2017) who found that health spending positively affects economic growth in several countries in Africa.

When examined spatially, Figure 4 shows that not all provinces which have a high human capital index will have a high GRDP per capita. There are some provinces which have a human capital index above the national average but have a GRDP per capita below the national average. In these provinces, although the mean years of schooling and life expectancy are high, they do not have high per capita income either. This indicates that the welfare of the population has a vague relationship with education. Statistically, the higher a person's education, the higher the salary he will receive, but on the other hand, the higher the education, usually followed by a higher educated unemployment rate. Based on the BPS-Statistics Indonesia (2020) publication, educated unemployment reached 64.25%, and persisted from year to year. Meanwhile, the level of the graduated educated workforce is smaller than uneducated graduates, which is only 44.35%. These educated graduates have difficulty entering the labor market according to their preferen.
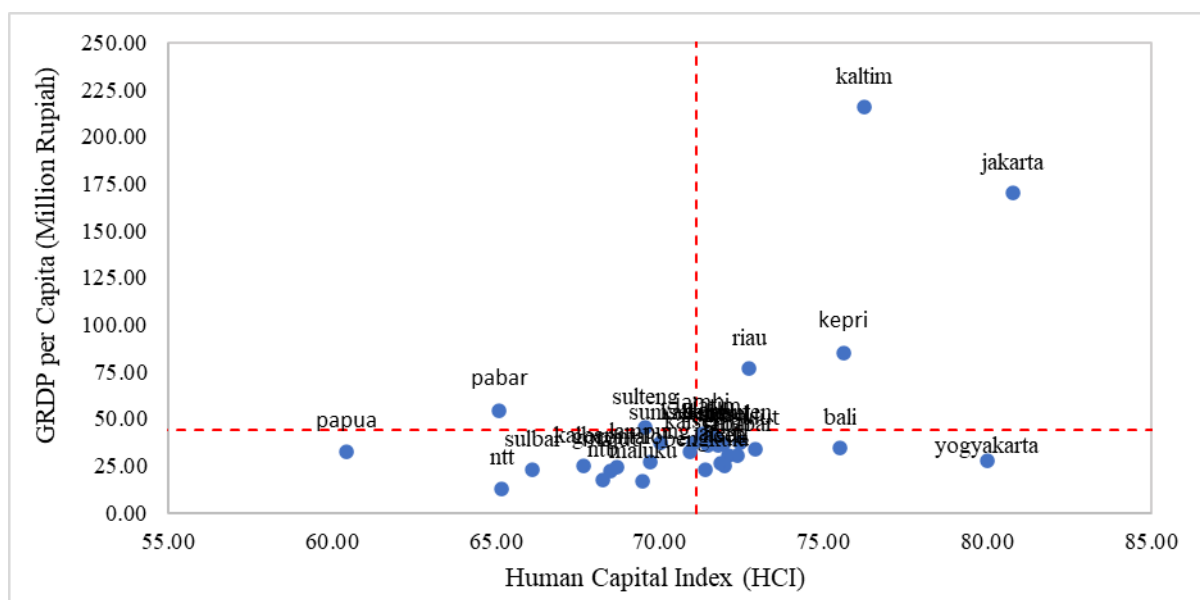
Source: BPS-Statistics Indonesia, 2020 (data processed)

Figure 4. Map of HCI and GRDP per Capita Distribution by Province (2020)

Based on statistical tests and descriptive analysis, it can be stated that the Indonesian economy is driven more by physical capital investment than human capital development. This result, contrary to the authors' expectations, estimates that both physical and human capital (education) together drive economic growth. However, there is another explanation proposed by Graca et al., (1995), which agreed with the neoclassical model. In the early stages of this model, physical capital accumulation was considered the locomotive of economic growth. When physical capital reaches a certain critical level, the economy enters a 'take-off' stage and then enters a stage of continuous growth driven by the accumulation of human capital. In essence, in the development process, private incentives to accumulate human capital will only increase when physical capital has accumulated enough. Moreover, there is a view that physical development is more visible than human development so that politically, the ruling government has a greater preference in physical development. Mihaela et al., (2017) stated that according to economic theory supported by many empirical cases, human capital and investment in knowledge are

engines of economic growth that will be enjoyed in the medium and long term. The Indonesian government must immediately prepare quality human capital to achieve sustainable development if it does not want to be stuck longer in the middle-income group.

As discussed earlier, the control variable is also an important factor in influencing economic growth. By including control variables into the model, the effects of physical and human capital will be corrected and reliable. Based on the result in Table 2, the ICT index, trade openness index (TOI), inflation, provincial minimum wages (PMW), and the dummy variable for the island have a positive effect on economic growth. On the other hand, population and open unemployment rate negatively affect economic growth.

The mastery of ICT is key in encouraging increased productivity in the corporate, industrial, and state levels. Some recent literature studies using various analytical methods confirmed this (Widarni & Bawono, 2021; Niebel, 2018; Stanley et al., 2018). According to BPS-Statistics Indonesia (2020) the average percentage of households uses computers is 14.14%, the population uses mobile phones at 61.84%, and the population using the internet is 53.75%. The government needs to prepare various strategic efforts to encourage the utilization and development of ICT equally across Indonesia. At present, there is still an imbalance in the mastery of ICT between western and eastern Indonesia. Extreme comparisons, for example, the percentage of people who use the internet in Jakarta is 77.61%, while on the eastern side of Indonesia, the proportion of the population of Papua Province who uses the internet is 25.73%. Inequality also occurs for ownership/mastery of computers and mobile phones. This imbalance occurs because the

infrastructure supporting ICT development is still biased towards western Indonesia.

Economic openness through trade positively affects the economic growth of the provinces in Indonesia. This result is in accordance with economic theory, whereby in the trade, all parties involved benefit. Trade can also be used as an engine of economic growth. Recent research conducted by Alam & Sumon (2020) reinforces the results of this study, where they discuss the connection between trade openness and economic growth for 15 Asian countries from 1990 to 2017. Kong et al., (2021) in their research in China also confirmed that trade openness would improve the quality of economic growth. Thus, every economic actor in every province in Indonesia needs to increase its trade competitiveness by focusing on comparative and competitive advantages to get greater benefits in trade.

In relation to price dynamics, the estimation results reveal that price increases positively and significantly affect GRDP per capita. The same thing also happened in the Eurozone according to the research of (Kryeziu & Durguti, 2019). Price increases generally improve the Indonesian economy because inflation is well controlled. Inflation control in Indonesia is carried out in a coordinated manner starting from the central level to the regional level by forming a regional inflation control team.

The determination of the provincial minimum wage (PMW) which is carried out annually according to the estimation results positively and significantly influences improving economic growth. Chu et al., (2020) confirm this result, wherein the long run (steady-state) an increase in minimum wages will increase economic growth, although in the early stages of the transition the minimum wage decreases the level of output due to a reduction in low-skilled jobs. Companies will be more selective in using labor. In Indonesia, the determination of PMW is carried out by

involving three parties, namely workers, companies, and the government. With industrial relations, the increase in PMW is determined based on the agreement of each party, so that all parties do not feel disadvantaged, and the economy is more inclusive. The establishment of minimum wages in Indonesia is regulated and stipulated in Law No. 13/2003 concerning Manpower. The existence of this law makes all parties involved comply because it has legal consequences.

The dummy variable for the island positively and significantly affects economic growth with a coefficient value of 0.0002. It means, there is a difference in the economic growth of the province in Java Island with the provinces outside of Java Island by 0.0002 percent. This difference is relatively small, but the gap in income per capita for residents of Java and outside Java is growing.

The linkage between population growth and economic growth is still a long debate among population economists. According to Bloom et al., (2003) there are at least three main theses on population growth with increasing economic growth, namely restrict, promote, and neutral. The statistical test result in this study indicates that an increase in population growth will decrease economic growth. Indonesia is a country with the fourth-largest population in the world, which is 267 million people. An increase of one percent of this large population will decrease economic growth by 0.76%. According to Kurniawan & Managi (2018), the decline in per capita income growth is caused by the growth of wealth per capita from natural resources is lower than population growth.

In this research period, there are indications that Okun's law applies to the Indonesian case. Of all the models in this study, only the 7th model has a statistically significant effect, while the other 9 models show an insignificant effect, but the direction of the effect of the coefficients shows a negative impact of unemployment on economic growth. The Indonesian government has to formulate and make economic policies that can reduce unemployment to increase economic growth.

CONCLUSION

As mentioned in the introduction section, this research aims to analyze whether economic growth is driven by physical or human capital. Estimation results show that the Indonesian economy is driven more by physical capital investment than human capital. The formation of human capital that positively and significantly affects economic growth is health. However, the education variable represented by the mean years of schooling has not significantly affected economic growth when incorporating control variables into the research model. In order to improve the education quality, the state requires the government to provide substantial education and health expenditures. However, the budget has not been used optimally so that graduates' achievements are not achieved. Moveover, education spending also does not meet the criteria for quality spending by comparing the ability of students between countries, for example in PISA-2018 which put Indonesia near the last order. In contrast to education spending, an increase in health spending will increase economic growth, through improving the quality of health and life expectancy. A healthier society will have a high level of productivity that impacts the regional and national economy. Increased ICT, inflation, provincial minimum wages (PMW) will increase economic growth. Meanwhile, an increase in population and open unemployment rate will reduce economic growth.

Considering the important role of physical capital investment in the economy,

policymakers are expected to be able to create a healthy business climate so as to attract investors. Throbinsonis is done by improving the investment ecosystem, reforming various regulations related to licensing, and providing fiscal facilities to business actors who will invest in developing the quality of human resources, as well as building various new industrial areas. In addition, the government also needs to provide more detailed GFCF data for equitable investment at the national and regional levels.

In improving the quality of human capital, the government needs to overcome the problem of high skill gaps where more than 50% of the workforce is elementary and junior high school graduates (BPS-Statistics Indonesia, 2019). The Indonesia Smart Card (Kartu Indonesia Pintar/KIP) Program must be more effective so that the mean years schooling of Indonesia's population increases. To overcome the skills gap in the labor market, the government together with related parties need to provide job training to school, college, and unemployed graduates by activating the Pre-employment Card (Kartu Prakerja). In the health sector, the government needs to focus on fixing the Social Security Administrator for Health (BPJS Kesehatan) and Health Insurance (Jaminan Kesehatan Nasional/ JKN), strengthen services and access at first-level healthcare facilities, increase the number of qualified health workers, strengthen nutrition and immunization programs for toddlers, and educate the public the importance of healthy lifestyles to suppress infectious disease rates. In the end, if the quality of human capital is high, the productivity of human capital will also increase and in the end will increase competitiveness and economic growth.

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