

THE EFFECT OF E-MONEY, HUMAN DEVELOPMENT INDEX (HDI), AND INTERNET PENETRATION ON ECONOMIC GROWTH IN INDONESIA

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Abstract

This study is to provide insight to the public and government in understanding whether E-money, Human Development Index (HDI), and internet penetration significantly impact or not the economic growth in Indonesia in order to prevent a decline in economic value in Indonesia. This study uses quantitative methods with secondary data obtained from the official websites of Statistics Indonesia, known in Indonesia as BPS (or Badan Pusat Statistik, the Central Bureau of Statistics), Bank Indonesia (BI), and Indonesian Internet Service Providers Association (APJII). The data obtained and analyzed using multiple linear regression test the significant value or effect. As a result of this research found that e-money, the Human Development Index (IPM), and internet penetration have a significant effect on the stability of economic growth. This shows that if e-money, HDI, and internet penetration increase, economic growth will also increase.

Keywords: *Economic growth; Human Development Index (HDI); E-money; internet penetration; Indonesia; Gross Regional Domestic Product.*

Introduction

The state of the economy in Indonesia in 2020 has an unstable condition, according to data from the Central Bureau of Statistics (BPS). Economic growth contraction decreased to -2.07 percent. Based on news from Kompas.com, the minister of finance, Sri Mulyani Indrawati, corrected that economic growth during 2020 would decline to -1.7 percent (Kompas.com 2020). Efforts can be made to improve economic performance so that a recession does not occur by making innovations like the digital economy (Bank Indonesia 2020). In the era of Industry 4.0, Indonesia was encouraged to innovate in digital technology. Minister of Communications and Informatics Johnny G Plate stated that internet penetration in Indonesia reached 73.7 percent of the total population of 202.6 million. It can be said that Indonesia is one of the countries that are fast in adopting digitalization to increase economic growth.

Bank Indonesia estimates that Economic growth will reach 4,7–5.5 percent in 2022 from 3.2 – 4.0 percent in 2021. Innovations made to create immunity from Covid-19 in the short term and through policy stimulus. The Governor of BI, Perry Warjiyo,

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conveyed the statement in 2021. Advances in technology affect economic growth. An example of technological advances is the emergence of electronic money, also known as E-Money. Minister of Trade explained that the potential of the digital economy is still wide open. The digital economy currently contributes 4 percent to the economic growth in 2020. For the potential of the digital economy to be optimal, it is necessary to develop a new wave of technology so that more people use the internet and make payments using E-Money (Erlanitasari 2020, 145-56). Indonesia, a digitally oriented society, can be seen from the number of internet users. According to data from Bank Indonesia, E-Money is a product that has the potential to increase financial inclusion, which in turn will affect economic growth.

Research conducted by Elistia (2018) concludes that human development has a causal relationship with economic growth, that they influence each other and are related. According to Farid (2019), the number of internet users significantly affects economic growth. Nizar and Sholeh (2021) stated that the increasing number of internet users and quality human resources shows that E-Money, human development, and internet users significantly influence the growth economy. Another study by Hodrab, Maitah, and Smutka (2016) concluded that the internet positively affects economic growth. Payments using non-cash have helped increase economic activity in Nigeria, a developing country that shows that all E-Money products positively impact economic growth (Omodero 2021, 40-53).

The novelty in this study with previous studies is the differences in types and total numbers of variables and periods in the sample. The previous study used five provinces in Indonesia as the object for 2010-2016. Currently, the author uses all 34 provinces in Indonesia for the period 2017-2021. The author chose the period 2017-2021 to see if there were any new results from previous research. Based on the background described, this research has the following problem formulation: Does E-Money affect economic growth? Does the Human Development Index (HDI) influence economic growth? Does Internet Penetration have any effect on economic growth? The contribution of this research expects that the government can maintain the stability of economic growth by considering specific indicators or factors. The results of this study will be related to the digital economy, which will be needed to maintain and increase economic growth in the industrial 4.0 era. This research expects help to provide information or knowledge to the public or readers as a reference in future studies in economics or accounting.

The development of modern technology characterizes the theory of endogenous growth. This theory arises because of the knowledge externality that expects companies to be more productive in economic growth (Maharani & Isnowati 2014). This theory believes that human capital in the form of technological growth influences growth (Romer 1986). Arguments according to Aghion and Howitt (1998), there are many reasons that technological progress can influence economic growth. So, as in the explanation of the endogenous theory, it is hoped that human development and technological progress will help in economic growth in Indonesia. In the theory of

endogenous growth, the role of humans supports economic growth in the long term (Sunusi et al. 2014). Therefore, endogenous theory can explain the Human Development Index (HDI) variable. Endogenous theory can also explain the variables of E-Money and internet penetration because the theory discusses technological developments. The framework of this study is as follows:

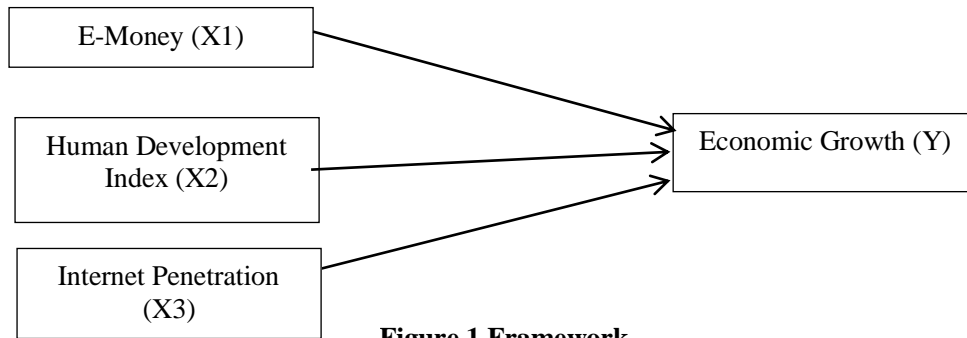


Figure 1 Framework

Technology development keeps advancing and growing in today's industry, including the payment industry, which has experienced some rapid changes. The growth of computers and the expansion of access to the internet network are making it possible to build an efficient payment service system. The payment system is related to transferring funds from one party to another and includes various components, such as payment methods and clearing (Bank Indonesia 2008).

Electronic money, an example of a non-cash payment, is also known as E-Money. In 2016, Suseco explained that E-Money showed better features in terms of speed and efficiency in transactions compared to credit and debit cards. E-Money was created as an innovation in the field of payment instruments, and it can be said that E-Money in Indonesia has been around for quite some time. One of the reasons why E-Money is popular and widely used by the public is that it is easy to use. The benefits of E-Money are that it can be used anywhere and anytime, the scanning process is fast hence there are no hassles of transactions. Using E-Money is safer than cash as there are always records of transactions.

Research from Omodero (2021) shows that electronic money products have a significant positive impact on economic growth, and payments with electronic money have increased economic activity. Research conducted by Sitompul (2020) also shows that electronic money has a positive and significant long-term effect on economic growth. Still, there is no short-term effect between electronic money and economic growth in Indonesia. This it can be seen that electronic money (E-Money) can encourage and influence economic growth. Based on the results of previous studies, the hypotheses of this study are:

H_1 : E-Money has a significant influence on economic growth in Indonesia.

Human development was first mentioned in 1990. Human development has criteria for developing skills and abilities of a person to set one's destiny to an income level, and it significantly impacts discussions about how best to improve the quality of life (Appiah 2019, 101-109). Human development was initially characterized as an

"individual decision-making process" that allows people to live long and healthy lives, obtain information, and approach the assets needed for traditional lifestyles (Hopkins 1991). The World View of Human Development created by the United Nations Development Program (UNDP) in 1990 treats human development as a demonstration of development that wants to expand alternatives that can be achieved through empowering people. The Human Development Index (HDI) is a complex index that measures the average success of a region or country in achieving several indicators (Central Bureau of Statistics 2016).

The Human Development Index (HDI) is an indicator of economic growth in a country, as indicated by the Gross Domestic Product (GDP) per capita value. Economic development is an increase in the Human Development Index (HDI). It is a composite indicator covering three areas of human development that are widely considered. The indicators are as follows: (1) Health sector: longevity. (2) Education and knowledge. (3) Economic sector: Decent standard of living (United Nations Development).

Damanik et al. (2021) research show that the Human Development Index significantly influences economic growth. Still, partially the Human Development Index does not have a significant effect on economic growth. The results of research conducted by Nawawi et al. (2021) show that the higher the human development index, the higher the economic growth rate, which means that there is a positive and significant influence on economic growth. Thus, it can be seen that the Human Development Index's value can encourage and influence economic growth. Based on the results of previous studies, the hypotheses of this study are:

H_2 : Human Development Index has a significant influence on economic growth in Indonesia.

Internet penetration is represented by the percentage of the population using the internet. The internet creates new industries and expands opportunities with the ability to drive innovation, spread knowledge, empower consumers, build networks, and regulate social interactions around the world (Chu 2013). As the digital market continues to grow, internet users also increase. The direct impact of ICT can be measured as a percentage of the Gross Regional Domestic Product (GRDP). The importance of Information and Communication Technology (ICT) for economic and social development has become a dramatically unique position since the rapid growth of technology, and its market began in the mid-1990s (Hodrab et al. 2016, 765-775).

The results of research conducted by Tchamyu et al. (2019) show that internet penetration effectively influences economic growth. The results of a study conducted by Sani (2019) show that the internet is vital in increasing economic growth in the short term. This it can be seen that the value of internet penetration can encourage and influence economic growth. Based on the results of previous studies, the hypotheses of this study are:

H_3 : Internet penetration has a significant influence on economic growth in Indonesia.

Methodology

The type of research method used is quantitative research using secondary data. Secondary data is data and information obtained from pre-existing sources, and secondary data can also be obtained from previous research results.

The collection is done by downloading from the official websites of Statistics Indonesia, known in Indonesia as BPS (or *Badan Pusat Statistik*, the Central Bureau of Statistics) [www.bps.go .id](http://www.bps.go.id), Bank Indonesia (BI) www.bi.go.id, Indonesian Internet Service Providers Association (APJII). The data taken is from the years 2017 to 2021. This study's data analysis uses descriptive statistics, and the result provides a simple summary of the sample and its measures (Mishra et al. 2019, 67). The selection of sample criteria is as follows:

Table 1 Sample Criteria

| Sample Criteria | Quantity |
|---|----------|
| Provinces in Indonesia from 2017 to 2021. | 170 |
| Provinces that do not have complete information regarding research variables. | (68) |
| Total | 102 |

This study also uses a classical assumption test in the form of a normality test aiming to see whether the regression sample, independent and dependent variables have a normal distribution or not. The normality test is an essential step in determining the measures of central tendency and statistical methods for data analysis (Mishra et al. 2019, 67). There are three types of classical assumptions tests in the study, namely the normality test, heteroscedasticity test, and multicollinearity test.

The heteroscedasticity test is carried out by using the White test method. If the displayed value is 0.05, there are no heteroscedasticity indications. The multicollinearity can be observed by examining the correlation matrix. If the correlation matrix is less than 0.8, it can be stated that there is no sign of multicollinearity. The test is performed with the help of an application program named STATA. Another analysis used is a multiple linear regression test using fixed effect methods. Here is the formula (Farid 2019):

$$GRDP = a + \beta_1 EM + \beta_2 HDI + \beta_3 ICT + e$$

Description:

- GRDP = Economic growth
- EM = E-Money
- HDI = Human Development Index
- ICT = Internet Penetration
- a = Constant
- $\beta_1 \beta_2 \beta_3$ = Coefficient of each variable
- e = Error term

The Coefficient of determination is a test used to estimate the extent to which the model shows variations in the independent variables. The value of the Coefficient of

determination is between the values of zero (0) and one (1). The value of the Coefficient of determination that leans to the number one means the ability of the independent variables to put almost all the information needed to estimate the dependent variable. The simultaneous significance test (f test) evaluates whether all independent variables have a simultaneous effect on the dependent variable. A parameter significance test (t-test) reveals how much influence each independent variable has in explaining the variation in the dependent variable (Ghozali 2018).

Results and Discussion

Data Description

The variable used in this study is Gross Regional Domestic Product (GDRP) as the dependent variable as the proxy of economic growth. In addition, the independent variables are E-Money, Human Development Index (HDI), and penetration internet.

Table 2 Descriptive Statistics Test Results

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|----------|-----|----------|-----------|----------|---------|
| GRDPI | 102 | 11.98885 | 1.138346 | 10.18857 | 14.4341 |
| EM | 102 | 24650.45 | 51221.82 | 2 | 282983 |
| HDI | 102 | 71.16078 | 3.881203 | 60.44 | 81.11 |
| ICT | 102 | 64.82676 | 16.79046 | 21.7 | 91.4 |

Source: Data Processing STATA, 2022

Table 2 displays the results of the descriptive statistics. There are 102 total data used in this study. The variable maximum value (GDP) of Gross Regional Domestic Product (GRDP) is 14,434, and the minimum value is 10,188. The average result is 11,988, with a standard deviation of 1,138. This variable's standard deviation value is less than the average value. This result implies that the distribution of GRDP data is equally distributed. E-Money (EM) has a minimum value of 2 and a maximum value of 282983. The obtained average value is 24650, with a standard deviation of 51221. This variable's standard deviation value is more prominent than its average value. This finding suggests that the distribution of EM data is unequal. The Human Development Index (HDI) has a minimum of 60.44 and a maximum of 81.11. The obtained average value is 71.16, with a standard deviation of 3.88. This variable's standard deviation value is less than the average value. This result implies that the distribution of HDI data is equally distributed. Internet Penetration (ICT) has a minimum value of 21.7 and a maximum value of 91.4. The obtained average value is 64.82, with a standard deviation of 16.79. This variable's standard deviation value is less than the average value. This result implies that ICT data is equally distributed.

Classical Assumption Test

Normality Test

This normality test is used to show whether the regression model is a normal distribution or not. A good regression model is a form of a regression model with a normal distribution or close to normal. The decision-making in the normality test is by

looking at the probabilities if the value is more than 0.05, indicating that the residual is normally distributed. Based on the table below, the results show that the data used in this study is normally distributed.

Table 3 Shapiro-Wilk Normality Test Results

| Variable | Obs | W | V | z | Prob>z |
|----------|-----|---------|-------|-------|---------|
| res | 102 | 0.98027 | 1.650 | 1.120 | 0.13133 |

Source: Data Processing STATA, 2022

Multicollinearity Test

Based on the table below, multicollinearity can be determined by looking at the correlation matrix value. The results on table 4 show that the correlation matrix is less than 0.8, and the results shown in table 5 show that the VIF value is less than ten and the 1/VIF value is less than 1, indicating no sign of multicollinearity.

Table 4 Multicollinearity Test Corelation Matrix

| | GRDP1 | EM | HDI | ICT |
|-------|--------|--------|--------|--------|
| GRDP1 | 1.0000 | | | |
| EM | 0.6745 | 1.0000 | | |
| HDI | 0.4463 | 0.4811 | 1.0000 | |
| ICT | 0.1654 | 0.2549 | 0.2724 | 1.0000 |

Source: Data Processing STATA, 2022

Table 5 Multicollinearity Test VIF

| Variable | VIF | 1/VIF |
|----------|------|----------|
| HDI | 1.34 | 0.744530 |
| EM | 1.33 | 0.751959 |
| ICT | 1.10 | 0.905855 |
| Mean VIF | 1.26 | |

Source: Data Processing STATA, 2022

Heteroscedasticity Test

Based on the table below, the White-test heteroscedasticity shows that prob>chi2 is 0.2798, indicating no sign of heteroscedasticity in the data using STATA.

Table 6 Heteroscedasticity Test Result

White's test for H_0 : Homoscedasticity

Against H_a : Unrestricted heteroscedasticity

| | |
|---------------|--------|
| chi2(9) = | 10.94 |
| Prob > chi2 = | 0.2798 |

Source: Data Processing STATA, 2022

Regression Analysis Test

The table below shows the outcomes of the regression analysis using STATA.

Table 7 Regression Analysis Results

| | | | |
|-----------------------------------|------------------|---|--------|
| Fixed-effects (within) regression | Number of obs | = | 102 |
| Group variable: PROV | Number of groups | = | 34 |
| R-sq: | Obs per group: | | |
| within = 0.1388 | min | = | 3 |
| between = 0.1647 | avg | = | 3.0 |
| overall = 0.1645 | max | = | 3 |
| | F(3,65) | = | 3.49 |
| corr(u_i, Xb) = 0.2466 | Prob > F | = | 0.0205 |

| GRDP1 | Coef. | Std. Err. | t | P>t | [95% Conf. Interval] |
|-------|----------|-----------|-------|-------|----------------------|
| EM | -3.36e07 | 2.38e07 | -1.41 | 0.162 | -8.11e07 1.38e07 |
| HDI | .0525208 | .0207739 | 2.53 | 0.014 | .0110324 .0940091 |
| ICT | .0002134 | .0002307 | 0.92 | 0.358 | -.0002474 .0006741 |
| _cons | 8.24588 | 1.471841 | 5.60 | 0.000 | 5.30641 11.18535 |

F test that all $u_i=0$: F (33, 65) = 1959.30

Prob > F = 0.0000

$$GRDP = 8.2458 - 3.36 + 0.0525 + 0.0002$$

Source: Data Processing STATA, 2022

- a. Table 7 can be explained by the following equation: hence, it can be stated that a constant value has a positive value of 8.2458. This positive sign shows the unidirectional effect between the dependent and independent variables. This result indicates that if all independent variables such as E-Money, HDI, and penetration internet are 0 percent and have no changes, the GRDP (economic growth) value is 8.2458.
- b. The regression coefficient value for E-Money (X1) is -3.36, which indicates a negative value with an opposite direction effect between E-Money and GRDP. This result shows that if the E-Money has increased by 1 percent, on the other hand, the GRDP will decrease by -3.36. With the assumption that the other variables remain constant.
- c. The regression coefficient value for HDI (X2) is 0.0525, which indicates a positive value on the same direction effect. This result suggests that if HDI increases by 1%, the GRDP will also increase by 0.0525, assuming that the other variables remain constant.
- d. The regression coefficient value for ICT (X3) is 0.0002, which indicates a positive value on the same direction effect. This result suggests that if ICT increases by

1%, the GRDP will also increase by 0.0002, assuming that the other variables remain constant.

Hypothesis Test

1. Simultaneous significance test (f test)

If the probability value is less than 0.05 at a significant level of 5%, it can be seen that all variables simultaneously have a significant effect. It can be seen in table 7 that the probability value (prob > F) has a value of 0.02, which means that all variables affect economic growth in Indonesia simultaneously.

2. Parameter significance test (t-test)

Based on table 7, the E-Money variable has a t-value of -1.41 and a significant value of 0.162. The t-test states that the significance is at five percent if $P > |t|$ more than 0.05, meaning the E-Money variables do not affect Indonesia's economic growth, and the first hypothesis is rejected. Variable HDI has a t-value of 2.53 and a significant value of 0.014, and the t-test is said to be significant at the 5% level if $P > |t|$ less than 0.05. Therefore, the HDI variable does affect Indonesia's economic growth, and the second hypothesis is accepted. Furthermore, the ICT variable has a t-value of 0.92 and a significant value of 0.358, and the t-test is said to be significant at the 5% level if $P > |t|$ more than 0.05. Therefore, the ICT variable does not affect Indonesia's economic growth, so the third hypothesis is rejected.

3. Coefficient of Determination

The results of the Coefficient of determination can be seen from the R-Squared value. The Coefficient of determination test is used to see how much the model's ability can simultaneously explain variables' variation. Table 7 shows that the R-Squared value is 0.1388, meaning that all independent variables can define the dependent variable and have an effect of 13.88%, and 86.12% can be explained and influenced by other variables.

Discussion

1. Effect of E-Money on Economic Growth

The E-Money variable has a t-value of -1.41 and a significant value of 0.162. The t-test states that the significance is at 5% if $P > |t|$ more than 0.05, meaning the first hypothesis is rejected. The result shows that the E-Money variable does not influence economic growth. It implies that if E-Money has increased, economic growth will not be affected. The outcome of this study is the opposite of the study conducted by Omodero (2021), which stated that E-Money has a significant positive impact on economic growth. However, the outcome does support research by Oginni et al. (2013), which researched electronic payment, which included E-Money. Using the Ordinary Least Square (OLS) method, the results of their study suggest that E-Money contributed negatively to economic growth.

Furthermore, Susilawati & Putri (2019) conducted similar research between E-Money and economic growth. It was stated that the decrease or increase in E-Money does not affect economic growth, which implies that E-Money has no significant effect

on economic growth in Indonesia. Considering the use of E-Money causes a shift in public deposits from savings and time deposits to float, this transfer of funds from banks to non-bank institutions, the use of E-Money will only encourage the velocity of money, not economic growth in Indonesia. (Susilawati & Putri 2019, 667-678). Nonetheless, E-Money can potentially improve welfare and the financial system. Hence, E-Money can boost economic growth by increasing consumption.

2. Effect of Human Development Index (HDI) on Economic Growth

The variable HDI has a t-value of 2.53 and a significant value of 0.014, and the t-test is said to be significant at the 5% level if $P > |t|$ less than 0.05. Therefore, the HDI variable does affect Indonesia's economic growth, and the second hypothesis is accepted. The results are in line with previous researchers, Nawawi et al. (2021), as the analysis results stated that the higher HDI, the higher the rate of economic growth, which implies a positive and significant influence on economic growth. On the contrary, the result of this study does not support the analysis from Damanik et al. (2021), which indicates how HDI partially does not have a significant effect on economic growth.

Elistia & Syahzuni (2018) conducted similar research to study the correlation between HDI and economic growth in ten ASEAN countries. The results have shown that the correlation is quite strong between HDI and economic growth and has positively affected each other, which implies that HDI does indeed have a significant effect on economic growth. The relationship between HDI and economic growth becomes one of mutual influence. Hence, increasing levels of human development will lead to increased opportunities for economic growth and vice versa. Moreover, the result supports research by Appiah et al. (2019), concluding that human development can influence economic growth.

Not to mention, the outcomes show that the higher rate and value of HDI, the higher the rate of economic growth will going to be. The result of this study can support research conducted by Salman (2016) which shows that the higher human development, the better the direct effect on economic growth. Human development is based on health, knowledge, and standard of living. A higher HDI implies that better health standards, higher income levels, and higher knowledge will create opportunities for more economic activities that increase economic growth. It was suggested to make more resolutions to develop better human development to stabilize and increase Indonesia's economic growth rate.

3. Effect of Penetration Internet on Economic Growth

The ICT variable has a t-value of 0.92 and a significant value of 0.358, and the t-test is said to be significant at the 5% level if $P > |t|$ more than 0.05. Therefore, the ICT variable does not affect Indonesia's economic growth, so the third hypothesis is rejected. However, the result is in opposition to research conducted by Asongu et al. (2020) which found that internet penetration dramatically impacts economic growth. On the other hand, the results support research by Imansyah (2018), which stated that internet penetration does not affect economic growth in Indonesia. Zhang (2019) has done a similar study to determine whether information and communication technology (ICT),

including internet penetration, contributes to economic growth. The result shows that internet penetration does not seem to have contributed to economic growth in Asian countries. Nonetheless, if provided equally, internet penetration can potentially improve economic growth as the internet can help with higher online transactions using e-banking and e-commerce, leading to a better income for the development of the economy.

Conclusion

This paper has attempted to investigate the effect of E-Money, HDI, and internet penetration on economic growth in Indonesia. As an economy becomes central to people's everyday lives, it is essential to understand how E-Money, HDI, and internet penetration affect economic growth. This study found that E-Money, HDI, and internet penetration simultaneously influence economic growth in Indonesia. HDI does have a significant effect on economic growth in Indonesia, while partially, both E-Money and internet penetration have no significant impact on economic growth in Indonesia. The first hypothesis test confirms that E-Money has no significant effects on economic growth in Indonesia. This result does not support the study by Omodero (2021), which states that E-Money has a significant positive impact on economic growth. The result concludes that E-Money has no capability of influencing economic growth. If the value of E-Money rises, the economy's growth will fall and vice versa.

The second hypothesis test shows that HDI significantly affects Indonesia's economic growth. The results support previous researchers, Nawawi et al. (2021), as they offer the analysis results that the higher HDI, the higher the rate of economic growth, which concludes that there is a positive and significant influence on economic growth. On the other hand, the result of this study does not support the analysis from Damanik et al. (2021), which indicates how HDI partially does not have a significant effect on economic growth. The third hypothesis test also confirms that ICT does not considerably influence economic growth. The results support research by Imansyah (2018), which stated that internet penetration does not impact economic growth in Indonesia. Hence, with the findings of this study, it is wished for the government to take advantage of the potential of HDI as they keep increasing and will be more beneficial to economic growth if adequately taken care of. If approached correctly, it can increase the potential of providing opportunities for economic growth. The research can be used as input and additional information for the government concerning making decisions and paying attention to the right time to invest in HDI to maintain the economy in Indonesia. On the other note, this study expects to gain insight into economic growth and be a reference for future researchers.

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