

PENGARUH INVESTASI DAN PERKEMBANGAN TEKNOLOGI TERHADAP PERTUMBUHAN EKONOMI INDONESIA

THE EFFECT OF INVESTMENT AND TECHNOLOGY DEVELOPMENT ON INDONESIA'S ECONOMIC GROWTH

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ABSTRACT

Economic growth is an indicator for measuring a nation's economic performance and expansion. The theory of economic growth is associated with numerous numbers. Solow's theory, for example, suggests that investment and technology can stimulate economic growth. According to Harrod Domar, investments can contribute to economic development. This study aims to investigate the connection between Foreign Direct Investment (FDI), Domestic Direct Investment (DDI), and the ICT Index and Indonesia's economic growth. In this investigation, the Least Square Panel method was employed (PLS). According to the findings, Domestic Direct Investment (DDI) and the ICT Index had a positive and significant effect on the economic growth of Indonesia. Foreign Direct Investment (FDI), in contrast to these two variables, has a positive but negligible effect on Indonesia's economic growth.

Keywords: Domestic Direct Investment (DDI), Economic growth, Foreign Direct Investment (FDI), Indeks ICT, Panel Least Square (PLS).

ABSTRAK

Pertumbuhan ekonomi merupakan indikator untuk mengukur kinerja dan ekspansi ekonomi suatu negara. Teori pertumbuhan ekonomi dikaitkan dengan banyak angka. Teori Solow, misalnya, menunjukkan bahwa investasi dan teknologi dapat merangsang pertumbuhan ekonomi. Menurut Harrod Domar, investasi dapat memberikan kontribusi bagi pembangunan ekonomi. Penelitian ini bertujuan untuk mengetahui hubungan antara Foreign Direct Investment (FDI), Domestic Direct Investment (DDI), dan ICT Index dengan pertumbuhan ekonomi Indonesia. Dalam penyelidikan ini, metode Least Square Panel digunakan (PLS). Berdasarkan hasil temuan, PMDN dan ICT Index berpengaruh positif dan signifikan terhadap pertumbuhan ekonomi Indonesia. Penanaman Modal Asing (FDI), berbeda dengan kedua variabel tersebut, memiliki pengaruh positif namun dapat diabaikan terhadap pertumbuhan ekonomi Indonesia.

Keywords: Domestic Direct Investment (DDI), Economic growth, Foreign Direct Investment (FDI), Indeks ICT, Panel Least Square (PLS).

BACKGROUND

Economic growth in a country necessitates massive investment. Capital is one of the production factors used to fund economic growth activities. Developing countries, on the other hand, lack sufficient capital to finance their countries' economic growth needs due to low levels of productivity and high consumption. Developing countries attract a large amount of FDI in order to close investment, employment, and technological gaps [1]. The difficulty in obtaining capital is an impediment to economic growth. As a result, the government seeks capital in order to finance the economy's needs. The expansion of FDI is expected to improve the financial sector, thereby increasing economic growth and improving people's welfare [2].

Economic development is financed from domestic and foreign sources of income. Sources of domestic revenue come from taxes, the results of natural resource management, State-Owned Enterprises (BUMN) and domestic investment. Foreign capital is generally classified into two types: foreign investment and foreign assistance in the form of loans and grants. Both of these instruments are used as a source of development financing due to the gap between savings and investment, so that with a source of financing from abroad it is expected to be able to overcome this gap.

According to Robert Solow's Neoclassical theory of economic growth, capital formation and population growth have a significant impact on a nation's economic growth. Both domestic and foreign investment through foreign direct investment (FDI) contribute to economic growth in terms of capital formation. Foreign direct investment, capital, and labor all significantly contribute to the economic expansion process.

The Neo-Classical theory of economic growth emphasizes the role of capital owned by a country. Capital from both within and outside the country will benefit a country's economy. Domestic investment, also known as Domestic Investment (PMDN) or Domestic Direct Investment (DDI), is thought to be capable of driving a developing country's economy very well, as increased investment in the country leads to increased economic growth [3].

Foreign Direct Investment occurs when a company invests directly in another country by facilitating the manufacturing process or marketing products [4]. Foreign Direct Investment (FDI) will have a multiplier effect by transferring capital, technology, managerial capabilities, and knowledge from developed to developing countries. It is hoped that this transfer will increase productivity and national output, which will have an impact on economic growth. Another effect of FDI is the creation of jobs, which is essential for overcoming poverty and unemployment. This will also have an impact on social life, bringing peace and improving people's welfare, potentially attracting more investors. FDI is expected to be able to address the lack of domestic savings, increase foreign exchange reserves, boost government revenues, and develop managerial expertise for the economy of the investment destination nation. This circumstance compels the Indonesian government to make every effort to attract foreign investment or Foreign Direct Investment in order to obtain foreign sources of capital to sustain its economic growth [5].

In order to accelerate economic growth, the government is increasing exports. Increasing exports is no longer an option; it is a requirement for a country's economic growth. Exports can help a country increase its production capacity while also providing access to scarce resources and potential international markets. Exports generate foreign exchange, which is used to finance the import of raw materials and capital goods required in the manufacturing process, resulting in added value. Increasing foreign exchange earnings through improved export performance is also critical for developing countries in order to compensate for a lack of physical and financial resources, which are critical for carrying out development efforts in general [5].

Export trade, according to Salvatore (2014), is a driving factor of economic growth in developing countries. Increasing exports will increase domestic production, which will necessitate labor input, resulting in increased employment and state income. Export growth that continues to rise demonstrates that a country's economic activities are going efficiently. The debate over Foreign Direct Investment has actually been going on for a while time. On the one hand, Efendi and Soemantri claim that Foreign Direct Investment has a positive impact on economic growth in investment destinations (2003). The transfer of technology and managerial skills, new manufacturing technologies, and access to international networks all have positive effects. Foreign Direct Investment makes it simple to obtain soft loans in developing countries.

The negative argument contends that the presence of Foreign Direct Investment can endanger the destination country's economic stability [6].

According to Kuznetz, a nation's economic growth is determined by the accumulation of capital, human resources, and natural resources, both qualitatively and quantitatively. According to this theory, infrastructure is classified as capital accumulation. Because infrastructure can impact economic activity directly or indirectly. It can be utilized directly in production activities, such as the electricity distribution infrastructure. In addition to supporting indirect economic activity, such as the development of information and communication technology [7]. Economic development in developed countries is partly due to progress in the development of Information and Communication Technology (ICT), but the role of ICT in economic growth is indirect. That is, advancements in information and telecommunications technology do not directly increase the production of goods and services. ICT has a positive economic impact in several ways, including reduced production costs, increased innovation and application of technology, and improved resource allocation efficiency [8].

ICT development in Indonesia can be measured by the ICT development index. Is a measure used to describe the level of development of information and communication technology in the territory of Indonesia. The ICT index is composed of 11 indicators which are grouped into 3 sub-indexes, namely infrastructure, use and skills which are then added together to form a single standard measure of ICT development in a region. The role of ICT in increasing economic growth is indirect, on the other hand ICT development requires very high costs. Because of that ICT is often a public good whose provision requires the role of the government. In the development of ICT by the government it is hoped that new economic activities will emerge. So that these factors will have a different impact on the presence of ICT in each region. Because economic growth will be influenced by other factors, not only the presence of ICT [9].

According to Solow's theory, technology can contribute to economic expansion. When there is technological progress, labor efficiency increases. For example, by awarding scholarships to outstanding residents, their knowledge can be applied to the country, resulting in new innovations as technology advances. And with the presence of new innovations, it will be able to boost economic growth. According to the Harrod-Domar theory, investment activities and economic growth are positively correlated in a country. Investment activity is a significant factor that impacts the economy in two ways. The relationship between investment and state income is positive. The simpler the investment process, the more investment activities will be conducted and the greater the state's revenue will be. Secondly, investment can boost the economy's production capacity by increasing the capital stock. Capital formation as an expense that will increase demand for community necessities [10].

Based on these two factors, investment can impact both demand and supply. In addition to influencing aggregate demand, long-term investments also influence aggregate supply due to changes in production capacity. The Harrod-Domar theory emphasizes the importance of reserving state revenues to finance damaged goods. According to "Economic Development" (Todaro, 2006), its purpose is to advance the economy of the country. This is why investment is essential as a form of capital. To achieve steady-state growth, the situation and conditions of business actors must have stable expectations and perspectives that will have a positive impact on economic growth [11].

Simon Kuznet defines economic growth as an increase in a country's ability to provide economic goods to its population; this increase in capability is the result of technological, institutional, and ideological changes. The three principal components of this definition are crucial to an economy:

1. The continuous increase in national output is a sign of economic growth and the maturation of an economy's ability to provide a variety of economic goods, as well as an indication of economic growth.
2. Technological advancement is a necessary condition for sustained economic growth, but it is not sufficient to realize the growth potential of new technologies.
3. Institutional, attitude, and ideological changes must be implemented immediately. Without social innovation, technological innovation is akin to a light bulb without electricity. Potential exists, but without supplementary input it is negligible.[11].

Domestic Direct Investment (DDI) is spending on investments or companies to purchase production goods to increase the economy's capacity to produce goods. Investment increases a country's potential output and long-term economic growth by accumulating capital through the construction of a number of buildings and equipment useful for productive activities. Consequently, it is evident that investment, specifically Domestic Direct Investment (DDI), is crucial in determining output and income levels. The economic force that drives investment is determined by investment costs, which are determined by future expectations, interest rate policies, and taxes. Consequently, DDI has a positive effect on economic growth [11].

ICT contributes to economic growth and productivity because ICT products and services are the output of the ICT industry and the input for industries that employ ICT. ICT can have an effect on economic growth through four primary channels. Information technology encompasses every aspect of the technology used to create, store, modify, and utilize information in all of its forms. Another theory expressed by Williams in the field of information technology is a generic form that describes any technology that helps generate, manipulate, store, communicate, or transmit information. a further corroborating theory Everything that facilitates the recording, storing, processing, retrieval, transmission/transmission, and reception of information is known as information and communication technology [9].

RESEARCH METHODS

Data Types and Sources

The type of data used in this study uses secondary data. Secondary data is data obtained from agencies or other third parties. Data in the form of publications presented by related parties can be obtained. The data for this study were gathered from journals, previous research, books, and publications from Bank Indonesia, the Indonesian Central Bureau of Statistics (BPS), the Ministry of Finance, the Financial Services Authority (OJK), and other organizations or parties.

Data analysis method

The quantitative data analysis method that will be used in this study is the analytical technique used to estimate parameters. Data analysis was carried out by statistically testing the variables collected using the Eviews 9 program. Panel data is data that consists of time series and cross-sectional data in econometric theory. This study uses a fixed effect model, which is an estimation method that assumes that each object has a different intercept but has the same coefficient. To distinguish between one object and another, dummy variables or pseudo variables are used so that this method is also called Least Square Dummy Variables (LSDV).Hypothesis testing in this study can be done using the following statistical tests:

Statistical t-test

Individual parameter significance test (t test) was performed to determine the significance of the effect of each independent variable on the dependent variable, assuming that all other variables remained constant. This is the hypothesis:

1. $H_0 : \beta < 0$ there is no effect between FDI, DDI, and the ICT Index on the economic growth of 32 provinces in Indonesia.
2. $H_1 : \beta > 0$ there is an influence between FDI, DDI, and the ICT Index on the economic growth of 32 provinces in Indonesia.

The test criteria are:

1. If the probability (prob) value is greater than 0.05, the hypothesis is rejected or the independent variable does not have a significant effect on the dependent variable.
2. If the probability (prob) value is less than 0.05, the hypothesis is accepted or the dependent variable has a significant impact on the independent variable. [13].

RESULT

Using the Hausman test, it was determined whether the notion that the fixed effect model is superior to the random effect model is accurate. A Hausman test is required in order to determine which of the fixed effect model and the random effect model is optimal. The Hausman test estimation results indicate that the probability value is 0.0000. The probability value is less than alpha when compared to the critical value or alpha (= 5 percent = 0.05), so the best model is the fixed effect model.

Correlated Random Effects - Hausman Test

Pool: PROVINSI

Test cross-section random effects

Table 1. Hasil uji Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	92.73543	3	0.0000

Sumber: Data Diolah, 2020.

Tabel 2. Result *fixed effect model*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.764863	0.066566	71.58129	0.0000
LOG(FDI?)	0.025665	0.019827	1.294441	0.1971
LOG(DDI?)	0.028110	0.011500	2.444257	0.0154
ICT?	0.049258	0.012753	3.862393	0.0002

Source: Author's Analysis 2020.

From the regression equation above it is known that the constant value is 4.764863 and if an increase of 1% FDI then economic growth increases by 0.025665%. if there is an increase of 1% DDI it will increase economic growth 0.028110. Likewise, if there is a 1% increase in ICT, it will increase economic growth by 0.049258%.

Tabel 3. Hasil Uji F-Statistik

R-squared	0.846094	Mean dependent var	5.142366
Adj R-squared	0.825333	S.D. dependent var	0.501091

S.E. of regression	0.078701	Akaike info criterion	-2.103730
Sum squared resid	1.170626	Schwarz criterion	-1.570661
Log likelihood	270.6178	Hannan-Quinn criter.	-1.888557
F-statistic	260.3321	Durbin-Watson stat	2.197695
Prob(F-statistic)	0.000000		

Source: Author's Analysis 2020.

Foreign direct investment, domestic direct investment, and the information, communication, and technology index have a significant impact on economic growth, according to the first test in table 3, where the F statistic is 260.3321. Consequently, the statistical probability value of 0.000000 is less than the significance threshold of 5 percent ($= 0.05$). According to these results, foreign direct investment, domestic direct investment, and the information, communication, and technology index variables all influence the economic growth of Indonesia simultaneously.

Table 4. t-Statistik

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.764863	0.066566	71.58129	0.0000
LOG(FDI?)	0.025665	0.019827	1.294441	0.1971
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Based on table 4, it can be interpreted that the influence of the independent variable with the dependent variable can be explained as follows:

1. The probability value for foreign direct investment is 0.1971, which is greater than the significance threshold of 0.05. Therefore, foreign direct investment has no significant impact on economic growth in Indonesia.
2. The probability value for domestic direct investment is 0.0154, which is less than the significance threshold of 0.05. Therefore, domestic direct investment has a substantial impact on economic growth in Indonesia.
3. Given that the probability value of the information communication and technology index is 0.0002, which is less than the significant level of 0.05, this indicates that the index has a significant effect on Indonesia's economic growth.

Table 3 shows the value of the R² test results which obtained an R-squared of 0.846094. These results explain that 84% of Indonesia's economic growth is influenced by foreign direct investment, domestic direct investment, information communication and technology index.

DISCUSSION

The Individual Effect estimation from the Fixed Effect Model is used to determine the extent to which each independent variable, such as foreign direct investment, domestic direct investment, and the information communication and technology index, influences Indonesia's economic growth. Under constant assumptions, the coefficient value for each province illustrates the effect of foreign direct investment, domestic direct investment, and the index of information, communication, and technology on Indonesia's economic growth.

A positive value indicates that the increase in economic growth resulting from the coefficient's value is not influenced by the independent variable, but rather by factors outside the scope of the model. In the absence of foreign direct investment, domestic direct investment, and the information, communication, and technology index, the value of Indonesia's economic growth is increasing. Negative values indicate that the presence of independent variables influences Indonesia's economic growth. The coefficient represents the amount of economic growth influenced by the independent variable. The following is the result of estimating individual effects.

Table 5. Result of Individual Effect Estimation in Fixed Effect Model

No	CROSSID	Effect
1	Jawa Timur	0.918635
2	Jawa Barat	0.855947
3	DKI Jakarta	0.768483
4	Sulawesi Barat	-0.630049
5	Gorontalo	-0.725741
6	Maluku Utara	-0.76365

East Java and West Java provinces have high positive coefficient values, according to table 5. Wholesale and retail traders, manufacturing, and agriculture are major contributors to East Java's economic growth. Manufacturing, wholesalers and retailers, as well as car and bicycle repair, agriculture, forestry, and fisheries, have all made significant contributions to West Java's economic growth [14]. This proves that wholesale and retail traders, processing industries, and agriculture all have an impact on the growth of the two provinces. This industry may expand as a result of increased demand, which will boost output.

The provinces of West Sulawesi, Gorontalo, and North Maluku have the lowest negative coefficient values. West Sulawesi province's economic growth is being driven by processing industries, wholesale and retail traders, agriculture, forestry, and fisheries. Manufacturing, construction, lodging, and food and beverage industries are the economic sectors that propel Gorontalo's growth (Central Bureau of Statistics of West Sulawesi, 2018; Central Bureau of Statistics of Gorontalo, 2018). This condition indicates that the processing industry has an impact on the two provinces' economic growth.

The Effect of Foreign Direct Investment on Economic Growth

According to the findings of the study, foreign direct investment has a positive but insignificant impact on Indonesia's economic growth. Because the hypothesis states that foreign direct investment has a positive influence on Indonesia's economic growth, these findings indicate that the hypothesis is rejected. Foreign direct investment growth, which has been increasing year after year, has not been able to fully influence rising economic growth. According to endogenous economic theory, economic growth is influenced not only by the amount of capital, but also by other factors such as human resources and technology [15].

The findings of this study are consistent with those of Wiranti Adam (2019), who investigated the effects of foreign debt and foreign investment on the economic growth of Indonesia. The findings of the study indicate that foreign investment has a positive but insignificant effect on Indonesia's economic growth. The second variable, foreign debt, has a negative and negligible effect on economic growth in Indonesia. From 1986 to 2016, [6] conducted additional research on the effect of FDI, PMDN, capital expenditures, and exports on economic growth. According to the results of the study, FDI has no significant effect on economic growth.

This could be due to the fact that the available human resources continue to have low education, with an average high school education, while the number of human data sources with recent university education remains small. Despite the fact that foreign direct investment is increasing

year after year, employment remains low. This occurs because the company's human resource quality is not in line with its own. The absorption of benefits from foreign direct investment, in addition to an increase in incoming capital stock, namely the transfer of technology brought by the company, will have an impact on increasing the soft skills of the unemployed workforce. If there is a sufficient workforce, complementary foreign direct investment and human capital will drive economic growth.

Foreign direct investment is the primary means for developing countries to gain access to technological advances. However, the application of more advanced technology necessitates a level of human capital capable of absorbing new technology. The application of advanced technology and the ability of human resources to absorb it is a determining factor for economic growth. In order to boost economic growth, there must be a strong interaction between foreign direct investment and available human capital.

The Effect of Domestic Direct Investment on Economic Growth

The results of the analysis indicate that DDI has a positive and significant effect. Domestic direct investment has a positive effect on Indonesia's economic growth, as stated in the hypothesis; therefore, the hypothesis is accepted. This capital formation is essential for the advancement of the economy, as the presence of domestic direct investment will alleviate capital shortages, and the greater the investment value will encourage and facilitate Indonesia's economic growth process.

In accordance with Adam Smith's classical theory, there are three determinants of economic growth: natural resources, human resources, and capital goods. Harrod and Domar expressed a similar viewpoint, stating that investment is critical in the process of economic growth and that growing an economy necessitates investment as an additional capital stock. Domestic direct investment in Indonesia's 32 provinces has a positive and significant impact on Indonesia's economic growth because it is influenced by a number of factors, including Indonesia's investment climate, infrastructure, abundant natural resources, and the presence of a domestic market.

Effect of ICT Index on Economic Growth

Information and communication technology (ICT) has a positive and significant impact on Indonesia's economic growth, according to the study's findings. This is consistent with the research hypothesis that the ICT index positively affects economic growth in Indonesia. This is consistent with Simon Kuznets' theory, which states that economic growth is an increase in a country's capacity to provide economic goods for its population, and that this increase is a result of technological advancements. Solow shared the view that technological innovation can stimulate economic expansion. Increased labor productivity results from technological advancement. For instance, by awarding scholarships to exceptional citizens, their knowledge can be applied to the nation, resulting in new innovations as technology advances.

According to a World Economic Forum (WEF) report, countries that follow technological developments outperform others in terms of economic and social development. That is, if a country is to develop, it must keep up with technological advances. With good ICT quality, information communication and technology can encourage a country's economic growth by increasing the maximum output generated in production. The better the technological conditions in a country, the higher the productivity of its economic actors. As a result, the advancement of information communication and technology will be able to increase economic growth [16].

The positive impact of Information and Communication Technology (ICT) on economic growth with many related studies [17]. The positive impact of the ICT index which includes both labor and capital gives an indication that it is necessary to continue and increase investment in

internet ICT capital stock, broadband and cellular infrastructure and related systems. The importance of investing more in ICT-related workforce skills [18].

CONCLUSION

The conclusions in this study are:

1. Economic growth in Indonesia is unaffected by foreign direct investment. This indicates that Indonesia's economic growth is determined by factors other than foreign direct investment.
2. In Indonesia, domestic direct investment has positive and significant impact on economic growth.
3. The ICT index has positive and significant impact on Indonesia's economic growth.

RESEARCH RECOMMENDATIONS

The researchers in the study made the following recommendations based on the results of the analysis and discussion, which have been explained and linked to the conclusions:

1. The government can make efforts to increase economic growth by creating a conducive investment climate, reviewing and reducing regulations that are burdensome to investors, and improving the quality of human resources, in the hope that the value of foreign direct investment will increase and encourage economic growth in Indonesia.
2. To boost economic growth, the government hopes to increase domestic direct investment in Indonesia through policies that maintain economic, political, and domestic security stability, as well as improve infrastructure facilities that facilitate regulations.
3. It is expected that the government will accelerate the advancement of information, communication, and technology in order to stimulate economic expansion. Information, communication, and technology will facilitate and accelerate economic activities, including production and distribution, as a result of higher quality development, resulting in greater economic growth.

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