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Impact of Road Infrastructure and Foreign Direct Investment to Asean Economy

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Abstract

In global economy era, developing countries try to increase their competitiveness. This study aims to analyze the effect of road infrastructure and Foreign Direct Investment (FDI) on Economic Growth as in ASEAN by 2008-2017. Variables in this research included economic growth, road length and FDI. The type of data used is panel data which analyzed by the Ordinary Least Square (OLS) method with fixed effect model specifications. The results showed that road infrastructure and FDI simultaneously had an effect for economic growth in ASEAN, and from the 9 countries the biggest effect is on Brunei Darussalam, Malaysia, and Thailand whose road infrastructure and FDI have a positive effect on economic growth in the period 2008-2017. Individually, road infrastructure variable has a negative effect, and FDI has a positive effect. It means that economic growth in ASEAN is less effected by physical capital and may be derived from other factors such as human resources or technological development, and investment has an important role in ASEAN economic growth. Further research is recommended to develop by adding other variables that are thought to have a relationship and represent the entire population.

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INTRODUCTION

In the global economics era, development of economic in a country is needed indicators to see how far the progress who has been done. Development at the national level is also carried out with the aim of improving the welfare of the community (Pujiati 2015). According to the 2nd ASEAN Summit on December 15, 1997 Malaysia, ASEAN agreed on the ASEAN 2020 vision, which aims to: Create a stable, prosperous and highly competitive ASEAN economic region marked by the flow of goods, services, and investment, freer flow of capital, skilled labor flows, and equitable economic development while reducing poverty and socio-economic inequality; Accelerating trade liberalization in services; and Increase the movement of professionals and other services freely in the Southeast Asian region

The economy in the ASEAN region has developed a lot in 2020, especially after the formation of free trade between the ASEAN economic communities (MEA), demanding that the countries in this region which are mostly developing countries continue to develop both human resource development and physical capital in the form of infrastructure, and facilities and infrastructure supported by strengthening of capital to support the speed of economic trade between countries. One of indicators for national development can be seen from economic growth. Economic growth is the tendency of long-term per capita output growth process that comes from the internal processes of the economy (the forces within the economy itself), not from outside and it's temporary.

Economic growth is self-generating, which means that the growth process generates a strength or momentum for continued growth in the next period. ASEAN as a geo-political based organization on in Southeast Asia countries with one of the main objectives is to advance economic conditions through 4 main pillars namely a single market and production base, competitive economic regions, equitable economic development, global economic integration. To realize this many factors are needed, one of which is the availability of physical capital.

Economic growth is a process of long-term per capita output growth that occurs when there is an increase of output originating from the internal economic process itself and is temporary, that is known as self generating growth. We can tell the economy is grow if there is an increase in output per capita in the long run, economic growth as a quantitative measure that describes the development of an economy in a certain year when compared with the previous year (Sukirno, 2006). According to classical economic theory economic growth is influenced by output growth of national production system of a country consists of three main elements, wich is: Natural resources (factors of land production), Human resources (population), availability of capital stock.

Classical economic growth theory from Adam Smith said that natural resources are the main factor as well as a limiting factor of economic growth which is then processed and utilized by human resources with the support of capital stock or capital to encourage economic growth. This means that if natural resources have been processed, the rate of economic growth will cease. Then because human resources are considered to have a passive role so the availability of labor won't be a problem because it will adjust to the population. Economic growth is also driven by population growth according to Adam Smith's theory population growth can encourage economic development, it can also be an indication of expanding markets and the fulfillment of labor needs and followed by an increase in energy specialization that encourages productivity and technological innovation. (Sukirno, 2010).

The role of investment, especially investment in physical capital and human capital, plays a role in long-term economic growth. However, as seen in table 1.0, the condition of infrastructure and road infrastructure in ASEAN as a representation of physical capital is still not good. Of the 9 developing countries in ASEAN, only a few countries in southeast asia that quality of the road infrastructure is ranked on same or better than the ranking of the global competitiveness index, each of them was Malaysia, Laos and Brunei Darussalam. Apart from the three countries the

quality of road infrastructure is still not aligned or does not have a maximum contribution yet in supporting the 12 pillars of global competitiveness, especially the pillars of the economy that have a direct link.

According to infrastructure theory as something that is needed, because without infrastructure, production activities in various sectors of economic activity (industry) cannot be run. (Hirschman, 1958). In another sense infrastructure is defined as one of the important factors determining economic development. (Todaro, 2006). Besides the availability of infrastructure, especially transportation can also be used as an indicator in looking at economic conditions because of its role in maintaining the the production process in a country, in addition transportation infrastructure can also play a role in the distribution of goods prices that may occur due to inefficiencies in the distribution process (Nihayah and Nurfitrokha, 2020). Infrastructure in general also plays a role in economic growth through investment where infrastructure is a factor seen by investors in investing their capital. transportation infrastructure has an important role in the economy because it will provide easy access to sources of raw materials. Isolated areas that were previously difficult to reach are no longer a problem for the marketing and distribution of goods and services (Nihayah & Kistanti, 2020). In ASEAN, trends of transportation can be seen in table 1.

Table 1. Road infrastructure and Global competitiveness index 2017

Countries	Road competitiveness index	Global competitiveness index
Brunei Darussalam	33	46
Cambodia	99	94
Indonesia	64	36
Lao DPR	94	98
Malaysia	23	23
Myanmar	136	131
Philippines	104	56
Thailand	59	32
Vietnam	92	55

Source: The Global Competitiveness Report 2017–2018.

In terms of quantity, developing countries in Southeast Asia have number of roads length that mostly increased except for Myanmar. Indonesia became the country with the longest road length with 518,153 km in 2017, because Indonesia was a country with the largest area. Roads length of each country cannot be compared in terms of quantity only, because the needs of each country are different, there are geographical factors such as the area, topographical conditions, and other factor. Like Brunei Darussalam, a country with only 5,765 km2 area, has small quantity of road length with only 3.053 km in 2017.

While Indonesia as the largest country with couple of large islands has more than 500,000 km of road length. The growth of the road length is determined by the development, especially by the governments of each country, and the development speed in a country is determined by the amount of government expenditure. However, this may not be able to determine the effect on economic growth in each country, however a scientific review is needed to find out how big is the impact between road infrastructure, and investment on economic growth in ASEAN.

Other variable which has a great part in economy growth is investment. According to Harrord-Domar's Growth Theory in (Todaro, 2006), the basis in every economy in a country is to have saving or deposits portion of its national income to replace or maintain economic capital goods such as infrastructure and facilities and equipment that have been depreciated or damaged. Investments here especially new investments play a role in adding net saving or capital stock. Southeast Asia is a place that has a very high investment potential considering that most of its members are developing countries with large natural and human resource potential. The Following table 2 shows the average nominal of foreign direct investment in ASEAN country.

Table 2. Average Nominal of Foreign Direct Investment 2008-2017.

Country	Average nominal of FDI ASEAN 2008–2017 (USD)
Indonesia	15,022,520,000
Vietnam	9,766,610,000
Malaysia	9,311,020,000
Thailand	8,578,730,000
Philippines	4,306,840,000
Myanmar	2,098,360,000
Cambodia	1,429,990,000
Lao DPR	683,040,000
Brunei Darussalam	547,600,000

Source: The Global Competitiveness Report 2017–2018

After going through the data review and explanation above, it can be seen that infrastructure has an important role for the rate of economic growth, because each sector of the economy and market requires infrastructure support both directly and indirectly, such as for the production process, and distribution to consumers. If the market movement process runs smoothly, then it can maintain prices to keep stable. Infrastructure is also one of the determining factors for investors, especially foreign investors who will invest their capital so that it can give some additional production capacity as a representation for economic growth. Therefore, road as one of the most important infrastructures in connecting production to consumption activities, it must be known how much the impact it has on economic growth, and supported by foreign direct investment data. FDI was confirmed to influence economic growth (Purnomo & Mudakir, 2020; Raz et al., 2012). This research is necessary to conduct because it can estimate the target of road infrastructure development and foreign investment is needed to maximize economic growth, and to be able to compare the economic conditions of developing countries in the Southeast Asian region.

This study aims to prove whether road infrastructure and Foreign Direct Investment have an impact on economic growth in developing Southeast Asian countries. This is significant because the new growth theory (NGT) stated that economic growth is dependent on how the government treats or manages its resources. The more efficient and optimal, it will be able to increase economic growth.

RESEARCH METHODS

This research uses a quantitative descriptive method with an economics scientific approach. The data used in this study secondary data, or statistical data that have been collected and processed systematically, the data included economic growth, road length, and Foreign Direct Investment Investment (FDI) collected from the ASEAN Setatistical Yearbook 2018, with detailed time series data from 2008-2010, and cross sections of 9 developing countries in Southeast Asia. The sample in this study includes 9 developing countries in Southeast Asia included Brunei Darussalam, Cambodia, Indonesia, Lao DPR, Malaysia, Myanmar, the Philippines, Thailand and Vietnam.

The analysis technique is panel data analysis. Panel data has a space dimensions (cross-section) and time dimensions (time serries), in data observations are carried out the value of a variable in certain time period. Cross section is carried out on the value of a variable in the same period and taken from several different sample units (Gujarati, 2013). Steps that are taken in panel data analysis, first, test the model using 3 approaches, namely the common effect model (CEM), the fixed-effect model (FEM), and the random effect model (REM). Furthermore, to determine the best model, the Chow test and Hausmann test are used. The model can be formulated in equation 1.

$$EGit = \beta 0 + \beta 1\ Rlit + \beta 2\ FDIit + \mu it \ldots\ldots\ldots \quad (1)$$

Where, EG is economic growth (%), RL is road length (Km), FDI is foreign direct investment (USD), β is regression coeficient, i is ASEAN countries (i = 1,2,3....10), t is years (2008-2017), μit is residual (distraction factor) outside of model.

Furthermore, to determine the best model, the Chow test and Hausmann test are used. First is chow test, it used to choose between Common Effect or Fixed Effect. Then to choose between Fixed Effect or Random Effect is used Hausman test. Then the goodness of fit is used to measure the accuracy of the actual value of the regression model, for this needed several tests included coefficient of determination test (R^2), the test of the significance of individual parameters (*t test*), and simultaneous significance test (*F test*).

The coefficient of determination (R^2) is used as a scale to measure the proportion of the dependent variable (y) which can be explained by the independent variable (x). R^2 can be said as a measure of suitability of the model, with values located between 0 to 1, R^2= 0 means that there is a impact between the independent and dependent variables, and if R^2= 1 means that the independent variable has a stronger impact with the dependent variable or the model can be said it's good model. Although R^2 is one measure to see the suitability of the model, R^2 is not the only measurement that can be used. (Ariefianto, 2012).

The t-test is used to show the extent to which the independent variable (x) used in the model can individually explain the variation of the dependent variable (y). (Kuncoro, 2011). Hypothesis testing is done by comparing t-counts to t-table values. With a significant level of 5%, the decision; if *t*-statistic > *t*-table, the independent variables individually have significant effect on the dependent variable (y) and if *t*-statistic < *t*-table, independent variable (x) individually does not significantly influence the dependent variable (y).

The *F* test is used to show whether all independent variables (x) used in the model simultaneously or simultaneously have a real influence on the dependent variable (y) (Kuncoro, 2011). The F test is done by comparing *F* statistic to the F table value. With a significance level of 5%, the decision used are as follows: If the calculated F statistic > F table, it means that the independent variable (x) simultaneously have a significant effect on the dependent variable (y).

If *F* statistic < *F* table, it means that the independent variable (x) doesn't have simultaneously significantly influence the dependent variable (y).

The classic assumptions test was included in this study but not all classic assumption tests commonly used for the OLS (Ordinary Least Square) and GLS (Generalized Least Square) models must be fulfilled entirely in the determination of panel data models, enough with only multicollinearity tests, heteroscedasticity that needed (Basuki, 2016).

RESULTS AND DISCUSSION

After testing with the CEM, FEM, and REM approaches and tested with the Chow test and Hausman test, the best model in research on transportation infrastructure and economic growth in ASEAN is the fixed effect model (table 3).

Table 3. Fixed Effect Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.829.487	8.134.915	3.484545	0.0008
RL	-0.005089	0.564753	-0.592859	0.5550
FDI	0.198221	0.189065	3.075983	0.0029

Source: Data Processing, 2021

According to table 3, the empirical model can be written as equation 2.

$$EGit = 4.829487 - 0.005089it + 0.198221it + uit \quad (2)$$

Equation 2 shows that the Constanta is 4.829487. It can be interpreted that the independent variable of road infrastructure and FDI is considered constant or zero, then economic growth in ASEAN is at the level of 4.83%. The estimation results of the fixed effect model can be assumed that there are intercept differences between cross-sections but the intersections are the same between time. This means that the results of the fixed effect model output can show the unique heterogeneity of intercept values in each developing country in ASEAN. Individual effects that can be seen in the cross-section effect can be seen on table 4.

Table 4. Cross-section Effect Regression Output of Fixed Effect Model

Countries	*Cross-section Effect*	Constant
Myanmar	3.437.475	8.266.962
Lao DPR	2.887.327	7.716.814
Cambodia	1.379.697	6.209.184
Vietnam	0.809874	5.639.361
Indonesia	0.172022	5.001.509
Philippines	0.007996	4.837.483
Malaysia	-1.132.537	3.696.950
Thailand	-2.318.679	2.510.808
Brunei Darussalam	-5.243.174	-0.413.687

Source: Data Processing, 2021

According to the estimation results of panel data regression with the fixed effect model, it is known that the results of cross-section effects from 9 developing countries in ASEAN, and from table 4 it can be seen that the 3 countries whose their economic growth got affected by road infrastructure variables and FDI simultaneously are Brunei, Malaysia and Thailand.

According to Table 1, it shows the developing countries with the highest competitiveness index for road infrastructure in ASEAN are Malaysia (23rd), Brunei Darussalam (33rd) and Thailand (59th). It means that these countries have good economic conditions with the decent transportation infrastructure that good enough that a slight change in the variable will have a huge effect on economic growth in the three countries compared to other countries. While for the countries with the highest economic growth rates, such as Myanmar, Lao DPR, and Cambodia, with economic growth above 6% even though the road infrastructure variable is considered constant or zero, with the effect on economic growth that is getting smaller, then the improvement of the infrastructure and FDI variables should also be increased more than other countries, and does not close the possibility if the condition of road infrastructure and FDI is better, it will be able to have a positive impact on economic growth.

Based on the estimation results of panel data regression shows if the road infrastructure variables have a positive and significant effect on Economic Growth in ASEAN with a real level of 5%. Road infrastructure has a coefficient between variables of -0.005089 with 0.0000 probability value, which means that if road infrastructure length got 1 KM of addition length, it will potentially reduce economic growth by 0.005% assuming other factors outside the model are considered fixed, ceteris paribus. where investments in physical capital and human capital contribute to long-term economic growth. Joint investment with savings can also encourage sustainable economic growth (Mankiw, 2000).

This negative influence means that road infrastructure is still not an important part in supporting economic growth in most developing countries in ASEAN, even though transportation in general has a large influence to countries, individual, community, economic development and socio-political activities. In addition, when referring to table 4, it can be interpreted that the development of road infrastructure is still not optimal for most developing countries and can still be improved to the point if the condition of infrastructure is able to encourage economic growth. These results can also be caused by transportation infrastructure variables represented as road length, cannot be generalized in the panel data model, given that there are fundamental characteristics differences in developing countries in ASEAN, especially in terms of geographical and economic conditions that differ from each other, which making the length of the road unable to represent general economic growth in ASEAN.

Economic development in developing countries in ASEAN which still relies on physical capital makes the availability of physical infrastructure one of the determining factors to boost economic growth, so it is consistent with the theory that transportation in this case is represented by transportation infrastructure having a role in meeting the needs of production, distribution and public consumption, and if the process of production, distribution, and

consumption gets better it will affect the total value of production in a country.

Research from Raghdsifa, et.al (2018) has a different result which states that transportation infrastructure has a one-way relationship and has a positive effect on economic growth in Indonesia. Likewise with the findings of Pradhana, Rudra P, et al. (2013) that in India road transport infrastructure influences economic growth and vice versa, because transportation infrastructure is one of the main inputs in the process of producing goods. The differentiator from the above research is that the results were obtained in only one country, and without including the cross-section effect.

The linkage of road infrastructure to economic growth does tend to be more prevalent in developing countries, for developed countries, as conveyed by the research of Meersman, Hilde and Marzieh Nazemzadeh (2012) that the expansion or development of transportation infrastructure cannot directly stimulate economic growth in countries (Belgium), because the needs and focus of public sector investment were diverted from the physical sector to the social and education sectors because the infrastructure in developed countries was considered to be sufficient in supporting the economy.

Optimal economic growth and adequate road infrastructure connectivity have made the focus on physical capital funding such as infrastructure development shifted to human capital such as education and health. In ASEAN, the country that has reached that stage is Singapore, so it has different tendendcy with other countries in ASEAN, so it is not included in the sample. According to Utari and Nihayah (2016) Transportation in general has a great influence on the activities of individuals, society, economic development, and socio-political condition of a country. The availability of transportation infrastructure, especially roads, has a big role to support the sustainability of multi-sectors economic activities.

Transportation as supporting infrastructure in production activities start from providing raw materials, helping the mobility of human resources, mobility of other factors of production, to marketing industrial products while also serving to minimize the activities. This is in line with Putri (2014) that road transportation infrastructure has a role as a stimulus for economic growth because the availability of road transportation helps minimize the capital which creates a more efficient production and distribution cycle. Road infrastructure development also plays a role in encouraging the growth of new regions through increasing the volume of goods and services traffic. If the road infrastructure is not good or damaged it's can caused obstacles in the allocation of resources, industrial development, distribution of factors of production, goods and services, which are feared to affect income.

Beyond the tendency of the results of this study, transportation infrastructure still has a vital role as derived demand, which means an increase in transportation infrastructure availability will encourage or trigger an increase of economic growth, quoted from research by Raghdsifa, et.al. (2018). This is a reason to remain not ignoring the factor of road length infrastructure, especially in developing countries such as the ASEAN region in helping economic development. as has been done in China that infrastructure improvement can be one of the economic strategies to promote inter-regional collaborative expansion (Foo et al., 2019)

The other finding shows that the Foreign Direct Infestment (FDI) variable has a positive and significant effect on GDP in ASEAN with a real level of 5%. FDI has a coefficient between variables of 0.198221 with a probability value of 0.0000 meaning that if the amount of FDI increases 1 billion dollars, the economic growth value has the potential to increase by 0.2% by assuming other factors outside the model are fixed, ceteris paribus. The positive impact of FDI or foreign direct investment on economic growth in ASEAN developing countries during the period 2008-2017 indicates that FDI is one source of capital in economic development in ASEAN. Meanwhile, FDI allocation for developing countries in the Southeast Asian region has a different focus on each country that

adjusts its main resources or potential in the economy.

Developing countries with the highest average FDI values are Indonesia, where FDI entering Indonesia in 2017 is 13.7% that came from the metal, machinery and electronics industries, 12% from the mining sector, then 12.2% from the energy sector. Under Indonesia there are Vietnam, and Malaysia, where in Vietnam Manufacturing industries are the largest foreign investment destination sectors with 71.2%, followed by the property sector at 7.2% and the wholesale/retail sector at 5.7%, while for Malaysia 52.6% FDI flowed into the service sector, but the figure for the manufacturing industry was still quite large at 25.4% and followed by the mining sector by 7.8%. The three countries can be said to have an almost similar focus on economic development and can be considered to represent the characteristics of the country's economy in ASEAN in general, where the availability of foreign capital is still needed to support economic development in terms of high needing of foreign investment in the primary sector and manufacturing industry.

The role of FDI in the economy is in line with Harrord-Domar's Growth Theory, that the basis in every economy in a country is to have a saving portion in its national income to replace or maintain economic capital goods such as depreciation or damage. Investments, especially new investments play a role in adding net saving or capital stock (Todaro, 2006). The positive effect of FDI on economic growth in this study is the overall value of the 9 countries in Southeast Asia. This is in line with Nihayah and Rahayu (2020).

It should be remembered that the direction of the effect between FDI and economic growth can differ according to the economic conditions of each country. For example, that in the study of Muhammad Kholis (2012) which states that FDI in Indonesia does not have a positive influence on economic growth, due to inefficient bureaucracy, inadequate infrastructure, and fluctuating investment climate. This is in line with research by Raghdsifa, et.al (2018) where FDI does not affect economic growth, but economic growth affects FDI.

Meanwhile according to Fadhila, MA and Mahmoud KA (2015) that FDI affects economic growth in Malaysia, That's FDI affects economic growth along with the accumulation of human capital. Similar conditions also occur in India, according to Pradhana, Rudra P, et al (2013) in India that FDI has a cointegration or interrelated relationship with economic growth.

Basically, FDI can be one of the factors that can illustrate economic growth for a country because the accumulation of additional capital from other countries can help develop the economy in a country, especially in sectors that have greatest potential contribution to GDP. FDI also has a link and influences the availability of infrastructure including transportation infrastructure such as in the research of Tyagi et al., 2017, Raghdsifa, et.al (2018), and Pradhana, Rudra P, et al. (2013). Road infrastructure is the deciding factor in investing its capital mainly in the primary sector and the manufacturing and industries which are one of the main sectors in ASEAN.

CONCLUSION

Based on the results of data processing and discussion on the effects of road infrastructure and FDI on economic growth in ASEAN, the findings are road transport infrastructure has a negative effect on economic growth in developing ASEAN countries in general by the period of 2008-2017, with the greatest effect on economic growth are in Brunei Darussalam, Thailand, Malaysia, the Philippines, Indonesia, Vietnam, Cambodia, Lao DPR, and finally Myanmar. Second, foreign direct investment has a significant positive effect on economic growth in developing ASEAN countries in general by the period of 2008-2017, with the greatest effect on economic growth are in Brunei Darussalam, Thailand, Malaysia, the Philippines, Indonesia, Vietnam, Cambodia, Lao DPR, and finally Myanmar.

According to the result, it is recommended that developing countries in ASEAN continue to increase the availability of physical capital and

continue to improve their infrastructure, including road infrastructure, to create more efficient production and distribution process for boosting economic growth in each country. In addition, developing countries also must be strengthen other factors besides physical capital in economic growth, such as improving human resources, then technological reform, and investment. Because it is possible that the availability of physical capital such as road infrastructure has no positive effect because other factors outside that are still inadequate such as human resources quality for utilizing the physical capital that is already available.

It is also suggested that the investment sector must be strengthened and well managed from a technical and bureaucratic perspective, especially in managing the main destination sectors to interest foreign investors, for example the main sectors of some ASEAN countries are the primary sector and manufacturing industry in order to increase GDP contribution and encourage growth rates the economy. To increase investor interest, many things must be maintained including economic stability, political stability, state security and accompanied by improving physical infrastructure and other factors such as development of human resources and technology. It is expected that the addition of the FDI value for the right sector can increase domestic production volume and encourage economic growth.

Due to various limitations in research, it is expected that further research can develop further a, such as by adding other variables that are might have relate to economic growth and can represent the entire population. In addition to create more perspective on interpretation it is recommended to use alternative other analytical tools in similar research.

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