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Analysis of the Influence of Information and Communication Technology on Economic Growth in 5 ASEAN

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Abstract

Analyzing the impact of technology, information, and communication on economic growth is the objective of this study. The panel data used in this study covers five countries in ASEAN from 2009 to 2019. Regression Ordinary Least Square (OLS) with Fixed Effect Model (FEM) was used as the analysis method. Internet users, mobile phone users, gross fixed capital formation (PMTB), and labor (TK) were used as independent variables. The natural logarithm of national income is then used as the dependent variable. The results show that the internet user variable does not affect economic growth. Meanwhile, the number of mobile phone users has a significant and beneficial impact on the growth of the economy. In addition, the gross fixed capital formation and labor variables show significant results and promote economic growth. Policy implications that can be carried out by the government or the private sector is required to make efforts to increase the use of mobile cellular through an increase in ICT infrastructure that is more equitable so that the population can make better use of ICT in their economic activities such as e-commerce which can boost output from the expenditure side, namely consumption so that economic growth increases.

Keywords: *Technology, Information and Communication, Economic Growth, National Income, Fixed Effect Model*

JEL Classifications*: C33, E23, O40*

1. Introduction

Economic growth is an increase in economic activities or activities carried out by the community which causes an increase in the production of goods and services or national income in a country (Sukirno, 2002). Because with economic growth that continues to grow positively, it will have an impact on accelerating national development. The government in each country always targets that economic growth in each country increases every year, as has been done by countries in ASEAN.

Association of Southeast Asian Nations (ASEAN) is one of the geopolitical and economic organizations of countries in the Southeast Asian region which was founded in Bangkok, on August 8, 1967, by Indonesia, Malaysia, the Philippines, Singapore, and Thailand based on the Bangkok Declaration. This organization aims to promote economic growth, social progress, and cultural development of its member countries, promote peace and stability at the regional level, and increase opportunities to peacefully discuss differences among its members.

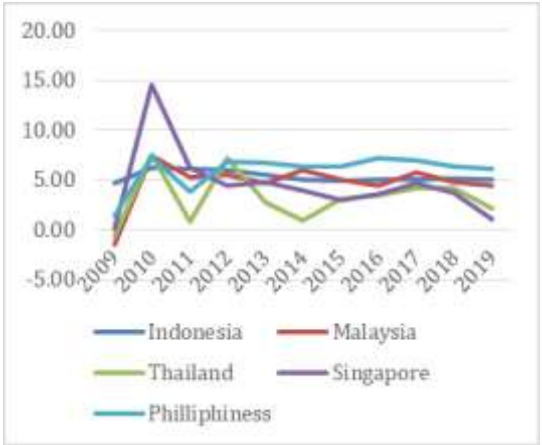

Figure 1. Economic Growth in 5 ASEAN - percent
Source: World Bank, 2023.

Based on Figure 1 it can be seen that economic growth in 5 ASEAN countries is generally positive even though in certain

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years it has decreased. For example, the country of Singapore in 2009 experienced economic growth of 1.3% because the recession that occurred in America and developed countries affected the global economy so that Singapore's economy which was dependent on foreign trade experienced the impact of the recession. However, in 2010 Singapore experienced a high increase in economic growth of 14.52% due to an increase in tourists to the two new casinos which ultimately led to an increase in the tourism sector thereby increasing Singapore's GDP in the real estate sector by $41,994.8 million.

Then, economic growth in Indonesia from 2010 to 2014 decreased but not so much and started to be quite stable in 2015 to 2019. Then the economic growth of Malaysia and the Philippines from 2009 to 2019 experienced fluctuations that tended to be stable. Meanwhile, Thailand's economic growth had declined in 2011 by 0.8% because at that time Thailand was experiencing a flood that occurred for almost 1 month causing hundreds of people to die and industrial activities had to be stopped. Even though it had improved in 2012, in the following two consecutive years it continued to decline where in 2014 economic growth was 0.9%, based on Thailand's GDP, the decline came from the agricultural sector which fell from 1,462,283 million Bath to 1,334,795 million Baht.

According to Majeed and Ayub (2018) states that factors that can affect the economic growth of a region can be in the form of additional production factors such as machinery and technology, an increase in the number of skilled workers, and so on. Therefore, growth theory continues to be developed by experts to find out what factors can significantly influence economic growth.

Information and Communication Technology (ICT) is a technology that can provide information through telecommunications. The main focus of ICT includes the internet, wireless networks, cellular telephones, and other communication media that can be used to send, store or exchange information. ICT is able to facilitate the provision of information to be easier and cheaper, for example, *e-commerce* can reduce travel costs, communication costs and also overcome many limitations of exporters or producers by maximizing access to information (Ariansyah, 2018). The development of information and communication technology can make the loss *barrier* or boundaries between one country and another so that the exchange of information can be faster and easier (International Telecommunication Union, 2016).

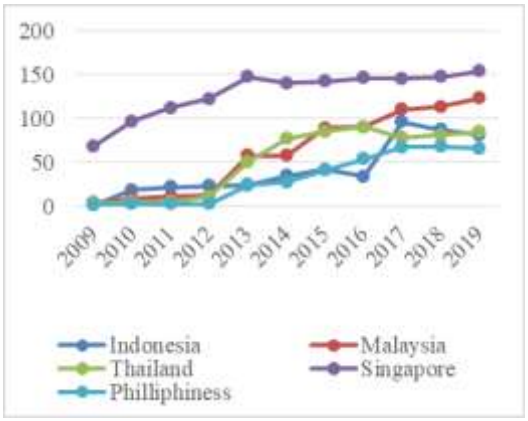

Figure 2. Internet users in 5 ASEAN – per 100 people

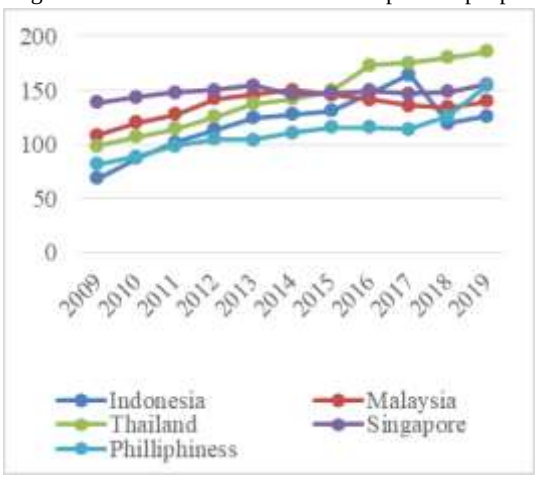

Figure 3 Mobile cellular users in 5 ASEAN per 100 people
Source: International Telecommunication Union (ITU), 2020.

Based on Figure 2, it can be seen that internet users in 5 ASEAN countries as a whole have increased. Singapore held the highest internet users, reaching 88.9% in 2019. A very sharp increase occurred in Indonesia, the Philippines, and Thailand from 2009 to 2019 consistently increasing continuously. Meanwhile, Malaysia also experienced an increase in individual internet users from 2009 to 2012 and had decreased in 2013 but increased again in 2014 to 2019.

Figure 3. Mobile celluler users in 5 ASEAN – per 100 people.
Source: International Telecommunication Union (ITU), 2020.

The use of the internet can grow rapidly because it is supported by the use of mobile cellular as a medium for digging up useful information. The use of mobile cellular is one form of progress from the existence of information and communication technology. Figure 3 shows that the use of mobile cellular in 5 ASEAN countries has increased every year. Continuous increases occurred in Thailand and the Philippines from 2009 to 2019. Meanwhile, Malaysia and Singapore experienced fluctuations but were still quite stable. Mobile cellular users experienced a decline in Indonesia in 2018 with 319 million users. This is because in 2018 Indonesia implemented a new policy for the use of prepaid SIM cards to minimize fraud.

The problem in this study is that there are technological advances as indicated by the use of the internet and the use of

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mobile cellular which tend to increase, but this increase is not followed by economic growth in 5 ASEAN countries which tends to decrease (in Figure 1). So the research question arises how the influence of information and communication technology on economic growth in 5 ASEAN countries. Then, the purpose of this study is to analyze the effect of information and communication technology on economic growth in 5 ASEAN countries from 2009 to 2019.

2. Literature Review

2.1 Information, Communication, and Technology

All technical devices for processing and transmitting information are referred to as information and communication technology (ICT). ICT consists of two parts: Information Technology and Communication Technology (Reynold & Apostle, 2010). Information technology includes everything related to the processing, use as a tool, manipulation, and management of information. Communication technology includes everything related to the use of tools to process and transfer data from one device to another (Sutopo, 2012). It is obvious that information technology and communication technology are closely related. Information and communication technology includes all activities related to the processing, manipulation, management, and transmission of information between media.

Information and communication technology influences the economy both as input and output (Faldrix et al., 2021). As an input, ICT can increase the efficiency and effectiveness of economic activities including reducing transportation and trade management costs, increasing market information, reducing information transaction costs, creating job opportunities, bridging information and development gaps between villages and cities, improving people's living standards, and ICT as well. create new jobs (Azmi & Said, 2007). Meanwhile, as an output, ICT is experiencing very rapid development and a large demand for products causes all economic industries to eventually be able to produce bigger and faster (Sepehrdoust & Ghorbanseresht, 2019).

2.2 *Solow Growth Theory*

The Solow growth theory (Solow growth model) or the exogenous growth theory. While the technology describing the efficiency level is an exogenous variable and is considered a residual, the Solow model assumes that economic growth is affected only by changes in the production factors of physical capital (savings and investment) and labor (population growth). Both labor and capital are assumed to earn diminishing returns when studied separately and constant returns when studied jointly (Todaro & Smith, 2009).

The theoretical model of Solow growth starts from the Cobb-Douglas production function, in general, the production function can be written as follows:

$Y = F(K, L)$ (1)

In equation (1) economic growth (AND) influenced by the capital function (*Capital, K*) and workforce (*Labor, L*). Then the Solow growth model is designed to show how capital, labor, and technological advances interact in the economy. So the technological progress factor is added to the Solow growth model in equation (2).

$Y = F\ (K, L, A)$ (2)

In equation (2), economic growth is not only influenced by capital and labor but is also influenced by technological progress (A). When the available technology increases, the efficiency of the workforce will also increase (Yang & Gu, 2021). As happened in the industrial revolution 2.0 where the industry was able to mass produce goods due to the invention of electricity which could reduce production costs, and also during the industrial revolution 3.0 efficiency increased even more when computerization was introduced.

2.3 *Empirical Model*

Information and communication technology can be proxied such as internet users and mobile cellular users as a form of technological progress. In the era of digitality and globalization, ICT has an important role in increasing national products so that it will increase national income. According to Kamilla et al., (2019) that the use of ICT can create economic growth and increase the competitiveness of a country. In this study, based on the Solow growth theory model contained in equation (2.2), the theoretical model is as follows:

$GDP = (INTM, MCER, PMTB, TK)$ (3)

Information:

GDP	: Gross domestic product
$INTM$	: Number of internet
$MCER$	: Number of mobile cellular
$PMTB$	: Gross Fixed Capital Formation
TK	: Total Workforce

Technological progress is one of the important factors in economic growth (Mankiw, 2003). In the current era of globalization, technological progress is illustrated by the rapid development of information and communication technology (ICT). Some examples of the development of ICT are the use of the internet and the use of mobile cellular. The internet produces users that allow one individual to connect with one or more other individuals to communicate, receive and disseminate information (International Telecommunication Union, 2016). To be able to use the internet, a hardware device is needed as access, one of which is by using a mobile cellular. ICT has economic value where obtaining, processing, and utilizing the information it has can create economic growth and increase the competitiveness of a country (Oktavia, 2020). The efficiency and effectiveness of ICT in economic activities is the rapid increase in market information and global scope so that it will produce good quality output.

Gross fixed capital formation can affect the performance of an economy and also affect the total output of goods and services of a country (Mankiw, 2003). Economic growth can be driven by the gross fixed capital farmation in a number of ways, such as increasing a country's infrastructure investment, transferring information, technology, and knowledge, which in turn increases the technology and public facilities which can expand the less developed sectors of the economy.

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Labor is one of the production factors used in the production process (Todaro & Smith, 2009). Based on Solow's growth theory, output (economic growth) is influenced by the labor factor, meaning that as the workforce increases, output will also increase (Mankiw, 2003). Majeed & Ayub (2018) stated that an increase in the working population would increase productivity which could then drive economic growth in the country.

3. Methods

The types and data used in this study are secondary data. The secondary data used in this study is in the form of panel data from 5 ASEAN member countries during the period from 2009-2019. The five ASEAN member countries used as samples are Indonesia, Malaysia, Thailand, Singapore and the Philippines because these five countries are the founding countries of ASEAN. The time period used was after the global economic crisis in 2008 and before COVID-19 in 2020. In this study, the analytical method used was panel data regression analysis using the *Ordinary Least Square* (OLS) with the help of Eviews 9 software. The operational definition of each variable used can be seen in Table 3.1.

Table 1. Data source

Variable	Variable Symbol	Units of measurement	Data source
Economic growth	GDP	Billion Dollars	*World Bank*
Internet user	INTM	Per 100 people	*International Telecommunication Union*
Mobile Cellular Users	MCER	Per 100 people	*International Telecommunication Union*
Gross Fixed Capital Formation	PMTB	Billion Dollars	*World Bank*
Labor	TK	People	*International Labor Organization*

By using the panel data regression analysis model, the equation model used for this study is:

$$LnGDP_{it} = \beta_0 + \beta_1 INTM_{it} + \beta_2 MCER_{it} + \beta_3 LnPMTB_{it} + \beta_4 LnTK_{it} + \beta_5 D1_{it} + \beta_6 D2_{it} + \epsilon_{it} \quad (4)$$

Information:
$LnGDP$: natural logarithm of *Gross Domestic Product*
$INTM$: Number of Internet users
$MCER$: Number of mobile cellular
$LnPMTB$: natural logarithm of Gross Fixed Capital Formation
$LnTK$: natural logarithm of the amount of labor
$D1$: 1 if the ICT Development Index level is moderate, 0 otherwise
$D2$: 1 if the ICT Development Index level is low, 0 otherwise
β_0 : intercept
$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$: regression coefficient
i: object type
t: time
ϵ_{it} : residual

In equation (1),i indicates the type of object (5 ASEAN Countries) that the unit is from*cross section* and*t* is the time (year) which is the unit of*time series*. The use of medium dummy 1 and low dummy 2 in equation (1) aims to be able to see the effect of financial inclusion which has low and medium levels, while high levels are used as*brenchmark* so it is not included in the equation model.

4. Results And Discussions

In regression testing with panel data, there are three kinds of models, namely*Common Effect Model* (CEM), *Fixed Effect Model* (FEM), and*Random Effect Model* (BRAKE). A series of tests need to be carried out to determine the best model of the three models above, namely the Chow Test, Hausman Test, and Lagrange Multiplier Test. after getting the right model the next step is to detect classical assumptions in order to get good results or meet the BLUE rules (*Best Linear Unbiased Estimator*).

4.1 *Chow test and Hausman test*

Uji Chow		Hausman test	
Effect Test	**Probability**	**Test Summary**	**Probability**
Cross-section F	0.0128	Cross-section random	0.0482
Cross-section Chi Square	0.0037		

Table 2. Chow Test Results and Hausman Test

For the first test, a chow test was carried out to find out which model was the best*Common Effect Model* (H_0) or*Fixed Effect Model* (H_a). Based on Table 4.2, it shows the results of the Chow Test which obtained a Cross-section F value of 0.0128, where the value is smaller than α (0.05). These results explain thatH_0 rejected and$H_a$accepted, so the FEM model is more accurate than the CEM model.For the second stage, the determination of the appropriate model is carried out through the Hausman Test to determine the intermediate model*Random Effect Model* (H_0) and*Fixed Effect Model* (H_a). Based on the results of the Hausman Test in Table 4.2, a random cross-section value of 0.0482 is obtained, which is smaller than α (0.05). From these results explain thatH_0 rejected and$H_a$accepted, so that the FEM model is more appropriate to use than the REM model. Because the FEM

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model has been selected to be the model to be used through the Chow and Hausman test results, it is not necessary to carry out the Lagrange Multiplier (LM) test.

4.2. Classic assumption test

Table 3. Classical Assumption Test Results

Classic assumption test	Criteria	Results	Conclusion
Normality	Jarque-Bera statistical probability of zero > α (0.05)	Nilai Prob. Jarque-Bera =0,726308	Normal distributed data
Multicollinearity	Correlation matrix value between independent variables < 0.80	Correlation matrix value between independent variables < 0.80	There is no multicollinearity
Autocorrelation	Value dU < DW < 4-dU	dW value = 0.908196 dL = 1,33442 dU = 1.81368 4 – dL = 2,66558 4 – dU = 2.18632	There is a positive autocorrelation, because the value of dW < dL or 0.908196 < 1.33442
Heteroscedasticity	Probability value > 0.05	Prob. INTM = 0.7327 Prob. MCER = 0.4424 Prob. LNPMTB = 0,2639 Prob.LNTK = 0,8480 Prob. D1 = 0,3845 Prob. D2 = 0.4707	There is no heteroscedasticity

The results of the classical assumption test show that there are problems with autocorrelation, but in panel data, it is permissible that there are problems with autocorrelation because according to Gujarati & Porter (2009) economic data *time series* In general, positive autocorrelation occurs because most of the data developments increase or decrease over time and do not contain a fixed up or down movement. Thus, the analysis that will be used is the FEM model with OLS estimation.

4.3. Regression Results

Table 4. FEM Regression Results

Independent Variable	Coefficient	t-Statistic	Prob
C	4.786496	0.961990	0.3413
INTM	-0.000636	-0.883664	0.3817
MCER	0.003491	3.849536	0.0004
LNPMTB	0.323682	2.307473	0.0258
LNTK	0.802406	1.967518	0.0554
D1	-0.300529	-3.237609	0.0023
D2	-0.339293	-3.040993	0.0040
F-Statistic		168.1828	
Prob (F-Statistic)		0.000000	
Adjusted R^2		0.968711	

Test the coefficient of determination (R^2) shows how much the model's ability to explain variable variation *growth*. The value of the coefficient of determination ranges from zero to one ($0 < R^2 < 1$). The coefficient of determination is obtained from the estimation results of panel data with the FEM model as shown in Table 40.968711. This means that 96.87% of economic growth performance (LN_GDP) can be explained by INTM, MCEL, LN_PTMB, LN_TK, D1, D2 variables. In other words, 3.13% is influenced by other variables outside the research model.

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F-test to determine simultaneously or simultaneously the effect of the independent variables to the dependent variable, namely LN_GDP. The F-test can be seen by comparing the probability value of the F-statistic with the significance level α (0.05) and comparing the calculated F-value with the F-table. Based on panel data regression test with *fixed effect model*-OLS as shown in Table 4 obtained probability values*F-statistic* of 0.00000. That is, probability *F-statistic* less than α (0.05), thenH_0 rejected andH_a accepted. These results are reinforced by the calculated F-value obtained at 168.1828, followed by the F-table value of 2.295 obtained from the significance of α = 0.05, and the value of df1 (*numerator degree of freedom*) = k – 1 = 7 – 1 = 6 and the value of df2 (*denominator degree of freedom*) = n – k = 55 – 6 = 49. This means that the F-count is greater than the F-table (168.1828 > 2.295). Then the decision obtained is to refuseH_0 and acceptH_a. Therefore, in this study, it can be stated that the independent variables simultaneously affect the dependent variable.

At the time of the model selection test, which was selected as the model to be used is *fixed Effect Model*. So it will produce an output value using the effect *parties* on each other *cross-section* which can be seen in Table 5.

Table 5. Output Cross-sectional Effects in 5 ASEAN Countries

Country	Coefficient
INDONESIA	-0.761137
MALAYSIA	0.274440
THAILAND	-0.402715
SINGAPORE	1.443399
FILIPINA	-0.553986

The results in Table 5 show the strengths of each *cross section* when the independent variable has no change or remains (constant). The value of the effect output on each *cross-section* will affect the value of the main constant. For example in Singapore, if the independent variable does not change or is constant, then economic growth will increase by 1.443399 plus the constant in equation 4.1 of 4.786496. So after being added, economic growth in Singapore if the independent variable does not change will grow by 6.229895 percent.

4.4 *The Influence of Internet Users on Economic Growth*

The t-count value for the internet user variable is -0.883664. Because the t-count value is absolute, the negative sign can be ignored. The results of the t-test show that the t-count value is smaller than the t-table (0.883664 <1.67722) and has a coefficient value of -0.000636. From these results indicate that the t-count value of the internet user variable is not in the critical area, thenH_0 accepted andH_a rejected. So it is concluded that the INTM variable partially has no influence on the economic growth variable (LN_GDP). This is clearly not in accordance with the hypothesis and theory regarding technological progress that drives economic growth. In addition, the number of internet users in several countries in a certain period is very low, thus making the data lame which then affects the research results to be insignificant. The results of this study are not in line with the research of Kamilla et al (2019) which states that the internet can encourage economic growth because the existence of the Internet can disseminate and obtain information, create new innovations, and obtain information about business and capital which will later be useful for companies. However, this research is in line with the research of Sahrina & Anis (2019) who used a causality test where the results said internet users had no relationship to economic growth, but economic growth affected internet users in ASEAN countries in the period 2001 to 2015. These results show that internet users and economic growth has no causality relationship and only has a one-way relationship. Pradhan et al (2018) in their research also found results that only economic growth had a one-way causality relationship with internet users in the G-20 countries in the period 2001 to 2012.

4.5 *Effect of Mobile Cellular Users on Economic Growth*

The results of the mobile cellular user variable statistical test (MCER) show that the t-count value is greater than the t-table (3.849536 > 1.67722) followed by a coefficient value of 0.003491. Based on the t-count value that is greater than the t-table, it means that the value is in the critical area, thenH_0 rejected andH_a accepted. So it can be concluded that mobile cellular users partially have a positive influence on economic growth (LNGDP). If there is an increase in MCER of 1 percent, it will result in an increase in GDP of 0.003491 percent assuming the other independent variables are held constant. These results are in accordance with the hypotheses and theories regarding technological advances that drive economic growth. In Solow's growth theory, technological advances increase labor effectiveness so that the production process can help increase economic output. The results of this study are in line with the research of Majeed & Ayub (2018) which proves that the use of mobile cellular has an effect on increasing global economic growth. Then Kamilla's research et al (2019) also stated that the impact of mobile cellular use would contribute to economic development. This is because the use of mobile cellular can help and facilitate the public in accessing information and conducting business activities such as *e-commerce* which will then drive economic growth.

4.6 *Effect of Gross Fixed Capital Formation on Economic Growth*

The statistical test results for the variable gross fixed capital formation (LNPMTB) show that the t-count is greater than the t-table (2.307473 > 1.67722) followed by a coefficient value of 0.323682. Based on the t-count value that is greater than the t-table, it means that the value is in the critical area, thenH_0 rejected andH_a accepted. So it can be concluded that gross fixed capital formation partially has a positive influence on economic growth (LNGDP). If there is an increase in LN_PMTB by 1 percent, it will result in an increase in GDP of 0.323682 percent assuming the other independent variables are held constant. These results are in accordance with the

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hypothesis and theory regarding capital that can encourage economic growth. The results of this study are in line with the research of Pradhan et al (2018) and Wardhana et al (2020) which state that gross fixed capital formation has a positive and significant effect on economic growth. Pradhan et al (2018) stated that by increasing the gross fixed capital formation in the G-20 countries for the 2001-2012 period, it would increase the amount of investment and capital for labor, thus increasing the output produced and making economic growth also increase. Research conducted by Kamilla et al (2019) also states that the gross fixed capital formation will absorb labor and in the long run will reduce unemployment and economic inequality which will then affect people's prosperity and the country's economic growth.

4.7 *Effect of Labor on Economic Growth*

The results of the statistical test for the labor variable (LNTK) show that the t-count value is greater than the t-table (1.967518 > 1.67722) followed by a coefficient value of 0.802406. Based on the t-count value that is greater than the t-table, it means that the value is in the critical area, thenH_0 rejected andH_a accepted. So it can be concluded that labor partially has a positive influence on economic growth (LNGDP). If there is an increase in LN_TK of 1 percent, it will result in an increase in GDP of 0.802406 percent assuming the other independent variables are held constant. These results are in accordance with the hypothesis and theory regarding the workforce that can encourage economic growth. The Solow growth theory states that labor along with technological advances can increase economic output. This research is in line with the research of Majeed & Ayub (2018) and Sepehrdoust & Ghorbanseresht (2019) which state that the number of workers is significant and influences economic growth. Majeed & Ayub (2018) in their research found that the increasing number of people working in developing countries in the period 1980 to 2015 will increase productivity which can then encourage economic growth in the country. Then Sepehrdoust & Ghorbanseresht (2019) said that increasing the number of workers in OPEC countries from 2002 to 2015 could increase the level of production output which would then increase economic growth.

4.8. *Effect of D1 Moderate ICT Development Index on Economic Growth*

The statistical test results of the dummy variable 1 medium ICT development index (D1) show that the t-count is greater than the t-table (3.237609 > 1.67722) followed by a coefficient value of -0.300529. Based on the t-count value that is greater than the t-table, it means that the value is in the critical area, thenH_0 rejected andH_a accepted. So it can be concluded that dummy 1 is partially having a negative effect on economic growth (LNGDP). This means that the 5 ASEAN countries whose ICT Development Index is at a moderate level affect economic growth by 0.300529 lower than the high ICT Development Index level. The dummy variable 1 describes countries that have a moderate level of ICT development index with a value of 1, while a value of 0 describes a level other than moderate. These results indicate that the moderate level of the ICT development index cannot encourage economic growth in each country.

4.9 *Effect of D2 Low ICT Development Index on Economic Growth*

The statistical test results of the dummy variable 2 low ICT development index (D2) show that the t-count is greater than the t-table (3.040993 > 1.67722) followed by a coefficient value of -0.339293. Based on the t-count value that is greater than the t-table, it means that the value is in the critical area, thenH_0 rejected andH_a accepted. So it can be concluded that a low dummy 2 partially has a negative effect on economic growth (LNGDP). This means that the 5 ASEAN countries whose ICT Development Index is at a low level affect economic growth by 0.339293 lower than the high ICT Development Index level. The Dummy variable 2 describes countries that have a low-level ICT development index with a value of 1, while a value of 0 describes a level other than low. These results indicate that a low level of ICT development index also cannot encourage economic growth in each country.

5. Conclusions

Effect output *cross-sectional* in the 5 ASEAN countries have different strengths in each country. Singapore and Malaysia have positive strength values so that if the independent variable does not change or is constant, economic growth will continue to increase. While for the countries of Indonesia, Thailand, and the Philippines have negative strength values, so that if the independent variable does not change or is constant, economic growth will decrease. Some existing studies have concluded that internet users have a positive influence on economic growth, but there are also others that have concluded that internet users have a negative relationship with economic growth. while in this study a conclusion can be drawn that internet users are indicated to have a negative and insignificant effect on economic growth. This is because the data on internet users for a certain period has very low data so that the data obtained makes the data lame so that the condition of the variables becomes insignificant. Then for mobile cellular users in this study has a positive and significant relationship to economic growth. Therefore, the policy implication that can be carried out by the government or the private sector is that it is necessary to make efforts to increase the use of mobile cellular, such as providing subsidies to purchase quotas for mobile cellular so that more and more residents, especially workers, use mobile cellular to support their production activities. With an increase in the communication network will help improve the quality of the workforce in the use of ICT. By increasing the quality of the workforce, productivity will also increase so that national income will increase and encourage the country's economic growth.

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