DOES INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) DEVELOPMENT FOSTER ECONOMIC GROWTH OF ASEAN5 +3 COUNTRIES?

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ABSTRACT

Globally, digital technologies affect lifestyles, norms and business restructuring models. Correspondingly, it plays a significant role in fostering the economic growth of Association of South East Asian Nations (ASEAN) as well as Asian countries at large. This study aims to investigate the impact of ICT development on the economic growth of the ASEAN5 +3 nations over the period of 2011 to 2018. ASEAN5+3 comprises of eight nations namely Malaysia, Singapore, Philippines, Thailand, Indonesia, China, South Korea and Japan. The methodologies applied in this study include panel data regression analysis and several diagnostic tests such as the Hausman test and the Breusch-Pagan Lagrange multiplier (BPLM) test. The empirical results suggest there is a positive significant relationship between ICT development and economic growth among the ASEAN5 +3 countries. This relationship can be further strengthened through various policy implementations such as governmental investments. The results of this study imply that these Asian countries are growing in consistence with information technology (IT)-led development.

Contribution/Originality: Empirical studies on the nexus between ICT development and economic growth offer inconclusive evidence of the relationship; hence, the results of this study enrich the literature of IT-led development specifically in the context of ASEAN countries. This study also aims to address the gap in empirical evidence with regards to ICT development and economic advancements in the context of ASEAN nations plus the three advanced countries namely China, South Korea and Japan.

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1. INTRODUCTION

Digital economy is defined as the economic returns that is derived primarily from digital instrumentations with a business model based on digital goods or services, and it is assumed to have contributed about 5% of the worldwide gross domestic product (GDP) and 3% of global employment (Bukht & Heeks, 2017). Further development in digital innovations, including cloud computing, fintech, mobile services and artificial intelligence has significantly impacted business structures and interactions as well as many informational digital platforms across the world. Albeit the

development of ICT infrastructure had been a great challenge, there is a substantial escalation in the number of Internet and mobile users in many developing nations in Asia (Das, Khan, & Chowdhury, 2016).

As the Association of Southeast Asian Nations (ASEAN) progresses to become the fourth largest economy globally by 2030, it is transitioning through the young population, a rising demographic in the socio-economic ladder, and a rapid adoption of technology innovations (Thomas, 2019). In accordance with a study conducted by the Economic Research Institute for ASEAN and East Asia (ERIA), ASEAN is anticipated to see an expeditious growth in the utilization of technology which in return, will facilitate the growth of its digital economy by 6.4 times, from $31 billion in 2015 to $197 billion by 2025. Hence, digital economy in ASEAN is a crucial factor in piloting the region's economic growth. This also applies to the East Asian countries, specifically ASEAN-5 nations namely Malaysia, Philippines, Indonesia, Thailand, and Singapore, as well as the three leading economies in Asia namely South Korea, Japan, and China.

Despite just having 50% population with access to the internet, China is already the world's biggest emerging market and is also the leader in the digital industry especially among Asian nations while Japan and Korea are also the important players in Asian region. On this note, the mentioned nations have established a strong relationship with ASEAN with a primary goal of expediting economic growth, cultural development, and social progress in the region. In China, its e-commerce trade volume has amounted up to 31.63 trillion yuan in 2018 which is equivalent to about US$4.5 trillion and its online retail sales amounted to over 9 trillion yuan in 2017. At the end of 2013, Japan's internet usage rate was at 99.9% and it has remained constant for several years, showing the diffusion of internet usage among businesses. Thus, regardless of each nation's different levels of advancement, this study aims to investigate the impact of digital economy, in terms of information and communication technology (ICT) development, on the economic growth of ASEAN5+3 countries throughout the study period of 2011-2018. Next section presents the review of past studies, follows by the section on data and methodology. The subsequent section offers discussion on the empirical results while the last section concludes this study.

2. PAST STUDIES

A stream of past studies across countries and across regions offers inconclusive evidence on the relationship between ICT development and economic growth. Hence, this study wishes to address the gap in empirical evidence with regards to ICT development and economic advancements in the context of ASEAN nations. Therefore, this paper intends to investigate the implications of ICT development on the economic growth of ASEAN5 +3 nations.

Colecchia (2002) suggested the Organization for Economic Cooperation and Development (OECD) countries had experienced a significant increase in the investment rates of ICT capital goods. Correspondingly, ICT contributions to economic advancements is found to have risen in the latter half of the 1990s thus, suggesting that there are optimistic effects of ICT capital investment on the economic progressions of these countries. On this note, Dahl, Kongsted, and Sorensen (2011) found that there is a positive and significant effect of ICT on output due to advances in the total factor productivity in the region.

Dewan and Kraemer (2000) conducted a research on 36 developed and developing countries and the results show the gains of IT capital investments are approximated to be positive and significant among the developed countries; nevertheless, the yield from IT capital investments is found to be statistically insignificant for the developing countries. On contrary, Dimelis and Papaioannou (2010) demonstrated that the growth contribution of ICT for both developed and developing countries is high and there is a positive and significant implication of ICT among the countries and it is greater among developing countries.

In the context of Asian countries, Dahl et al. (2011) focused on the relationship between openness and growth in emerging Asian economies of 12 rising Asian economies over the period of 1971 to 2009. The results show there is a positive and significant implication of openness on economic growth. Additionally, Irawan (2014) claimed developed countries are not always better-off in terms of ICT development than its counterparts, the developing countries. The findings of the study show four ASEAN members namely, Singapore, Malaysia, Indonesia, Thailand had lower yield relatively to the other three ASEAN nations.

In the same vein, Elsadig (2017) claimed there is a long-term relationship between GDP and the factors of production among ASEAN5 +3 countries, namely Malaysia, Thailand, Singapore, Indonesia, Philippines, Japan, Korea, and China through the study period of 1975 to 2006. There is also a positive relationship between labour, capital, and telecommunication investment against GDP as well. Likewise, using the Cobb-Douglas production function and Solow's residual model, Elsadig and Rahim (2013) has also found that ICT has a substantial implication on the economic advancement of the ASEAN5 +3 countries. The mentioned studies suggested the ICT development is vital in contributing to the economic development for these countries.

Additionally, Huong and Ab-Rahim (2020) found that ICT indicators, greatly impacts economic growth of the ASEAN-5 nations over the period of 2003 to 2018. The study suggested that these countries should further invest in ICT innovations especially on mobile cellular telephone subscriptions as well as fixed telephone line subscriptions to achieve economic growth. The results seem to be supported by past studies such as Majeed and Ayub (2018). Majeed and Ayub found that all ICT indicators (online service, telecommunication infrastructure and e-government) are relatively more favourable in strengthening both global and regional economic growth. As a matter of fact, the results of the study discovered that both developing and emerging nations are profiting more from ICT compared to developed countries. This serves as a validation to the argument that these economies are "leapfrogging" through ICT innovations. The findings of the study suggest that ICT investments is crucial to maximize benefits from the economies of the 21st century.

Sepehrdoust (2018) has conducted a similar study on OPEC countries over a period of 16 years (2002 to 2015). The findings show that an increment of 1% of ICT variables in the OPEC nations has led to a 0.05% increase in economic growth. Adeleye and Eboagu (2019) investigated the relationship between ICT development and economic growth of 54 Africa countries over the period of 2005 to 2015. The results show the 'leapfrogging' argument stands true and mobile cellular subscriptions possesses the largest output elasticity and has the highest potential which will allow Africa to progress tremendously.

On the contrary, Giday (2019) found that mobile phone penetration has fostered the GDP per capita of Sub-Saharan Africa countries; however, the Internet contributions towards the economic growth was found indifferent. The author added that the inability for Internet usage to contribute to the GDP per capita could be due to its low penetration, lack of skills of Internet users as well as the comparable immaturity state of the technology in the region. In this vein, Khan and Zhang (2019) claimed that countries with better human development index and mobile phone usage contributed to economic growth but Internet usage does not seem to do so. Robust panel data estimation was employed in this study. However, another study conducted on Indonesia over 1980 to 2014 by Rath and Hermawan (2019) showed that there is a positive relationship between ICT development and economic growth both in the long-run and short-run period.

3. METHODOLOGY

Figure 1 depicts the variables which are employed in this study. The three variables, namely mobile cellular subscriptions, labour force participation rate and unemployment rate represent the independent variables whereas trade openness and gross fixed capital formation are the control variable of this study which may affect the relationship between ICT variables and economic growth.
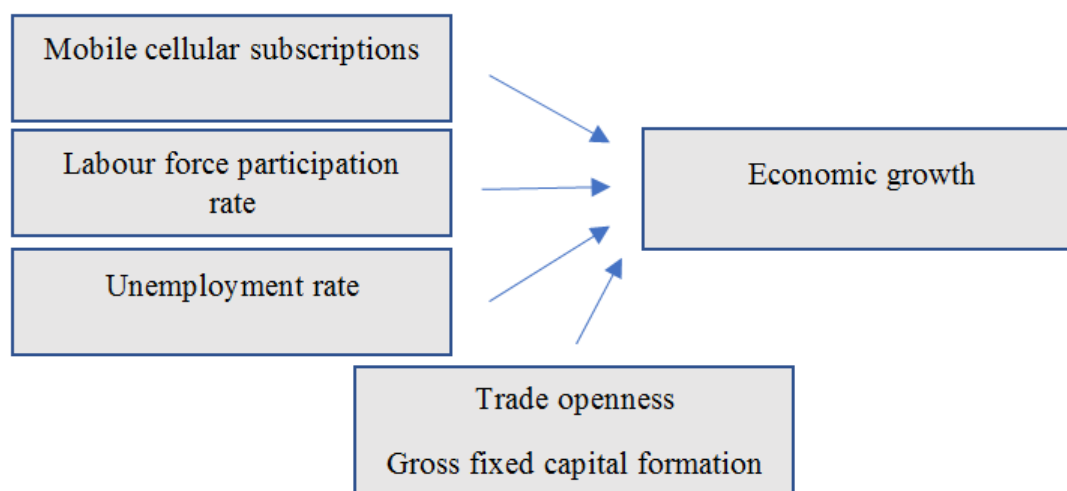

Figure-1. Conceptual Framework.

The panel dataset of ASEAN5+3 countries is obtained from the World Bank Open Data platform over a period of 8 years (2011 to 2018). The sample of this study is selected based on developing countries in Asia, namely the ASEAN5 +3 countries (Malaysia, Singapore, Thailand, Philippines, Indonesia, China, Japan and South Korea). Descriptive analysis and panel data regression are applied to assess the relationship between the independent variables and dependent variable.

3.1. GDP per Capita
GDP per capita measures the economic growth which serves as the dependent variable. The GDP per capita is generated at an annual basis by countries worldwide to determine its economic performance for the year.

$GDP_{i,t}$ = Gross domestic product (GDP) per capita for country i in period t.

3.2. Mobile Cellular Subscriptions
There is a rising trend of mobile subscriptions among emerging Asian countries, therefore, mobile cellular subscriptions is used as one of the ICT variables. This variable is computed for every 100 people in the respective country. Thus, to be more specific, the independent variable would be mobile cellular subscriptions per 100 people.

$MOB_{i,t}$ = Mobile cellular subscriptions per 100 people for country i in period t.

3.3. Labour Force Participation Rate
The labour force participation rate is a measure of the proportion of labour workers – both employed and actively seeking for jobs – in the working age population. This proxy excludes those in the working age category who are unemployed as they have stopped seeking for jobs. Hence, in other words, the labour force participation rate is a gauge of the country's active workforce. This variable is measured on an annual basis.

$LFPR_{i,t}$ = Labour force participation rate for country i in period t.

3.4. Unemployment Rate

Unemployment rate differs from the labour force participation rate as it represents the portion of the labour force who are jobless but are still actively seeking for one. According to Dahl et al. (2011), there are significant and positive productivity effects from ICT; therefore, this variable is used as a proxy for ICT development. Hence, both the labour force participation rate and unemployment rate are employed independently in this study. Consequently, these variables add-on to provide a more comprehensive picture of how ICT development impacts economic growth.

$UE_{i,t}$ = Unemployment rate for country i in period t.

Panel data regression analysis comprises two main elements which are the slope (β_0) and the estimated coefficient (β). The independent variables are mobile cellular subscriptions (MOB), labour force participation rate (LFP) and unemployment rate (UE), while the dependent variable is GDP per capita. Hence, in the regression model, there are three estimated coefficients which are β_1, β_2, and β_3. The panel data regression model can be structured as:

$$GDP_{i,t} = \beta_0 + \beta_1 MOB_{i,t} + \beta_2 LFP_{i,t} + \beta_3 UE_{i,t} + \varepsilon_{i,t} \quad ...Eq. (1)$$

Generally, there are three estimation models which are employed in this study, namely, the Pooled Ordinary Least Squares (OLS) model, Fixed Effect (FE) model, as well as the Random Effect (RE) model. A unique feature of the OLS model is that it does not measure the impact between its variables as separate entities. Instead, it measures only the general implications of the independent variables on the dependent variable. The pooled OLS regression model is structured as:

$$GDP_{i,t} = \beta_0 + \beta_1 MOB_{i,t} + \beta_2 LFP_{i,t} + \beta_3 UE_{i,t} + \varepsilon_{i,t} \quad ...Eq. (2)$$

Upon the application of this model, the coefficients and intercept are presumed to be homogeneous. Additionally, the error term in this model should have zero mean and uncorrelated to the independent variables as this allows the OLS results to be unbiased and consistent. Consequently, if the error term is correlated with the independent variables, it invalidates the assumptions and henceforth, leading to a biased and inconsistent OLS regression model. Hence, two alternative models are the FE and RE models.

Random Effect (RE) model is a statistical model whereupon the parameters of systematic components in the model has varied randomly. This model is frequently used in panel data analysis to estimate the variance of the groups and error term and it assumes that the intercept and slope are constant. In a RE model, the demeaning factor (λ) is added into the model. The value of λ ranges between zero and 1 and is founded on the estimations of the variance components. However, if the standard error of the model is found to be high, the RE model would not be applicable as the dummy variable is a part of the error term as well. Hence, the RE model of this study is structured as follows:

$$GDP_{i,t} = \beta_0 + \beta_1 MOB_{i,t} + \beta_2 LFP_{i,t} + \beta_3 UE_{i,t} + \lambda_i + \varepsilon_{i,t} \quad ...Eq. (3)$$

On the other hand, the Fixed Effect (FE) model is a statistical model in which the parameters of its components are fixed and not random. It is commonly used as a measure when there are different intercepts among groups. This model can be tested through the Ordinary Least Squares (OLS) regressions with dummies. As compared to the RE model where the dummy is a part of the error term, in the FE model, the dummy plays a vital role as a part of the intercept of the model. Therefore, the dummy variable needs to be added into the intercept. Hence, the FE model can be structured as follows:

$$GDP_{i,t} = (\beta_0 + \lambda_i) + \beta_1 MOB_{i,t} + \beta_2 LFP_{i,t} + \beta_3 UE_{i,t} + \varepsilon_{i,t} \quad ...Eq. (4)$$

Subsequently, five different diagnostic tests were conducted in this study to further determine the nature of the data employed. Some of the tests conducted are namely the Breusch-Pagan Lagrange Multiplier (LM) test and Hausman test, among the few. The Breusch-Pagan Lagrange Multiplier (LM) test is used to determine if there are any random effects present therefore, it can assist in the development of the RE regression and the OLS model. On the contrary, the Hausman test assists in comparing the consistency of the estimators and tests the correlation between the error term and the independent variables. Generally, the Hausman test helps to distinguish whether to use a random effect or a fixed effect model. Consequently, these tests are followed by the heteroscedasticity test, serial correlation test and the multicollinearity test. Adding on to this, static panel is employed instead of a dynamic panel due to its unsuitability after several trial and errors has been conducted. In this case, a static panel remains the most appropriate method to obtain relevant results for this study.

4. RESULTS

Table 1 tabulates the results obtained from a descriptive analysis conducted against the data used in this study.

Table-1. Results obtained from descriptive analysis.

Variable	Mean	Std. Deviation	Min.	Max.
GDP	27.60	1.30	26.13	30.24
MOB	4.82	0.18	4.27	5.19
LFP	17.59	1.50	14.91	20.48
UE	3.33	1.19	0.48	5.15
TRADE	110.29	97.15	30.39	379.09
FCF	26.33	1.43	24.51	29.4149

Note: GDP = GDP per capita; MOB = Mobiles cellular subscriptions; LFP = Labour force participation rate; UE = Unemployment rate; TRADE = Trade openness; FCF = Gross fixed capital formation; Observations: N=64, n=8 and t=8.

Based on the results tabulated, the GDP per capita mean is at 27.61 with a standard deviation of 1.3 while the mean mobile cellular subscriptions (MOB) is valued at 4.82 with a deviation of 0.18. Correspondingly, the mean of labour force participation rate (LPF) is at 17.59 with a standard deviation of 1.50 while unemployment rate (UE) has a mean of 3.33 and a deviation of 1.19 As for the controlled variables, trade openness has a mean of 110.29 and standard deviation of 97.15 while gross fixed capital formation (FCF) has a mean of 26.33 with a deviation of 1.43. According to these results, trade openness is observed to have the highest mean as compared to the rest while unemployment rate has the lowest mean value. Each of these values describes the centre of the data in this study. Further to this, the standard deviations tabulated in Table 1 shows that most of the data is found to be normal as it is spread out within 3 standard deviations from its respective means.

Table-2. Results obtained from FE test, RE test and POLS.

ITEMS	POLS	RE model	FE model
MOB	0.0036	0.1223*	0.1357**
LFP	0.1370***	0.0152	0.6188***
UE	0.0381**	0.0729***	0.0623***
TRADE	0.0015***	0.0009*	0.0018***
FCF	0.9731***	0.7739***	0.7771***
Constant	4.6567	6.7603	17.3653
R-squared	0.9922	0.9813	0.5269
Observation	64	64	64
BP-LM test		110.36***	–
		(0.0000)	
Hausman test	–		14.62**
			(0.0121)

Note: Note: GDP = GDP per capita; MOB = Mobiles cellular subscriptions; LFP = Labour force participation rate; UE = Unemployment rate; TRADE = Trade openness; FCF = Gross fixed capital formation.
***denotes 1% significance level, **denotes 5% significance level and *denotes 10% significance level.

Table 2 shows all variables are found to be significant at both 1% and 5% significance level in the FE model. Mobile cellular subscriptions (MOB) is significant at 1% level of significance while labour force participation rate (LFP), unemployment rate (UE), trade openness and gross fixed capital formation (FCF) are significant at 5%. Albeit, in the RE and POLS models, only four variables are found to be significant. Under the RE model, mobile cellular subscriptions and trade openness are significant at 10% significance level while unemployment rate and gross fixed capital formation at 1% level of significance. Labour force participation rate is found to be insignificant. Comparatively, in POLS, mobile cellular subscriptions is discovered to be insignificant at all levels while labour force participation rate, trade openness and gross fixed capital formation are significant at 1% significance level. Unemployment rate is significant at 2% level of significance. Based on these results, this study proceeds with its subsequent tests, the BP-LM and Hausman test, to determine which of these models would best fit and represent the data employed in this study.

BP-LM test is conducted to determine which model whether POLS or RE is appropriate for this study. The null and alternative hypotheses for this test are:

H_0: POLS is appropriate.
H_a: RE model is appropriate.

Based on the Table 2, the result is identified to be significant at 1% significance level. This indicates that the null hypothesis stating that POLS is appropriate, is rejected, and the RE model is found to be relatively more appropriate.

Subsequently, the Hausman test is carried out to determine which between the FE and RE model is more fitting for this study. The null and alternative hypotheses for this test are:

H_0: RE model is appropriate.
H_a: FE model is appropriate.

Based on the tabulated values, the null hypothesis is rejected; thus, the FE model is found to be suitable. All in all, based on both results obtained from both the BP-LM and Hausman tests and after rejecting both null hypotheses, the decision rule has justified that the FE model is found to be the most appropriate model for this study.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
chi2(1)   =   1.26
Prob > chi2 =   0.2614

Figure-2. Result for heteroscedasticity test.

Figure 2 depicts the test results obtained from the heteroscedasticity test. The probability value obtained is 0.2614 which is found to be insignificant at 5% significance level. Therefore, the null hypothesis of constant variance should not be rejected. Hence, it can be concluded that the data is free of heteroscedasticity.

Table-3. Result for VIF test.

Variable	VIF	1/VIF
LLFP	6.00	0.166630
LFCF	3.20	0.312657
TRADE	3.04	0.328736
LMOB	2.10	0.476788
UE	2.10	0.476788
Mean VIF	3.18	

Note: Note: GDP = GDP per capita; LMOB = Log of mobiles cellular subscriptions; LLFP = Log of labour force participation rate; UE = Unemployment rate; TRADE = Trade openness; LFCF = Log of gross fixed capital formation.
***denotes 1% significance level, **denotes 5% significance level and *denotes 10% significance level.

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
$F_{(1, 7)} =$ 56.174
$Prob > F =$ 0.0001

Figure-3. Results for Woolridge serial correlation test.

Based on the VIF test, if the individual coefficients are more than 10, multicollinearity is said to be severe among the variables. According to the result tabulated in Table 3, the coefficients of each variable are found to be relatively low and less than 10. If a linear association exists between the variables, multicollinearity is present too. However, in this case, as the values are less than 10, it indicates that there is relatively low correlation between the variables. This is followed by the serial correlation test with its result as shown in Figure 3. Based on Figure 3, the data has a probability value of 0.0001. At 5% significance level, the data is identified to be significant and therefore, the null hypothesis is rejected. Thus, in this data set, it can be concluded that first order autocorrelation is present.

Based on the above results, it is evident that mobile cellular subscriptions per 100 people (MOB), labour force participation rate (LFP) and unemployment rate (UE) are positive and statistically significant against the economic advancement of the eight countries, namely the ASEAN5 +3, which were observed and tested in this study. Within the explanatory variables, the magnitude of the estimated coefficients occurs within a range of the lowest being 0.06 (UE) and 0.62 (LFP). Although unemployment rate (UE) shows an expected positive sign, it remains lower than the other variables. These coefficients show how much the economics of each country would grow in response to an increase of the independent variables tested, portraying the significantly positive implications of ICT development on economic growth.

Based on the results obtained from the diagnostic tests conducted, it is found that the data used are free from heteroscedasticity. This is an indication of an absence of outlier in the data and the variance of errors in the relationship is persistent across all values of the independent variable, namely GDP. The results also show that, the possibility for multicollinearity to occur within this study is considerably low with an exception of FCF. This was further tested with the VIF test as well as the Woolridge serial correlation test for autocorrelation. As the VIF test detects multicollinearity between the explanatory variables and quantifies the severity of it, the results have shown that correlation is relatively low as compared to the maximum acceptable value of 10.

The outcomes of this study were found to be similar and in line with the results discovered in past studies which were conducted within other group countries. Das et al. (2016) brought to light that both measures of ICT development used in their study, namely mobile cellular subscriptions, and internet subscription, were positively significant. The authors added that based on their results, it is apparent that a strong homogenous and significant effect of ICT development on economic growth exists within the rising Asian countries studied. Similarly, Lee and Brahmasrene (2014) have also been able to prove their hypothesis, stating that in their study, ICT development has positively impacted the economic growth of ASEAN. Correspondingly, they have commented that due to this result, evidently, ICT development plays a vital function in promoting the region's economics.

The findings of this study could be justified by the outstanding economic achievements of the three external countries, namely Japan, Korea and China, and the advancing economies of the five ASEAN countries involved in this research. As the penetration rate of mobile cellular lines and ICT in these countries are significantly increasing, it is undoubtedly assuring that the economic growth in these countries would be highly impacted by this as well. Furthermore, as business operations, education systems, and governance are becoming more technology-driven in other major countries these days, the development of ICT is also, consequently, becoming more essential in our everyday lives.

It is indisputable that one of the leading and critical features in well performing economies around the world are the advancing and escalating ICT developments. The findings as discussed earlier has provided preliminary evidence that ICT development plays an important part in the economic growth of the countries studied, and possibly every other developing country as well. In line with that, governments should develop or further develop existing ICT policies to be put in place in times of such need and demand for it. The policies could include the promotion of investments of all sorts such as in the supply and production aspect, usage in all levels – schools, offices, businesses and government matters – as well as expansion to rural areas as an effort in narrowing the gap between urban and rural areas to encourage better economic prosperity.

In countries within our study such as Japan, Singapore, Korea as well as China, there have been government policies which have stood for years whose main goal is to build and develop local industries to manufacture more electronic software and hardware which would then in turn be used to generate incomes for their nations. Thus, these countries have shown their credibility in the ICT industry. This could be a guide for other countries to fall on.

Correspondingly, as governments play a vital role in ICT development across nations, in addition to production, policies could also be developed to further implement the application of ICT in other fields of the economy such as the education sector.

5. CONCLUSION

Due to the limited research and results, the true relationship between ICT development and economic growth is still vague especially during a time when technology is essential to the development of countries worldwide. This has led to this research title. In past theoretical studies, there were different results which were obtained from the data used by the respective researchers. Some were positively significant while others were the opposite. In accordance with that, empirical result obtained from this study has shown that the RE model was found to be most appropriate for this study. Further to this, the independent variables were found to be positively significant in correlation with the economic advancement of the ASEAN5 +3. This indicates that ICT development has had positively impacted the GDP of the eight countries used in this study over the eight-year period ending in 2018.

As results of this research have found that ICT development has been positively impacting the economic growth of the ASEAN5 +3 countries, there are some policy recommendations which could be considered in boosting the development as well as growth of ICT and the economy, respectively. Firstly, respective governments could include promotions of various investments in many aspects such as supply and production, education, businesses as well as government matters to encourage the usage and utilization of ICT. Additionally, this serves as an effort in bridging the gap between rural and urban areas to stimulate economic growth. Policies to further enhance and improve local industries through ICT should be developed and implemented as well. Countries such as Japan, Korea, China, and Singapore, among the ASEAN5 +3, have long implemented such policies which helped developed and built their local industries and in turn, boosted their economic prosperity. Therefore, considering such instances among the group countries, their credibility can be used as an example and guide to the other countries to further heighten their policies and be on par and caught up with this technology driven era.

Another aspect which policy implementations and government investments can focus on is in the reduction of poverty. The direct and wide usage of ICT in various businesses, sectors and services opens more space for the development of local ICT industries, local ICT-propelled business as well as driving innovations in areas or places that holds to be of more relevance in poverty reduction. However, for this to happen, countries will need to have good ICT infrastructure which provides support, nationwide, and be inclusive of everyone. In turn, countries with good infrastructure, accessibility as well as cheap, IT-competent labour force will be sought out by other larger countries to be outsourced or it could even be an opportunity to attract foreign investments. Yet, these are just some of the vast options which could be adopted through government policies by countries moving toward better ICT development.

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