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## The Nexus between Telecommunication Infrastructure and Economic Growth in ASEAN

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### Abstract

The study aims to analyze the long-term relationship between the telecommunications infrastructure development and economic growth in ASEAN, due to the dynamics of the telecommunications that run very fast in the world community. It will be known the influence on economic growth, whether it is a priority in the economic development of a ASEAN nation. Using annual time series data from ten ASEAN member countries for the period 1986-2015, GDP growth and the growing of telecommunication infrastructure is analyzed with Johansen Cointegration Test. The result show that a long-term relationship between telecommunication infrastructure development and economic growth is exist in each ASEAN member country. Therefore, if a country desires to promote economic growth, it is necessary to apply a particular policy to facilitate investment in the Information and Communication Technology (ICT) sector.

Keywords: telecommunications; infrastructure; economic growth; cointegration

### INTRODUCTION

The increasing trend of ICT users in various aspects of life indicates the entry of society into an era called the information society era. The thing that cannot be separated from the information society is telecommunications which has even become a necessity. The development of telecommunications should be driven by infrastructure in support of access to information so that economic activity will run more efficiently. Besides being important for economic growth, telecommunications infrastructure is also important to open and introduce the domestic market to the global market. The era of globalization requires a country has the ability to acquire, utilize, and process the telecommunications infrastructure to boost economic growth and improve the national competitiveness.

The flow of information traffic as a basic need for economic integration makes ASEAN region countries insert the telecommunications through digital innovation to the Master Plan on ASEAN Connectivity 2025 (MPAC) [1]. MPAC is a strategy to improve connectivity between ASEAN countries. The connectivity between regional countries is crucial, especially the agreement to establish the ASEAN region within the framework of the ASEAN Economic Community (AEC) as an attempt to promote economic activity over countries. However, the development of telecommunications infrastructure in ASEAN still shows disparities that indicate the occurrence of digital divide [2]. The digital divide in an area will impede the coordination that causes inefficient and not maximal economic activity which resulted in low competitiveness and will further impact on the economy.

Many studies have been done to catch the relationship between the infrastructure of telecommunications and economic growth. Some result stated that the development of telecommunications infrastructure has a connection with economic

growth in the short and long term. In ASEAN, it is not easy to apply because of the fluctuating economic growth in this region. telecommunications infrastructure tends to an increasing trend. It may indicate that in the short run, the two variables have different movements which implicate the absence of the relationship between the two variables. But in the long run both variables can move to achieve equilibrium so that both variables have a long-term relationship. Kooshki & Ismail, [3] demonstrated that in The New Industry countries (Singapore, South Korea, Hong Kong and Malaysia) have a significant positive impact of ICT investment to the economic growth during the period of 1990-2007. A study economic area needs to be supported by adequate telecommunication infrastructure to maintain the strong integration. The rate of telecommunication deployment in a country is currently measured from the teledensity level. Shiu & Lam [4] stated that "Teledensity is defined as the number of fixed line and mobile phone subscribers per 100 persons". Teledensity is a standard measurement used to measure the telephone lines per 100 inhabitants in a country. Through the International Telecommunications Union (ITU), the people can monitor the progress of teledensity worldwide.

The development of telecommunications infrastructure through other infrastructure and production factors capable of stimulating economic growth [5-9]. These findings in line with the view of Supply-Leading Hypothesis (SLH) which argues that the development of telecommunications infrastructure is a prerequisite for economic growth.

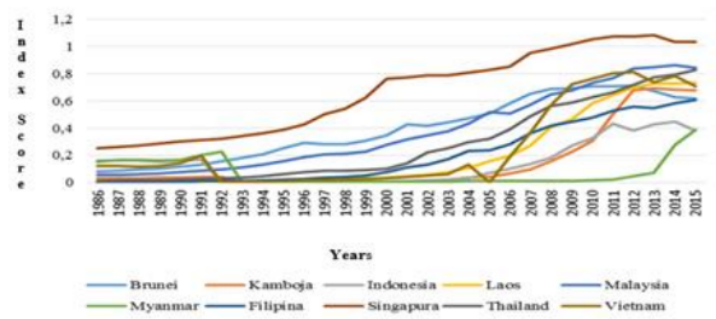


Figure 1. The Development of Telecommunications Infrastructure Index

Source: ITU, (World Development Indicator, [2])

The Demand-Following Hypothesis (DFH) declare that economic growth could encourage the development of telecommunications infrastructure. Different findings were expressed by Shiu & Lam [4]; Pradhan et al [10]; Kaur & Malhotra [11]. They hold the view that the telecommunications infrastructure plays only a minor role in the economy. Actually, the increasing of economic growth will cause an impact on the development of telecommunication infrastructure. The economic growth increases a person's ability to access information. It makes the telecommunications infrastructure emerging in various forms to fulfill the needs of the community.

A Feedback Hypothesis (FBH) states that economic growth and development of telecommunications infrastructure are able to complement and support each other, causing these two variables to affect each other [12]. Telecommunications infrastructure is required for economic growth and so is the reverse direction. However, Wilson, et al., [13]; Ramlan & Ahmed [14] have the different opinion that no relationship between the development of telecommunications infrastructure and economic growth. This result is in accordance with the view of Non-Leading Hypothesis (NLH). NLH states the development of telecommunications infrastructure and economic growth are not mutually affecting.

The Differences in views due to discrepancy in the circumstances of each factors that influence the development of telecommunications infrastructure and economic growth and it happened in ASEAN. The nexus between the economic growth and telecommunications infrastructure is important to examine in the long run because its suspected that this development plays a role in the economy, specially to open up local market in the international area. In ASEAN, the development of telecommunications that is growing so fast and dynamic at the global level, if does not properly arranged, will not provide positive benefits for a country's domestic economy. This study aims to examine the relationship between economic growth and the development of telecommunication infrastructure in ASEAN countries. This relation is important to examine in the long run because its suspected that this development plays a role in the economy, specially to open up local market in the international area.

## METHODS

This study uses a quantitative econometrics approach and uses secondary data sourced from International Telecommunication Union (ITU) to obtain the data of the Development of Telecommunications Infrastructure Index (DTI index), World Development Indicator and United Nations Conference on Trade and Development (UNCTAD [15]) to obtain the data of GDP growth. Time series data taken from each ASEAN member countries that are Brunei Darussalam, Cambodia, Philippines, Indonesia, Lao PDR, Malaysia, Myanmar, Singapore, Thailand and Vietnam for the period of 1986 to 2015. The data is analyzed by Johansen Cointegration Test to determine the long-term relationship between the two variables in each country. The Johansen cointegration test is more reliable for detecting multiple cointegration and more powerful than the Engle Granger test which residual-based [16]. This study uses statistical trace test in procedure of rejection of  $H_0$ . The Trace tests showed better results than eigen values especially in bivariate studies with small samples [17].

## RESULTS AND DISCUSSION

The study aims to determine the cointegration relationship between the development of telecommunication infrastructure and economic growth of ASEAN countries. The concept of cointegration is concerned with long-term equilibrium with a convergent economic system over time. Then if a shock occurs in an economic system, in the long-run there will be a force to drive economic to revert to its equilibrium condition. In other words, if there is an imbalance in the short run there will be a driving force to return to its equilibrium position. Before the test the steps must be executed is the stationary test and the lag length criteria test. Based on the stationary test, in average the variable of GDP Growth in each country has stationary at the level. On the other hand, the variables of DTI index in each country have unit root or non-stationary at the level. The degree of integration to characterize non-stationary process remains to be seen through testing in the first difference. The results of the stationarity test of the data at the first degree of integration shows that the procedure gives the result of the null hypothesis of the unit root being rejected. However, this does not apply to Cambodian, Indonesian, Thailand and Vietnam. The variable of DTI index still shows processes non-stationary on the first degree of integration or at the first difference. Thus, the unit root test for these countries remains to be seen in the second degree of integration or second difference.

The result shows that all variables in each country have been unimpeded of the unit root or are stationary. The data that has been integrated on the same degree can be used for cointegration analysis. Before doing the test, the next crucial thing is to determine the optimal lag. Its show that each country has a different lag. It implies that the treatment of a certain variable will have an impact on another variable one, two, or three years later according to the optimal lag length.

Tabel 1, Based on the cointegration test, each country shows that the trace statistic value is greater than the critical value at 5% so there is a rejection of null hypothesis. Thus it can be concluded that the two variables have an equilibrium and similarity of movement in the long-term during the research period. In other words, each short-term period of the development of telecommunications infrastructure and economic growth tend to adjust to achieve long-term equilibrium. The long-term relationship between economic growth and the development of telecommunications infrastructure is prevailing in each ASEAN country. This cannot be separated from the intervention of the governments of each country to improve its telecommunications system in line with the increasingly global competition. The government provides some policies to build telecommunications infrastructure network of the country as awareness of the importance of telecommunications infrastructure role to the economy.

**Table 1:** The Results of Johansen Cointegration Test

Country	Total Cointegration	Trace statistic	Critical Value	Conclusion
Brunei Darussalam	<i>None</i> *	32.35882	15.49471	Integrated
	<i>At Most</i> *	8,782627	3.841466	
Cambodia	<i>None</i> *	21.35558	15.49471	Integrated
	<i>At Most</i> *	8.393634	3.841466	
Indonesia	<i>None</i> *	20.25273	15.49471	Integrated
	<i>At most</i>	0.154439	3.841466	
Lao PDR	<i>None</i> *	45.87829	15.49471	Integrated
	<i>At most</i>	0.036247	3.841466	
Malaysia	<i>None</i> *	32.21765	15.49471	Integrated
	<i>At most</i>	0.659743	3.841466	
Myanmar	<i>None</i> *	22.23203	15.49471	Integrated
	<i>At most</i> *	4.039914	3.841466	
Philippines	<i>None</i> *	17.37569	15.49471	Integrated



	<i>At most</i>	1.881310	3.841466	
Singapore	<i>None *</i>	31.27440	15.49471	Integrated
	<i>At most</i>	3.457247	3.841466	
Thailand	<i>None *</i>	17.82731	15.49471	Integrated
	<i>At Most</i>	3.27E-05	3.841466	
Vietnam	<i>None *</i>	18.26715	15.49471	Integrated
	<i>At most</i>	0.450372	3.841466	

Notes \* : rejection of the null hypothesis at 5% level

Source : secondary data, processed

The telecommunications sector in Brunei Darussalam has experienced rapid development and achieve a high enough standard. As in Singapore, Brunei achieved the target of 100% digitalization in the late of 1990s. The penetration rate grew up especially *mobile-phone* in early 2000.

Myanmar has the institution engaged in the development of ICT called the *Myanmar Computer Federation (MCF)*, in 1998 the institution has opened public access centers throughout the country to allow access to telecommunications for its citizens. The Philippines, the government's deregulation of the telecommunications sector in 1995 made the market sector more competitive so that the companies concerned will be more flexible in developing telecommunications infrastructure. Since 1993-1994 the government of Lao PDR began to open up foreign investment in telecommunications. It has implications for the improvement of the provider, so that the particularly penetration of mobile-phone is increasing and now the service has covered the whole country.

Indonesia has a full competition market as well as an independent regulator. The market competition model minimizes the government intervention so that the private sector is very dominant in developing telecommunications infrastructure. The rational people will choose the services that can provide maximum utility. This will be responded by the service provider company by always developing its telecommunications infrastructure to maintain the loyalty of consumers / community.

Cambodia developed telecommunications infrastructure network by opening big investment opportunities for countries one of them is Indonesia. Not only Indonesia, Singapore has invested in Myanmar by building up a network of fiber optic through the length of 8600 km in 2015 [18]. Malaysia has a policy called The National Telecommunication Policy / The NTP (1994-2020) which serves as a catalyst for the development of the telecommunications sector to be a modern and dynamic sector. The NTP has a policy formulation of the development of telecommunications sector at national and international levels. At the international level, The NTP will ensure that Malaysia has a competitive telecommunications service provider and can be a market leader in the Asia Pacific region as well as in the world.

The Singapore's government has established a policy to reduce the digital divide by developing a knowledge-based economy. In addition, the Singapore's government privatize Singapore Telecommunications Limited (SingTel) in order to more freely this company build infrastructure. Therefore, Singapore now has a well-developed and fast-developed ICT infrastructure. Since the 1990s, the telecommunications infrastructure for fixed telephone network in Singapore has achieved of 100% digitalization consisting of the expansion of fiber-optic network that connects all of the telephone and the submarine cable network that provides global connections [19].

Thailand has several policies aimed to increasing the scope of telecommunications services and reducing the digital divide between rural and urban areas. Through the Ministry of Information and Communication Technology (MICT) Thailand adopted The Bridging Digital Device Strategic Plan (2008-2010) to improve accessibility to information and communication technology and to improve research and development [20].

Following the acceleration of telecommunications development strategy, Vietnam was able to achieve the development of modern telecommunications infrastructure. In 2003, more than six million fixed telephones were installed in Vietnam, covering 7.35% of previously 1% in 1995 [21]. The fixed line network in the countryside is also experiencing rapid development. In addition, the mobile phone network has also been connected to hundreds of mobile phone networks from 50 countries around the world.

Telecommunications infrastructure has been being a driving force for economic growth in these countries. It can be caused by many factors such as domestic and foreign investment in telecommunications sector. The same results were found by (Pradhan, 2014) which the infrastructure of information and communication technology (ICT) is manifested

perfectly in the G-20 countries. Norton [22], Nadiri and Nandi [23], and Roller and Waverman [24] in (Ahmed & Krishnasamy [9]) stated that "investment in telecommunications infrastructure, with its ability to create spillover effects through network externalities, can impact growth far more the alternative infrastructure". Investment in telecommunications infrastructure has an impact on the economy both directly through the telecommunications industry's output and indirectly through other sector outputs such as manufacturing, agriculture, services and others.

The growing of telecommunications infrastructure networks is able to stimulate economic growth, but it must be supported by development in other sectors. Thus, the development in the sectors which with the development of telecommunications infrastructure will be able to support and complement each other in promoting economic growth should be a concern, as the business environment, education, human resources through skill training so that the maximum advantage from the telecommunications system can be achieved sustainably.

Moreover, the existence of the long-term relationship between the development of telecommunications infrastructure and economic growth, the distribution of the development of telecommunications networks and the development of other supporting sectors becomes very urgent to do immediately. This is because in the long-term both variables can be integrated and the impact of the development of telecommunications development on the economy cannot be directly perceived.

### CONCLUSION

This study aims to examine the relationship between economic growth and the development of economic infrastructure in ASEAN countries. The result state that it shows an equilibrium in ASEAN's country and does not affected by the flow of change in the long-term. In other words, all variables in the short-term do adjustment to achieve long-term equilibrium. Therefore, if a country desires to improve economic growth, a policy is needed to facilitate investment in the Information and Communication Technology (ICT) sector.

### REFERENCES

- [1] ASEAN, 2016. Master Plan on ASEAN Connectivity 2025. (2016). Jakarta: ASEAN Secretariat., Jakarta: ASEAN Secretariat.
- [2] World Development Indicator, 2015. *World Development Indicator*, Washington DC: Publishing and Knowledge Divisions of World Bank..
- [3] Kooshki, M. F. & Ismaili, R., 2011. The Impact of Information and Communication Technology Investment on Economic Growth in Newly Industrialized Countries in Asia. *Australian Journal of Basic and Applied Sciences*, 5(9), pp. 508-516.
- [4] Shiu, A. & Lam, P. L., 2008. Causal Relationship Between Telecommunications and Economic Growth : a Study of 105 Countries, Hong Kong: The Hongkong Polytechnic University.
- [5] Dutta, A., 2001. Telecommunications and Economic Activity : An Analysis of Granger Causality. *Journal of Management Informations System*, 17(4), pp. 71-95.
- [6] Ding, L. & Haynes, K., 2006. The Role Of Telecommunications Infrastructure In Regional Economic Growth In China. *Australian Journal Of Regional Studies*, 12(3).
- [7] Stetsenko, O., 2007. *Telecommunications as a Determinant of Worldwide Economic Growth*. Kiev, National University Kyiv-Mohyla Academy: Master of Art in Economics.
- [8] Tella, S., Amaghionyeodiwe, L. A. & Adesoye, B. A., 2007. *Telecommunications and Economic Growth: Evidence from Nigeria*, s.l.: UN-IDEP and AFEA.
- [9] Ahmed, E. M. & Krishnasamy, G., 2012. Telecommunications Investment and Economic Growth in ASEAN5 : An Assesment from UECM. *New Zealand Economic Papers*, pp. 315-332.
- [10] Pradhan, R. P., 2014. Telecommunications Infrastructure and Economic Growth : Comparative Policy Analysis For The G-20 Developed and Developing Countries. *Journal of Comparative Policy Analysist: Research and Practice*, 16(5), pp. 401-423.
- [11] Kaur, K. & Malhotra, N., 2014. Telecommunications and Economic Growth In India : Causality Analysis. *IMPACT : International Journal of Research In Business Management (IMPACT : IJRBM)*, Volume 2, pp. 31-46.
- [12] Onakoya, A. B. O., Tella, A. S. & Osoba, M. A., 2012. Investment in Telecommunications Infrastructure and Economic Growth in Nigeria : a Multivariate Approach. *British Journal of Economics, Management, and Trade*, 2(4), pp. 309-326.
- [13] Wilson, A., David, U., Beatrice, E. & Mary, O., 2014. How Telecommunications Development Aids Economic Growth: Evidence from ITU ICT Development Index (IDI) Top Five Countries for African Region. *International Journal of Business, Economics and Management*, Volume 1, pp. 16-28.
- [14] Ramlan, J. & Ahmed, E. M., 2009. Information and Communication Technology (ICT) and Human Capital Management Trend in Malaysia's Economic Development. In: *Applied Economics Letters*. s.l.:Routledge: Taylor and Francis Group, pp. 1881-1886.
- [15] United Nations Conference on Trade and Development (UNCTAD), 2016. *Gross Domestic Product: Total and Per Capita, Growth Rates, Annual*, New York: United Nations.

- [16] Hakim, A. R., 2015. *Stasioneritas, Akar Unit, & Kointegrasi : Pengantar Time Series*. s.l., Kuliah Asistensi Pascasarjana Ilmu Ekonomi UI.
- [17] Lütkepohl, H., Saikkonen, P. & Trenkler, C., 2001. Maximum Eigenvalue Versus Trace Test for The Cointegrating Rank of a VAR Process. *Econometrics Journal*, Volume 4, pp. 287-310.
- [18] Agustinus, M., 2015. *Perusahaan Telekomunikasi Singapura Berminat Investasi Rp 2 T di RI*. [Online] Available at: <https://finance.detik.com/industri/d-3088323/perusahaan-telekomunikasi-singapura-berminat-investasi-rp-2-t-di-ri>
- [19] Ai, Foo Jong. 1997. Singapore One, Pioneering the 21st Century. Telecommunication Authority of Singapore (TAS). Speech-Asia Telecom 97.
- [20] Srinuan, C., Rohman, I. K., Srinuan, P. & Bohlin, E. (., 2009. *Digital Divide in ASEAN Countries: How wide is The Gap and What is The Role of Independent Regulator*. [Online] Available at: <https://editorialexpress.com/cgi-bin/conference/download.cgi?db> [Accessed October 2017].
- [21] Ministry of Post and Telecommunication, 2003. *Vietnam's Telecommunications Sector in International Integration*, s.l.: Telecom Paper
- [22] Norton, S. W. (1992). Transaction costs, telecommunications, and the microeconomics of macroeconomic growth. *Economic Development and cultural change*, 41(1), 175-196.
- [23] Nadiri, M. I., & Nandi, B. (2015). Modern communication technology and its economic impact: A survey of research findings. *Digiworld Economic Journal*, (100), 125.
- [24] Roller, L. H., & Waverman, L. (2001). Telecommunications infrastructure and economic development: A simultaneous approach. *American economic review*, 91(4), 909-923.

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