ANALYSIS ICT EFFECT ON INDONESIAN EXPORTS WITH EMERGING MARKET COUNTRIES

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Abstract

The development of information and communication technology (ICT) has recently affected international trade besides macroeconomic variables. This study aims to analyze the influence of ICTs and macroeconomic variables on Indonesian export performance with 6 countries emerging markets. This study uses secondary data sourced from UN Comtrade, ITU, World Bank, Distancefrom.net, and Federal Reserve Economic Data. Then, this study uses a static panel data analysis with the Ordinary Least Suares (OLS) method.

The results showed that internet users had a positive and significant effect on export performance, and fixed telephone subscriptions had a negative and insignificant effect. Other results showed that the population had a positive and significant effect on export performance, the distance of the economy had a negative and significant effect on export performance, real per capita GDP had a negative and insignificant effect on export performance, and the real exchange rate had a negative and significant effect on export performance. The policy implications are increasing electronic-based trading activities, increasing the quantity of products that are in demand by residents of partner countries, focusing on exporting to Emerging Markets Countries that have closer distances to Indonesia, and the need for a policy mix related to exports and exchange rates.

Keywords: emerging markets, export performance, ICT, macroeconomic variables.

1. Introduction

In the open economy, international trade has an important role in stimulating a country's economic growth. One component of an open economy exports. The role of exports for economic growth has direct and indirect effects. The direct effect is evidenced by the hypothesis of the Export-Led Growth (ELG) which states that export expansion can increase the Gross Domestic Product (GDP) (Dreger & Herzer, 2012). Meanwhile, the indirect effect is manifested in productivity. This means that export expansion affects economic growth through domestic and foreign investment, imports of capital goods, improvement of production processes, absorption of skilled labor, and knowledge spillovers (Gokmenoglu et al, 2015). The direct and indirect effects of exports on economic growth will ultimately affect trade activities between countries.

Trade activity between countries has been described in Keynesian models of the open economy. The assumption emphasizes that exports do not depend on the level of income. Another thing in the consumption theory is that consumption is determined by income. If the national income of a trading partner country increase or the exchange rate against the trading partner's currency is appreciated, there will be an increase in the volume and value of a country's exports (Harvey, 2016).

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The volume and value of exports are thus influenced by factors that are beyond the control of the exporting country. Apart from income and exchange rate, exports are also influenced by the population or population in trading partner countries, trade policies implemented by trading partners, and developments in Information and Communication Technology (ICT).

The current development of information and communication technology has become a benefit in trade between countries, namely (i) integration of markets and industries with transactions, distribution of goods and services that do not recognize the time and geographic boundaries; (ii) trade cost efficiency; (iii) can open and expand market access; and (iv) accelerating business activities in the market (Chu & Guo, 2019; Guan & Sheong, 2020; Xing, 2018).

Although the development of ICT can provide great benefits in supporting trading activities, in fact, there are still a number of challenges to be faced. According to the Readiness for Future Production Report in the 2018 Word Economic Forum, in terms of production structure in readiness to face Industry 4.0, Indonesia is still behind compared to Thailand, so that Indonesia is categorized as a nascent country driver and structure of production. In the business world, Indonesia is also still lagging behind. According to the Global Competitiveness Index, in 2019, Indonesia's business softification was ranked 32, and technology readiness was ranked 80 (Kuncoro, 2019). In addition, Indonesia is in the 2nd lowest position for fixed broadband speed and 5th lowest for mobile broadband speed in the ASEAN scope, so it has not been able to significantly boost Indonesia's export performance (Aryani et al, 2020).

In the end, the opportunities and challenges that occur in ICT become demands that the needs of the community are increasing along with the growth of the population. Apart from the population that can determine exports, economic distance, real GDP per capita, and real exchange rate are also important proxies in supporting Indonesia's export performance.

In order to support Indonesia's export performance, a potential trading partner is needed. Emerging Markets are believed to be opportunities to support Indonesia's export performance. It is proven that in 2008 when the global economic situation experienced a slowdown due to the economic crisis, Emerging Markets countries had less high volatility, high resilience, lower unemployment rate for developed countries, as well as at that time. Emerging Markets countries managed to hold back a relatively low increase in capital outflows. This illustrates that emerging market countries have increasingly shown that the standard of living they enjoy is getting higher, which is marked by economic growth that exceeds developed countries (Haines et al, 2019).

The relatively high resilience of Emerging Markets Countries can be an opportunity for Indonesia to support export performance, so that the country can be said to be potential. Based on data from Bloomberg in 2018, there were 6 countries that had real potential, namely China, India, South Korea, Malaysia, Thailand and Vietnam. These countries are 6 of the 10 largest countries that can support Indonesia's export performance.

Although these countries are the most potential trading partners for Indonesia, there is often a decrease in the volume of Indonesian exports. For example, the decline in the volume of Indonesian exports to China in 2011-2015 was caused by the impact of the global economic crisis, China's economic slowdown, the decline in prices for Indonesia's main export commodities, and at that time a ban on exports of raw minerals was imposed (World Bank, 2015) in (Jamilah et al, 2017). Apart from China, the decline in export volume also occurred between Indonesia and South Korea which occurred in 2011-2017, one of which occurred

because the composition of Indonesia's export volume still depended on the prices of basic commodities such as coal (Pujayanti, 2019).

The development of Indonesia's export volume cannot be separated from the population factor of partner countries. Among the 6 largest partner countries of Indonesia, when related to exports, the difference between people's needs and the stock of production products is a driving factor for partner countries to import commodities from Indonesia. Therefore, it is important to direct bilateral trade to partner countries that have populations so that it has an impact on the supply side, which can increase the supply of labor and from the demand side, which can encourage an increase in domestic production activities (Aryani et al, 2020).

Changes from the supply and demand side of a country's commodities for export to partner countries need to see developments in exchange rate volatility. In Emerging Market Countries, exchange rate volatility and exports have become a concern because they are characterized by a higher exchange rate volatility compared to developed countries (Darrat & Hakim, 2014). Countries belonging to Emerging Markets also have high real GDP per capita and are dominated by flexible exchange rate systems. Although the exchange rate volatility of Emerging Markets Countries is higher than developed countries, Khosa (2015) argues that exchange rate volatility in Emerging Markets countries tends to be unstable.

Based on the background that has been described, it appears that it is important to optimize Indonesia's current exports. One way that can be done is by continuing to expand Indonesia's bilateral trade cooperation with potential emerging markets partner countries. This can be done as a step in improving export performance in line with the times and societies that are increasingly sensitive to technological changes. Therefore, this study will explain how the influence of information and communication technology and macroeconomic variables on export performance in a case study of Indonesia's bilateral trade with 6 Emerging Market Countries.

2. Literature Study

The theory of partial balance of trade between countries explains that a country (country A) will be able to export a commodity to another country (country B) if the price in country A is lower than country B before the occurrence of international trade. Lower domestic prices for commodities in country A occur because the quantity of goods offered is greater than the quantity of goods demanded (excess supply). Therefore, country A has the opportunity to sell its excess commodities to country B. Meanwhile, in country B there is excess demand because the

amount of domestic demand in country B exceeds the amount of its supply (excess demand). As a result, the prices in country B are higher. Therefore, country B prefers to buy the commodities needed for country A which are cheaper. After that, the two countries negotiated and agreed to export their commodities to country B, while country B imported from country A (Salvatore, 2014).

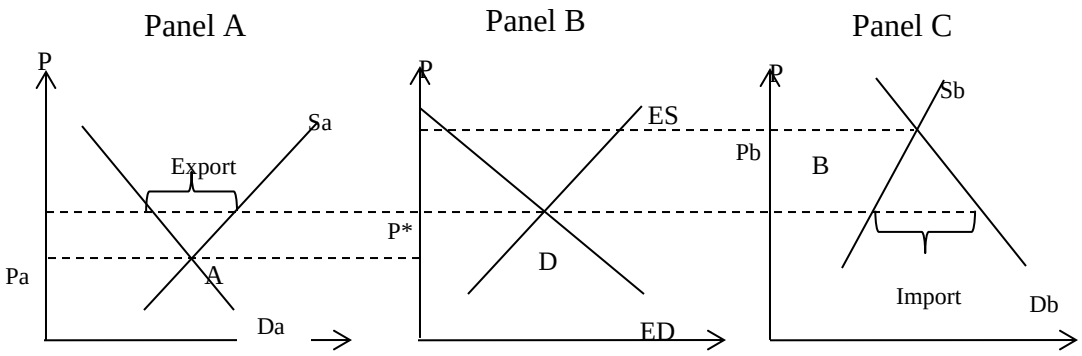

Figure 1. Supply and demand curve for international trade

Absolute Advantage Theory

The theory of absolute advantage was put forward by Adam Smith, which is one of the neoclassical theories. The assumption of the theory of absolute advantage is when one country is more efficient or has absolute advantage in the production of a commodity, but is less efficient or has absolute losses in producing another commodity. such circumstances allow the two countries to obtain their respective advantages by specializing in the production of commodities from the product of their absolute advantage and exchanging a portion of the country's output with other countries for commodities that have an absolute loss.

Comparative Advantage Theory

The theory of comparative advantage put forward by David Richardo. This theory is also called the Ricardian theory. This theory emphasizes that if a country is less efficient or has comparative losses with other countries in terms of commodity-related production owned by the two countries, then it can still produce mutually beneficial trade. A country needs to specialize by importing commodities that are less comparative and exporting goods that have a comparative advantage. One of the assumptions in the Richardian model is labor as an input variable in producing a good. It is assumed that labor is the only factor of production in producing 2 goods produced in 2 countries. The workforce used in the Richardian model tends to be homogeneous within countries and heterogeneous when it occurs between countries (Suranovic & Steve, 2010).

Factor Proportion Model (Heckscher-Ohlin)

The Heckscher-Ohlin model or factor proportion model is a model that extends the Richardian model and is another neoclassical theory. When the Richardian model sees labor as the only factor of production in producing the output, the Heckscher-Ohlin model adds the factor of production

from the Richardian model, namely capital. Thus, the Heckscher-Ohlin model says that the factor of production consists of capital and labor.

The assumption of the H-O model makes its 2-2-2 variant. That is, 2 goods, 2 factors, and 2 countries. This variant emphasizes that the interactions that occur in the market are interrelated, namely how the proportion of factors can affect supply and demand, where supply and demand encourage interactions in trade through factor markets that will affect the national market. Then, the national market will affect the goods market and factor markets, both at home and abroad. In other words, all markets based on the H-O model are interconnected markets.

Technology Gap Model and Product Cycle Model

According to the technology gap model put forward in 1961 by Posner, most of the trade that industry does in individual countries is based on the introduction of new products and new production processes. This provides an opportunity for companies in a country to innovate and compete in the temporary monopoly competition market in the world market. Temporary monopoly competition is often based on patents and copyrights granted to stimulate the flow of the meeting. However, this model has a weakness, namely that it does not explain the size of the technology gap and does not explore the reasons for the emergence of technology gaps (Salvatore, 2014). Finally, the technology gap model was expanded by Vernon in 1966 by the so-called product cycle model. According to this model, when a product is introduced, it usually takes a skilled workforce to produce it.

Competitive Advantage Theory

The theory of competitive advantage put forward by Porter entitled The Competitive Advantage of Nations explains that the increase in welfare standards (standard of living) at the state level is highly dependent on the capacity of a country's companies to achieve the highest level of productivity (Huggins & Izushi, 2015).

Specifically, 4 factors affect competitive advantage, including (i) condition factors. Porter states that the differences in condition factors consist of human resources, natural resources, knowledge and technology resources, and infrastructure resources; (ii) Demand conditions, namely demand for domestic consumers. This situation can have an influence on the differences in resources owned between countries and the relative location of a country in conducting trade; (iii) Supporting and related industries which become the most important contribution because they involve a network of special input providers from competition to be a source of competitive advantage. (iv) The structure, competition, and strategy of the company which is very dependent on the domestic environment and the different systems in various countries in determining the strategy in which the company can compete in each country and ultimately produce a competitive advantage. In the end, domestic competition encourages companies to be more innovative and competitive in price, as well as more quality (Huggins & Izushi, 2015).

Gravity Model

Empirically, gravity models have been widely used to analyze bilateral trade patterns. This model has based on the Law of Universal Gravitation proposed in 1687 by Isaac Newton. He argues that between 2 objects, namely i and j:

$$F_{ij}=G\frac{MiMj}{Di^2j} \quad (1)$$

Where:

F is "force of attraction", M is mass, D is the distance between objects, and G is the gravitational constant determined by the units of measurement for mass and force. The same thing was proposed by Jan Timbergen (1962) to explain trade flows.

$$F_{ij}=G\frac{Mi^{\alpha}Mj^{\beta}}{Di^{\theta}j} \quad (2)$$

Where F_{ij} trade flows from i to j, M_i and M_j are measures of "economic masses", D_{ij} s the distance from 2 locations, and G is a constant (the same as Newton's law, if $\alpha=\beta=1$ dan $\theta=2$).

Previous Study

Research conducted by Ismail (2020) regarding Digital Trade Facilitation and Bilateral Trade in Selected Asian Countries explains the importance of using the digital infrastructure as a support for the availability and accessibility of digital infrastructure in both exporting and importing countries. Focus of the digital infrastructure used in his research is fixed telephone subscriptions, cellular subscriptions, and broadband. The results show that research on the Digital Trade Facilitation and Bilateral Trade in Selected Asian Countries, states that the higher the use of digital infrastructure, namely fixed telephone subscriptions, cellular subscriptions, and broadband, the more trade flows between 10 selected Asian countries (China, India, Korea) can be increased. South, Hong Kong, Malaysia, Indonesia, Thailand, Singapore, Philippines, and Vietnam) and 20 selected trading partner countries. His research also explains other factors in supporting trade flows, namely real GDP per capita and geographical distance, where the results show that real GDP per capita has a positive and significant correlation to trade flows. Meanwhile, geographical distance has a negative and significant correlation with trade flows.

Chuo & Guo (2019) also explained that the development of Information and Communication Technology (ICT) plays an important role in global and regional economic development that facilitates fast cross-border transactions and can help in finding market potential and opportunities in conducting trade. This can lower transaction costs and increase national trade as well as tougher competition in world trade. Therefore, technological developments have provided great opportunities for trade between countries, namely to expand trade activities.

In contrast to the research conducted by Aryani (2020), namely the Influence of Information Technology and E-Commerce on Indonesian Trade to ASEAN Countries, although ICT (internet users in Indonesia and broadband in partner countries) and B2B transactions have a positive and significant effect on trade performance. However, the use of broadband in Indonesia has a negative effect on trade performance. Other variables, namely GDP and distance, have a positive and significant effect on trade performance. Overall, ICT has the greatest influence compared to other variables.

Research conducted by Guan & Sheong (2020) shows that the relationship between population and export performance, both from China to Africa and from African countries to China, has a positive and significant effect. This means that the larger the population of trading partner countries, the greater the volume of exports, which is indicated by the greater supply capacity in the case study of bilateral trade in Africa with China using panel data for 17 years from 1999-2015. The real GDP per capita variable has a negative and significant effect on African exports to China and has a positive and significant effect on African imports from China. The real exchange rate has a positive and significant effect on African exports to China and has a negative and significant effect on African imports to China.

In contrast to the research conducted by Dlamini (2016), the population has a negative and significant correlation to the sugar exports of the State of Swaziland. The negative relationship between trade flows and population in trading partner countries can be attributed to a condition known as the import substitution effect. This implies that the population of trading partners leads to the expansion of the domestic market. Such conditions can create greater independence and consequently, there is no urgency to conduct bilateral trade Other variables show that the real GDP per capita of an importer has a positive and significant correlation, and the geospatial distance between Swaziland and trading partner countries has a negative and significant correlation to exports. The State Sugar of Swaziland.

Research conducted by Stouffer et al (2016) shows that ICT has a positive and significant effect on the volume of Indonesian exports to partner countries in the ASEAN scope. In addition, real GDP per capita and population also have a positive and significant effect on Indonesia's export volume. Then, distance and the real exchange rate show a negative and significant effect on Indonesia's export volume. Therefore, the policy implication of this research is that Indonesia is expected to be able to develop strategic trade partnerships with big economic countries, such as Singapore and Malaysia. Thus, it can increase the volume of exports, especially ICT-based products.

In contrast to research conducted by Kang & Dagli (2018) which states that bilateral trade in 72 countries during the 2001-2015 period there is a positive relationship between real exchange rate and export volume, such as the depreciation of exporters' currencies. Could result in higher export volumes before the Global Financial Crisis (GFC). However, its influence weakened significantly, especially after the GFC. The impact of currency depreciation on trade was much smaller after the GFC (2012-2015) than before the GFC (2003-2006). This research also looks at the impact of the existence of Global and Regional Value Chains (GVCs), namely that the existence of GVCs can reduce the real exchange rate. Export volume, and can be a factor that can contribute to the weakening of the relationship between exchange rate and trade between countries.

This study will look at the influence of information and communication technology and macroeconomic variables on Indonesia's export performance in 6 countries that combine markets. Based on previous theory and research, the hypotheses of this study include:

a. It is assumed that there is a positive influence from partner countries' ICT on Indonesia's bilateral trade export performance in 6 Emerging Market Countries in 2000-2018;
b. It is assumed that there is a positive relationship between the population of partner countries on the performance of Indonesia's bilateral trade exports in 6 Emerging Market Countries in 2000-2018;
c. It is assumed that there is a negative relationship from economic distance to the performance of Indonesia's bilateral trade exports in 6 Emerging Market Countries in 2000-2018;
d. It is assumed that there is a positive relationship of real GDP per capita of partner countries to Indonesia's bilateral trade export performance in 6 Emerging Market Countries in 2000-2018;
e. It is assumed that there is a negative relationship from the real exchange rate to the performance of Indonesia's bilateral trade exports in 6 Emerging Market Countries in 2000-2018.

3. RESEARCH METHODOLOGY

Research Variable

The variables used in this research are independent variable and dependent variable. The dependent variable is the variable that is influenced by the presence of the independent variable,

while the independent variable is the variable that affects and causes the dependent variable to arise or change.

The volume of Indonesia's exports with partner countries is used as the dependent variable, while the independent variables consist of information and communication technology (internet users, cellular phone subscriptions, and fixed telephone subscriptions), economic distance, population, real GDP per capita, and real exchange rate. This research period is 19 years, from 2000-2018 with a sample of 6 emerging market countries consisting of China, India, South Korea, Malaysia, Thailand, and Vietnam.

Analysis Method

To see the effect of information and communication technology and macroeconomic variables on Indonesia's export performance in 6 Emerging Market Countries, with static panel data regression analysis with a fixed effect model. This study uses Eviews 10 as an analysis tool. The type of panel data in this study is balanced panel data, wherein econometric theory, this process is the unification of time series and cross section data (Ekananda, 2006 in Sitorus & Yuliana, 2018).

Panel Data Regression Analysis

The theory of technology gap model and product cycle model by Posner and Bernon explain the role of technology in trade between countries. Changes in trade performance between countries can be made based on changes in the relative abundance of factors (technology) between countries from time to time. In the context of population, growth or increase in population in the importing country creates more markets for the exporting country (Dlamini et al, 2016). According to the theory in the gravity model, the volume of bilateral transactions of goods and services will be proportional to the size of the trading partner's economy. However, it is inversely proportional to geographical distance (Keum, 2010).

According to the theory of demand in the international market, when the importing country as a trading partner country experiences an increase in purchasing power (increase in real GDP per capita), the partner country will increase the demand for certain products or commodities from the exporting country. Meanwhile, in the context of the exchange rate, namely the partial balance theory, the occurrence of trade between countries is also caused by the exchange rate between one country and another in the international market (Salvatore, 2014). The real exchange rate in the exporting country can affect prices. goods charged to the importing country.

The research model was conducted to see the effect of ICT and international trade variables on export performance. The specifications of each regression variable include:

$$EXP_{it} = \beta_0 + \beta_1 INT_{jit} + \beta_2 MOB_{jit} + \beta_3 TELP_{jit} + \beta_4 POP_{jit} + \beta_5 DIST_{it} + \beta_6 PDB_{it} + \beta_7 REER_{it} + u_{it} \quad (3)$$

Where:
INT : Partner country internet users (percent)
MOB : Mobile cellular subscriptions in partner countries (per 100 people)
TELP : *Fixed telephone* in partner countries (per 100 people)
POP : Partner country population (million people)
DIST : Indonesia's economic distance from partner countries (billion USD)
PDB : Partner country's real Gross Domestic Product per capita (percent)
REER : The real exchange rate (rupiah/dollar)
i : Cross section
t : Time series
β_0 : Constanta

β_{1-7} : Coefisien
u_{it} : Error term

For economic distance and real exchange rate, there are a series of calculations to determine the amount of economic distance and the real exchange rate of Indonesia in 6 Emerging Market Countries, including:

Economic Distance

Referring to the research of Inayah et al (2016), the formula is written as follows:

$$JE_{ijt} = JG_{ij} \text{ X } \frac{\sum Total\ GDPj}{GDPjt} \quad (4)$$

Where:

JE_{ij} : Economic distance between country i and country j in year t
JG_{ij} : Geographical distance between country i and country j
$\sum$ Total GDP_j : Total GDP of country j in the observation period
GDP_{it} : GDP of country j in year t

Real Exchange Rate

$$\text{Real exchange rate} = \text{nominal exchange rate X } \frac{CPI\ of\ destination\ cpuntries}{CPI\ domestic}$$

Where:
CPI : consumption Price Index

4. RESULT AND DISCUSSION

Export performance is one of the most important aspects in improving economic welfare for a country, including Indonesia, which is increasingly open in terms of trade. Based on data from Bloomberg, in 2018 China, South Korea, India, Malaysia, Thailand, and Vietnam were Indonesia's six largest partner countries in bilateral trade.

Even though these countries are potential partners for Indonesia, in reality the value of Indonesia's exports to China is in deficit. This fact also serves the bilateral cooperation between Indonesia and Malaysia, Thailand and Vietnam. In Indonesia's bilateral trade with China, there has been a deficit for the last 5 years, reaching US$ -11,432.4 billion in 2018. Then, the trade balance deficit has also continuously occurred in Indonesia's bilateral trade with Thailand from 2004-2018 in where, the highest deficit occurred in 2012 amounting to US$ -3,301.05 billion. Furthermore, Indonesia's trade balance deficit also occurred with Malaysia in 2013 amounting to US$ -4443.53 billion as the largest deficit. Indonesia and Vietnam also experienced a deficit of up to US$ 920.41 billion.

Meanwhile, the trade balance surplus only occurred in Indonesia's bilateral trade with South Korea and India. Seeing these conditions, export performance is very important in responding to Indonesia's trade balance deficit because the cause of the deficit is that the import rate is greater than the rate of exports.

Indonesia's exports for the last 50 years have been supported by raw material products (natural intensive products). If there is a surplus, it will be caused by an increase in commodity prices, not due to value added (Kemendag, 2019).

Development of Information and Communication Technology

The development of information and communication technology in Emerging Markets occurred around the mid-2000s. Since then, the concept of affordability has become clearer. The rapid development of connectivity along with the development of ICT in developing countries

throughout the 2000s was started by identifying it as an opportunity to bridge the digital divide. Seeing this condition, at that time, the benefits of ICT development were adopted as one of the development goals of the Millennium Development Goals (MDGs) (Mishra, 2010).

Along with the times, the development of ICT is also increasingly being used in various sectors, including the trade sector. In emerging market countries, the development of ICT can be seen, one of which is through the development of internet users.

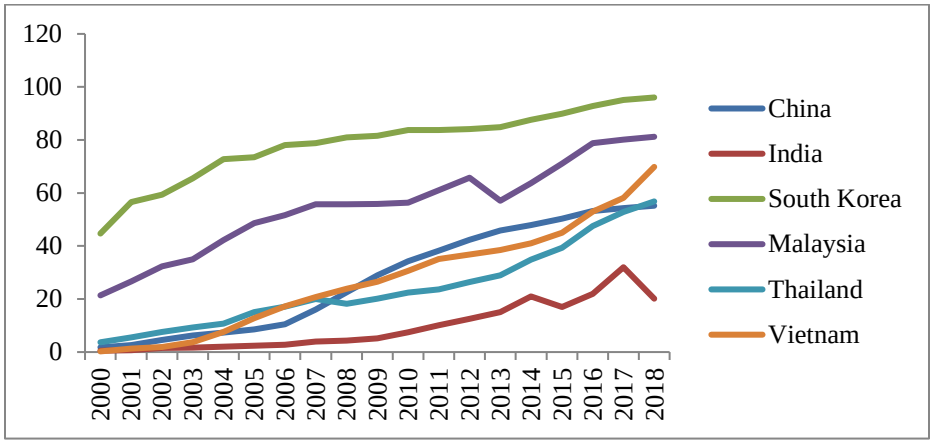

Figure 2. Internet users in 6 emerging market partner countries of Indonesia 2000-2018

It can be explained that during 2000-2018, the percentage of internet users in each of the 6 Emerging Market Countries with Indonesia's partners was different. The condition of internet users has increased in South Korea and Vietnam, where the largest level of internet users is South Korea. According to the Ministry of Communication and Informatics (Menkominfo), South Korea is the country with the largest and fastest number of internet users in the world.

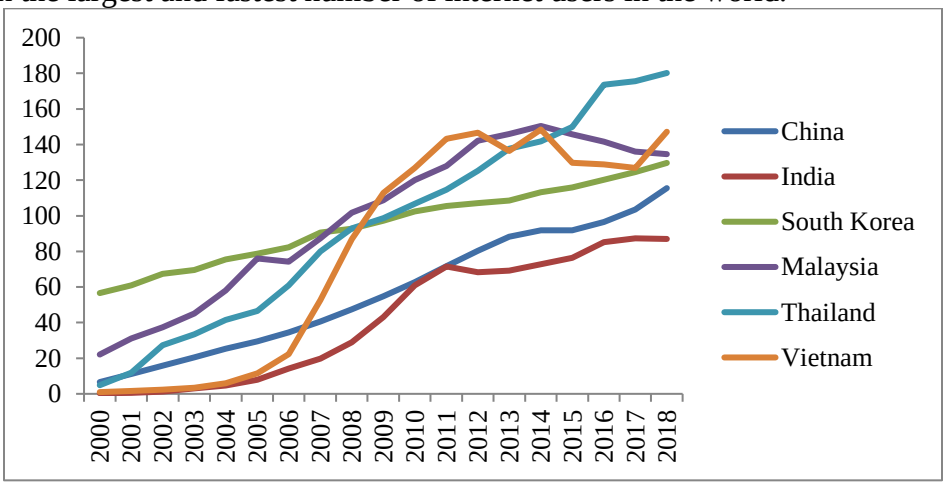

Figure 3. Mobile Cellular Subscriptions in 6 Emerging Market Partner Countries of Indonesia 2000-2018

The development of the internet that occurs requires supporting infrastructure to improve internet performance. One of them is by looking at the development of mobile cellular subscriptions, where the development can be seen in Figure 4. During 2000-2018, the development of mobile cellular subscriptions in 6 Emerging Market Countries with Indonesia's partners was different. In China, South Korea, and Vietnam, it can be seen that there is an increase every year. In contrast to India, Malaysia and Thailand tend to fluctuate.

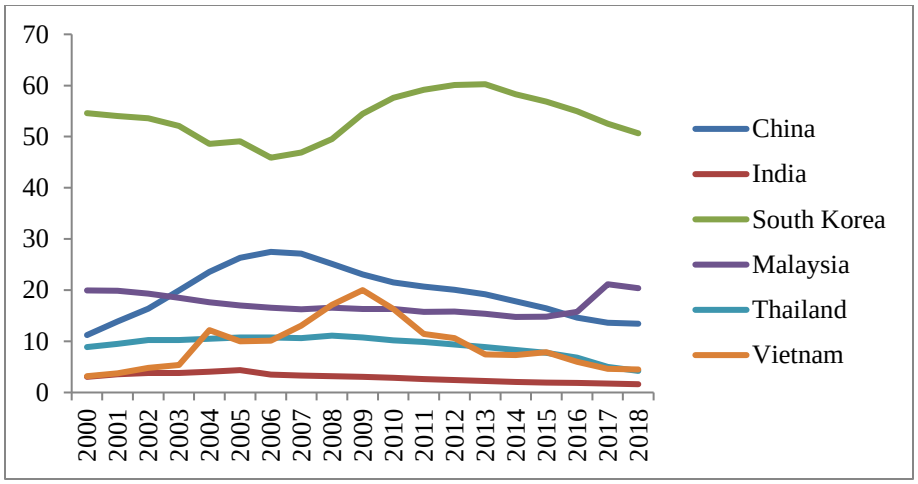

Figure 4. Fixed Telephone Subscriptions 6 Negara Emerging Market Mitra Indonesia Tahun 2000-2018

Apart from mobile cellular subscriptions, the development of ICT infrastructure can also be seen from users of fixed telephone subscriptions. The users of fixed telephone subscriptions in most of Indonesia's partner Emerging Markets countries have experienced a decline in the past 5 years, except for Malaysia, which has increased from 2017 to 2018. This has occurred over time, users of fixed telephone subscriptions have become less desirable due to more communication tools. efficient and more in demand by the community. Furthermore, it can be seen that the largest users of fixed telephone subscriptions are in South Korea, as in internet users, which has even experienced a decline.

Economic Distance Development

In the 6 Emerging Market countries, Indonesia's largest partner, economic distance tends to experience a downward trend. This happens because globalization is currently hitting every country to be more open in conducting trade cooperation between countries. Openness between countries in conducting trade encourages strategies to increase efficiency. The more efficient trade between countries is expected to reduce costs and boost Indonesia's competitiveness in bilateral trade with the six Emerging Market Countries.

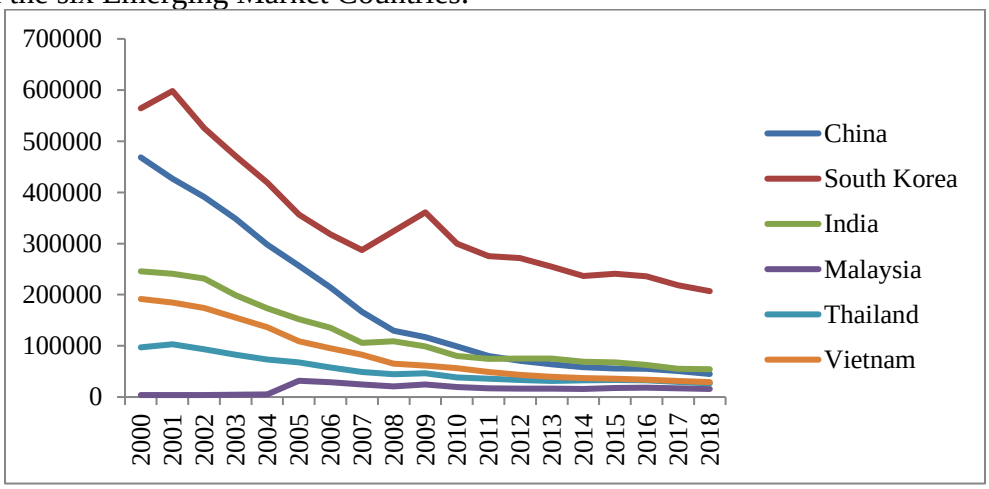

Figure 5. Economic Distance of 6 Emerging Market Partner Countries of Indonesia 2000-2018

Population Development

China and India are the largest countries in the world. a population that makes China and India more open to trade cooperation, also makes living standards more diverse. The increase in population is expected to encourage the consumer market to trade flows and is expected to increase the supply of goods and services that offer Guan & Sheong (2020).

Real GDP Per Capita Development

Real GDP per capita shows people's purchasing power. Based on data from the World Bank, focusing on the countries South Korea, Malaysia, and Thailand each have similarities in the decline in GDP, namely in 2009 where South Korea had a GDP decline of 0.79% compared to 2008 of 3.01%. In Malaysia, the decline in GDP in 2009 was -1.51% compared to 2008, which was 4.83%. In Thailand, the decline in GDP in 2008 was -0.69% compared to the previous year which was 1.72%. This happened because of the global crisis in the United States in 2008-2009 and even the crisis was called by economists as the mother of all crises which ultimately depressed economic growth (Oliver, 2013; Sugema, 2012).

Real Exchange Rate Development

Indonesia's real exchange rate against the 6 largest emerging market partner countries tends to be unstable. Focusing on India and Vietnam, that after 2010, based on the calculation of Indonesia's exchange rate against the two countries, it tends to increase. Meanwhile, the other four countries tended to increase until 2013. After that, it tended to be stable. The Indonesian exchange rate against India during the 2000-2018 period was the highest and occurred in 2018 (depreciated). Meanwhile, the exchange rate between Indonesia and Vietnam, which occurred in 2003, was the lowest (appreciated) exchange rate. However, the trade balance surplus with India is the largest compared to the other five countries.

Results of Panel Data Regression Analysis

Model estimation uses panel data analysis where the fixed effect model is the best model in this study which is obtained from the results of the chow test. After estimating the model, the steps taken to perform panel data regression analysis were to carry out a series of classical assumption tests, where in this study there were no errors in the classical assumption tests, both normality detection, heteroscedasticity detection, and multicollinearity detection.

The results of the panel data estimation regression regarding the effect of independent variables, namely information and communication technology as measured by internet users, fixed telephone subscriptions, and mobile cellular subscriptions, population, economic distance, real GDP per capita, and real exchange rate on the dependent variable, namely performance. export performance as measured by export volume. The results of the FEM regression then produce an equation, each independent variable will be discussed in the partial regression coefficient test (t test). The similarities in the results of the fixed effects model in this study are as follows:

$$EXP_{it} = -\beta_0 + \beta_1 INT_{jit} + \beta_2 MOB_{jit} - \beta_3 TELP_{jit} + \beta_4 POP_{jit} - \beta_5 DIST_{jit} - \beta_6 PDB_{it} - \beta_7 REER_{it} + u_{it} \quad (5)$$

$$EXP_{it} = -7311078{,}427 + 76415{,}042*INT + 2962{,}926*MOB - 55158{,}980*TELP + 0{,}044*POP - 13{,}59601*DIST - 193444{,}695*PDB - 407{,}254*REER + u_{it} \quad (6)$$

Information and communication technology

Information and communication technology variables in this study have different results. On the internet user variable, the coefficient is 76,415.04 and the probability is 0.044. The probability of not being able to reject H0 is less than $\alpha = 0.05$. Thus, the internet user variable has a significant effect on export performance. This means that an increase of 1% of internet users can increase the export performance of 76,415.042 billion USD. This positive and significant influence on these

variables is in line with research conducted by Chuo & Ghuo (2019) that an increase in the number of internet users can reduce transaction costs. So, it can increase trade between countries. This is reinforced by research conducted by Wardani et al (2019) on a case study of Indonesia's bilateral trade with ASEAN countries.

Variable fixed telephone subscriptions (TELP) have a coefficient of -55,158,980 and a probability of 0.428. The probability of not being able to reject H0 is less than $\alpha = 0.05$ (probability $<\alpha = 0.05$). Meanwhile, the probability of the fixed telephone subscriptions variable is greater than 0.05 (probability> $\alpha = 0.05$). Thus, the fixed telephone subsection variable has no significant effect on export performance. The negative but insignificant effect on the fixed telephone subscriptions variable on export performance is in fact not in line with the research conducted by Ismail (2020), which is because globalization and current liberalization have made fixed telephone users less desirable due to more efficient and efficient communication tools more in demand by the community.

Population

Coefficient of the population variable is 0.044823 and the probability is 0.000. The probability of not being able to reject H0 is less than $\alpha = 0.05$ (probability $<\alpha = 0.05$). Thus, the population variable has a significant effect on export performance. This means that an increase in the population of 1 million will increase the export performance by 0.044823 billion USD. The positive and significant influence of population variables on export performance is in line with research conducted by Shobande (2019) that the size of a country's population illustrates the significance of the consumer market on trade flows and an abundant workforce. This research is reinforced by Wardani (2019) that population variables have a positive and significant effect on exports because the larger the population of trading partner countries, the greater the volume of exports, which is indicated by the greater the ability to supply.

The results of the population influence on export performance are not in line with the research conducted by Dlamini et al (2016) that the relationship between population and the performance of Swazi sugar exports, where an increase in the population of trading partner countries by 1% will decrease the performance of Swazi sugar exports by 19.3%. The negative relationship between trade flows and population in trading partner countries can be attributed to a condition known as the import substitution effect.

Economic Distance

The economic distance variable shows a coefficient of -13.59601 and a probability of 0.007. The probability of not being able to reject H0 is less than $\alpha = 0.05$ (probability $<\alpha = 0.05$). Thus, the economic distance variable has a significant effect on export performance. This means that the economic distance variable has a negative and significant relationship to Indonesia's export performance, where an increase in economic distance of 1 billion USD will reduce the export performance of 13.59601 billion USD. The negative and significant influence of the economic distance variable on export performance is in line with the opinion of Yeo & Yeng (2019) which states that countries that carry out trade cooperation generally choose to trade with countries that are closer than countries that are far away. This opinion is in line with the research. Conducted by Wardani et al (2019) which is in line with the gravity model, namely that distance has a negative and significant effect on Indonesia's exports to partner countries in ASEAN. This means that the shorter the distance between Indonesia's exports to partner countries, the higher the exports.

The results of the effect of the economic distance variable on the export performance variable are not in line with the research conducted by Lawes & Whelan (2007) that the positive effect on

exports in case studies in the United States. This means that if you want to export to bilateral trade partner countries, companies in the United States must increase their fixed costs.

Real Gross Domestic Product Per Capita

Real GDP per capita variable in this study shows a coefficient of -193,444.7 and a probability of 0.114. The probability of not being able to reject H0 is less than $\alpha = 0.05$ (probability $<\alpha = 0.05$). Meanwhile, the probability of the real GDP per capita variable is greater than $\alpha = 0.05$ (probability $> \alpha = 0.05$). Thus, the real GDP per capita variable has no significant effect on export performance. This means that the GDP variable has a negative and insignificant correlation to export performance. This indicates that Indonesia's export products are inelastic to income. Thus, the increase in partner country income has no effect on export performance. This research is in line with research conducted by Sidamor (2013) and Guan & Sheong (2020) that GDP has a negative effect on exports in the case study of China's bilateral trade with Africa. The negative effect is because the main export commodities of African countries to China such as oil, ores and minerals have been restricted by Africa from exporting these products (Eleanor, 2017; Karapinar, 2010). Meanwhile, China, with its growing economy, is looking for alternative sources of supply to import these products (Andersson & Khalid, 2014).

Effect of real GDP per capita on export performance is not in line with research conducted by Nurhayati et al (2019) that real GDP per capita has a positive and significant effect on the export performance of Indonesia's nutmeg, lawang, and cardamom to China, Malaysia, Singapore, Thailand, the United States. , Germany, Brazil, Philippines, and Spain. The real GDP per capita in the research that has been done illustrates the condition of people's purchasing power in line with the theory of demand, which reveals that an increase in income will increase the demand for traded commodities (Hill & Wong, 2008).

Real Exchange Rate

Real exchange rate variable has a coefficient of -407,254 and a probability of 0,000. The probability of not being able to reject H0 is less than $\alpha = 0.05$ (probability $<\alpha = 0.05$). This means that the real exchange rate variable has a negative and significant relationship to export performance. If the real exchange rate of the exporting country (Indonesia) increases, the real exchange rate will increase. Thus, the goods in the exporting country from a foreign perspective become cheaper. The results of this study are in line with the theory of partial equilibrium in the international market, which states that the real exchange rate in the exporting country can affect the price of goods charged to importing countries. If the real exchange rate of the exporting country decreases, the real exchange rate will also decline. Thus, importing countries will pay higher prices to import goods from exporting countries. As a result, an increase in prices will reduce the quantity of goods demanded by partner countries (Inayah dkk, 2016).

Simultaneous Regression Coefficient Test (F Test)

The F test serves to determine whether the independent variables are simultaneously significant to the dependent variable (Gujarati, 2009). This can be seen in the probability regression results (F-statistic). The independent variables can be said to be simultaneously significant against the dependent variable when the probability (F-statistic) is less than $\alpha = 0.05$. The estimation results show that the probability (F-statistic) is 0.000000. That is, the Prob (F-statistic) is less than $\alpha = 0.05$ or in this study, the independent variables are simultaneously significant on the dependent variable.

Determination Coefficient Test (R^2)

The coefficient of determination indicates the percentage of all dependent variables which can be explained by the resulting independent variance variations. Meanwhile, the rest is explained by other variables outside the model (Ekananda, 2015). The result of the regression shows that R^2 is 0.86. This means that 86% of export performance is influenced by ICT, population, economic distance, GDP, and the real exchange rate. Meanwhile, 14% is influenced by other variables outside the model.

5. Conclution

Based on the estimation of panel data regression results, internet user variables have a positive effect on export performance because these variables can reduce transaction costs in trade between countries, while fixed telephone subscriptions have a negative effect because along with the times, the use of fixed telephone subscriptions has become less desirable so that has no effect on export performance. This shows that there is a need to increase electronic-based trading activities (e-commerce) considering that Indonesia is one of the countries with the largest social media users in the world as well as to better prepare for the 4.0 industrial revolution because from the production structure in readiness to face the 4.0 industrial revolution, Indonesia is still lagging behind.

The population variable has a positive and significant correlation on export performance. This indicates that the growth or increase in population in the importing country will increase the demand for Indonesian export products, thus creating more markets for the exporting country. The results of this study indicate that the increase in population every year in 6 Emerging Market partner countries makes Indonesia an exporting country to increase the quantity of products that are in demand by residents of the largest Emerging Markets partner countries.

The economic distance variable has a negative and significant correlation on export performance, that is, the higher the distance between countries, the lower the export performance is because the farther the trade distance between countries, the greater the transportation costs that must be incurred on trade flows between countries. Therefore, Indonesia needs to focus on exporting goods or commodities with Emerging Markets Countries that are closer to Indonesia to reduce trade costs which result in importing countries paying higher prices to import goods from Indonesia and the longer delivery times.

The real GDP per capita variable has a negative and insignificant correlation on export performance. This indicates that Indonesia's export products are inelastic to income, so that an increase in the income of partner countries has no effect on export performance.

The real exchange rate variable has a negative and significant effect on export performance. This means that the increase in the rupiah exchange rate per dollar (the rupiah is appreciated) makes domestic prices more expensive than foreign prices so that the value of exports is smaller than imports. The results of the effect of the real exchange rate on export performance indicate that there is a need for a policy mix related to exports and the exchange rate to ensure a stable exchange rate because a stable exchange rate will provide certainty, reduce operational risk, and further assist investors in making accurate planning. A stable exchange rate will make the goods traded by Indonesia remain competitive with other countries that produce similar products or commodities. When this happens, it will be easier to attract investors to invest in Indonesia, thereby increasing aggregate output and increasing economic prosperity for Indonesia.

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