THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ON THE INDONESIAN APPAREL EXPORT

Dampak Teknologi Informasi dan Komunikasi (TIK) Terhadap Ekspor Pakaian Indonesia

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Abstrak

Perkembangan Teknologi Informasi dan Komunikasi (TIK) berdampak pada perdagangan dalam era digital. Produk pakaian jadi merupakan komoditas utama dalam perdagangan yang ditunjukkan oleh tingginya permintaan untuk komoditas pakaian jadi. Hal tersebut menjadi peluang bagi pertumbuhan industri pakaian jadi dalam negeri, tidak hanya untuk memenuhi konsumsi domestik tetapi juga untuk memperluas pasar luar negeri. Penelitian ini bertujuan untuk menganalisis pengaruh TIK seperti penggunaan telepon seluler dan terbukanya akses internet, serta variabel lainnya seperti PDB, kurs, populasi, dan jarak terhadap ekspor pakaian jadi Indonesia ke sepuluh mitra dagang utama selama periode 2010-2016 dengan menggunakan model gravitasi pada data panel. Hasil penelitian menunjukkan bahwa TIK negara-negara tujuan ekspor berpengaruh signifikan terhadap ekspor pakaian jadi Indonesia, sedangkan TIK Indonesia memberikan hasil yang tidak signifikan. Sementara untuk variabel lainnya, hanya PDB yang berpengaruh signifikan, sedangkan kurs, populasi dan jarak tidak signifikan. Salah satu penyebab mengapa TIK Indonesia tidak signifikan adalah adanya kesenjangan yang lebar pada persentase pengguna internet antar wilayah, yang salah satunya disebabkan oleh tidak meratanya ketersediaan jaringan internet. Perluasan jaringan internet dengan kualitas baik akan dapat menghubungkan para desainer, industri hilir dan pedagang pakaian dalam rantai pemasaran yang lebih luas, selain keterlibatan Indonesia dalam Global Value Chain (GVC).

Kata kunci: *Perdagangan Internasional, TIK, Industri Pakaian, Model Panel Gravity*

Abstract

The Information and Communication Technology (ICT) development has impacted on trade sector in the digital era. Apparel is the main trading commodity which is indicated by a high demand for apparel commodities. There is an opportunity for domestic apparel industry, not only to satisfy domestic consumption but also to expand overseas market. This research aims to analyze the impact of ICT such as the use of cellular telephone and the open access to internet, as well as other variables such as GDP, REER, Population, and Distance on Indonesian apparel export to ten main importers during 2010-2016, by using panel gravity model. This study found that ICT of the export destination countries significantly affected Indonesian apparel export, while Indonesia's ICT gave insignificant result. Other variables that have significant impact was GDP. While REER, Population, and Distance gave insignificant impact. The reasons for this situation due to a wide gap of internet users percentage between regions because of the unevenly distributed internet sevices. This study suggested, in addition to Indonesia's better participation in the Global Value Chain (GVC), the expansion of good quality internet networks would enable designers, downstream industries and apparel traders to connect in a broader marketing chain.

Keywords: International Trade, ICT, Apparel Industry, Panel Gravity Model
JEL Classification: P45, O33, L67, C33

INTRODUCTION

Information and Communication Technology (ICT) development in Indonesia in the last few years has showed a significant growth. ICT indicators on households and individuals survey result conducted by the Ministry of Communication and Information show that Indonesian internet users in 2016 was 80.7 million, an increase of around 19.6 million users from the previous year. According to the survey, there was 24.2% of Indonesian internet users doing e-commerce transactions in 2016 (Ministry of Communication and Information, 2016).

Research from Google and Temasek in 2015 estimated that e-commerce has been able to contribute USD 1.7 billion to the Indonesia's economy in a year (Google & Temasek, 2016). In addition, the digital economy development based on social media and e-commerce has potential significant economic impacts, include the growth of Micro, Small, and Medium Enterprises (SMEs) revenue up to 80% and economic rate up to 2% per year (AIPEG, 2017). Product marketing can reach markets faster and easier with the internet and e-commerce. Various activities can be done without the need to meet physically between buyers and sellers, then make the volume of international trade increase (Terzia, 2011).

The most frequent Indonesian traded product in e-commerce activities is apparel products. Almost 73.8% of internet users buy apparel products online (Ministry of Communication and Information, 2016), showing that these products are the main product in e-commerce activities in Indonesia.

The demand for domestic apparel products increases in line with the growing number of population. The Ministry of Industry estimated that Indonesian apparel consumption growth between 2009-2013 would reach 9.4% annually. Apparel consumption of Indonesian reached 318.4 thousand tons in 2013 and increased to 348.3 and 381 thousand tons in 2014 and 2015 respectively. On this, the domestic apparel industry managed to supply 80.3% of the total in 2013 (Mardiansyah, 2015).

Production of Indonesian apparel has increased from 561.6 thousand tons

in 2009 to 724.1 thousand tons in 2013 or an increase of about 5.5% annually. However, the number of production recorded only 77% of utility level from installed capacity (Ministry of Industry, 2014).

Products of the excess production is then exported to various countries with a total value of USD 3.88 billion in 2016 (UN Comtrade, 2018). Indonesian apparel exports contribute around 3% to Indonesian non-oil and gas exports in 2016. USA, Japan and Germany are the top three export destination countries for Indonesian apparel products which account for 66.44% of total apparel exports. International market demand for apparel products from Indonesia is predicted to increase with economics improvement of the export destination countries. According to Tot (2014) in Mardiansyah (2015), the projection of the world apparel market value in 2025 will reach USD 2.1 trillion, equivalent to 5% annual growth, with China as the largest market worth USD 540 billion.

The world apparel trade market is influenced by consumer fashion trends and the latest technological developments that made shopping activities more comfortable and ergonomic (Bankmed, 2015). The world apparel industry grows by 3.5% annually and is predicted to reach USD 1,696 billion by the end of 2018. China is the largest apparel trade market in terms of market size and strong sales growth. There are three factors that make China become the biggest market for apparel commodities. They are an increase in e-commerce, a boom in fast fashion and the evolution of luxury markets. Even e-commerce in Middle Eastern countries is predicted to grow from USD 9 billion in 2012 to USD 15 billion in 2015 (Bankmed, 2015).

Global market improvement and global trade increase through e-commerce provide opportunities for Indonesian apparel products to strengthen market penetration through the use of broader ICT. The apparel industry is one of the five selected industries that Indonesian government is focusing on to support manufacturing industry acceleration and increasing competitiveness in the Industrial Revolution 4.0 era. Other sectors are food and baverages, automotive, chemical, and electronic industry.

Determination of the five selected industries is based on their shares to GDP, impacts on other industries, ability to absorb labor, amount of gained investment, and the speed of market penetration (supported by information

technology development). This program is outlined in Indonesian 4.0 industry roadmap entitled Making Indonesia 4.0. Moreover, apparel export is also one of the 11 leading variables formed by research of the BPS' Composite Leading Indicators (CLI) in 2010 using the calculation method from the OECD.

Onyeiwu (2002) suggested that the extent to which a country is integrated into the global economy can play a role in its access to information technology. Countries with greater contacts, whether trade, tourism, or geographic location with the outside world, tend to be more advanced in digital technology than other countries.

Many studies have analyzed the determinants of international trade, panel model is one of the most common methods. Liu et al. (2018) used panel model to study efficiency of construction land allocation in China. Khan et al. (2014) used panel data to study global estimates of energy-growth nexus. Abeliansky and Hilbert (2017) used the gravity model to test the quantity of subscription or the quality of data speed that affected the international trade. Basic gravity model uses variables such as Gross Domestic Product (GDP), and distance. But this research uses several common variables to explain international trade such as population and exchange rate (Zheng et al, 2017 and Thiemann et al, 2012).

This study aims to investigate the impacts of ICT, GDP, exchange rate, Population, and Distance on Indonesian apparel export to the ten main importing countries namely USA, Japan, Germany, Republic of Korea, China, Australia, United Kingdom, Canada, Belgium, and Netherlands.

METHODS

The gravity model was pioneered by Tinbergen (1962). It has been successfully applied in modeling general international trade flows. Trading gravity model was proposed by Pöyhönen (1963). This can be simply expressed as:

$$T_{ij} = \propto \left(\frac{Y_i Y_j}{D_{ij}}\right)$$

Where T_{ij} is the value of exports from country *i* to country *j*, Y_i and Y_j are the economic scales that are relevant of two countries, D_{ij} is the distance between of two countries, and $\propto$ is a constant. From the model, the bilateral trade between two countries is positively related to economic scales and negatively related to the distance between them. Gravity model improves

itself along with its wide application such as adding population, non-tariff coverage index, bilateral exchange rate, income per capita, common language, and so on to be included as new explanatory variables into the model (Liang & Zuo, 2010).

Based on Bergstrand (1985), bilateral gross aggregate trade flows in international trade are explained commonly using the following specification:

$$\mathrm{P}X_{ij} = \alpha(Y_i)^{\beta_1}\left(Y_j\right)^{\beta_2}\left(D_{ij}\right)^{\beta_3}\left(A_{ij}\right)^{\beta_4} \text{.....(1)}$$

where :

$\mathrm{P}X_{ij}$: US dollar value of the flow from country *i* to country *j*

$Y_i\ (Y_j)$: US dollar value of nominal GDP in country *i* (*j*)

D_{ij} : the distance from the economic center *i* to *j*

A_{ij} : any other(s) factors either aiding or resisting trade between countries *i* and *j*

u_{ij} : error term with $E(ln\, u_{ij}) = 0$

The conventional approach to estimate Eq. (1) is by taking logs of both sides of it, leading to a log-log form of the gravity model (Zheng, et al, 2017), as follows:

$$\ln\left(\mathrm{P}X_{ij}\right) = \beta_0 + \beta_1\, ln\,(Y_i) + \beta_2\, ln\left(Y_j\right) + \beta_3\, ln\left(D_{ij}\right) + \beta_4\, ln\left(A_{ij}\right) + \varepsilon_{ij} \text{.....(2)}$$

where $\beta_0 = ln\,\alpha$, $\varepsilon_{ij} = ln\, u_{ij}$

For this research, we separate the explanatory variables into two factors :

(1) Basic factors in standard gravity models

Economic scale

GDP as the development level of national economy for each country is a common proxy for trade demand and supply. And it used for standard gravity model specifications.

Geographic distance from Indonesia

Distance reflects the general international trading cost, and usually the geographic distance between the economic centers of two trade partners is considered in empirical analysis (Zheng, et al, 2017).

(2) General determinants for Apparel International Trade

Population

Salvatore (2013) explained that the increasing population in a country encouraged domestic consumption. Increasing consumption will increase goods or services demand to fulfill country's population needs. When the country is unable to fulfill

domestic consumption, it will increase import. Therefore, the population is positively related to encourage import. Hanousek and Kočenda (2014) used country population as a proxy for the potential market where the population made purchases. If the countries were highly economically integrated, it should be exactly the population that would be linked to a large extent of trade.

Exchange Rate

Wang & Lee (2012) assumed that trade flow to China depends on the real effective exchange rate. Zheng et al. (2017) claimed that according to the pass-through effect, the exchange rate of trade partners is expected to have a positive effect on Chinese nonferrous metal exports and negative effects on Chinese nonferrous metals imports. It is based on the estimation of Yu (2009) that clearly proved that the revaluation of the Chinese Yuan against the dollar significantly reduced China's exports to the United States.

Information and Communication Technology (ICT)

Ramos & Zarzoso (2010) findings indicated a positive and non-linear effect of technological innovation on export performance, which indicated that there were threshold for positive signs to occur. Thiemann et al. (2012) used internet user and mobile phone subscribers to represent modern digital ICT. Those variables are used as proxies for the geographical spread of ICT within countries, the availability of applications associated with the technology, and the cost of information and communication tools because there is a high correlation between prices and the extent of penetration of each ICT category.

Wang & Li (2017) used three proxies for ICT development, the first is ICT development index, which is comprises the access, the use and the skill level of ICT. The second is ICT subscription index, which is measured by broadband subscribers per 100 people. And the third is ICT usage index, which is measured by internet users per 100 people. They used industry level trade data and ICT data to show that ICT developed countries have comparative advantage in industries that are R&D intensive or task complex.

Nath & Liu (2017) suggest that among various ICT indicators, ICT use is the most important driver of exports, imports, and total trade of majority service items. Since ICT use sub-index primarily reflects the extent of internet use, this aspect of ICT development is the most helpful in increasing service trade flows. This research was related well with results reported by Liu and Nath (2013) who concluded that the trade-enhancing effect of ICT did not depend on ICT infrastructure or ICT capability per se but on its use.

The subject of this research is apparel export from Indonesia to the ten main importing countries (USA, Japan, Germany, Republic of Korea, China, Australia, United Kingdom, Canada, Belgium, and Netherlands). This research uses annual data from 2010 to 2016. Data source used in this study are apparel exports (*EX*) to ten export destination countries from UN Comtrade measured in US dollars as dependent variable, while the independent variables are real Gross Domestic Product (*GDP*) from The World Bank measured in US dollars, Relative Effective Exchange Rate (*REER*) obtained from International Financial Statistics from International Monetary Fund, *Population* from The World Bank, *Distance* from www.distancefromto.net and ICT variables which proxed by percentage of individuals using internet (*Net*) and mobile-cellular subscription per 100 inhabitants (*Mob*) are from International Telecommunication Union (ITU).

For the empirical analysis, this study uses panel data regression analysis. Developed panel data regression model for apparel exports for the research purpose in this study, expand from gravity model of Thiemann, et al (2012) respectively:

$$\begin{aligned}\ln\left(EX_{ijt}\right) = c &+ \beta_1\, ln\,(GDPX_{it}) + \\ &\beta_2\, ln\left(GDPM_{jt}\right) + \\ &\beta_3\, ln\,(REER_{ijt}) + \\ &\beta_4\, ln\,(PopulationM_{jt}) + \\ &\beta_5\, ln\left(Distance_{ij}\right) + \\ &\beta_6\,(NetX_{it}) + \beta_7\left(NetM_{jt}\right) + \\ &\beta_8\, ln\,(MobX_{it}) + \\ &\beta_9\, ln\left(MobM_{jt}\right) + \varepsilon_{ijt} \quad \text{.....(3)}\end{aligned}$$

According Zheng et al. (2017), a fixed-effect panel model cannot be applied to this research because the inclusion of time-constant explanatory variable such as *Distance*. Thus, we apply the random-effect model method to estimate the parameters in Eq. (3).

Random Effects Model

Based on Greene (2002), the fixed effects model allows the unobserved individual effects to be correlated with the included variables, then modeled the differences between units strictly as parametric shifts of the regression function. This model might be viewed as applying only to the cross-sectional units in the research, not to additional ones outside the sample. If the individual effects are strictly uncorrelated with the regressors, then it might be appropriate to model the individual specific constant terms as randomly distributed across cross-sectional units. So, we have the formula:

$y_{it} = \alpha + \boldsymbol{X}'_{\boldsymbol{it}}\boldsymbol{\beta} + u_i + \varepsilon_{it}$ .....(4)

$i = 1, \ldots, \mathrm{N}\,;\ t = 1, \ldots, \mathrm{T}$

where y_{it} is respon variables, α is constant, $\boldsymbol{X}'_{\boldsymbol{it}}$ is predictor variables, $\boldsymbol{\beta}$ is regression coefficients, u_i is the random heterogeneity specific to the *i*th observation, and ε_{it} is disturbance. We assume further that:

$$\mathrm{E}[\varepsilon_{it}|\boldsymbol{X}] = E[u_i|\boldsymbol{X}] = 0$$

$$\mathrm{E}[\varepsilon_{it}^2|\boldsymbol{X}] = \sigma_\varepsilon^2$$

$$\mathrm{E}[u_{it}^2|\boldsymbol{X}] = \sigma_u^2$$

$\mathrm{E}[\varepsilon_{it}u_j|\boldsymbol{X}] = 0$ for all *i, t,* and *j*

$\mathrm{E}[\varepsilon_{it}\varepsilon_{js}|\boldsymbol{X}] = 0$ if $t \neq s$ or $i \neq j$

$\mathrm{E}[u_i u_j|\boldsymbol{X}] = 0$ if $i \neq j$.....(5)

For these *T* observations, let

$\mu_{it} = \varepsilon_{it} + u_i$ .....(6)

and

$\mu_{it} = [\mu_{i1}\,, \mu_{i2}\,, \mu_{i3}\,, \ldots, \mu_{iT}\,]'$ .....(7)

Then, for this model:

$\mathrm{E}[\mu_{it}^2|\boldsymbol{X}] = \sigma_\varepsilon^2 + \sigma_u^2$

$\mathrm{E}[\mu_{it}\mu_{is}|\boldsymbol{X}] = \sigma_u^2\ ,\ t \neq s$

$\mathrm{E}[\mu_{it}\mu_{js}|\boldsymbol{X}] = 0$ for all t and s if $i \neq j$...(8)

Correlation coefficient of μ_{it} and μ_{js}:

$\rho = \mathrm{corr}\,[\mu_{it}\mu_{js}] = 1 \qquad$ for $i = j, t = s$

$\rho = \mathrm{corr}\,[\mu_{it}\mu_{js}] = \frac{\sigma_u^2}{\sigma_\varepsilon^2 + \sigma_u^2}$ for $i = j, t \neq s$

$\rho = \mathrm{corr}\,[\mu_{it}\mu_{js}] = 0 \qquad$ for $the\ others$

.....(9)

Because of the correlation between errors in the equation above, the Ordinary Least Square (OLS) method cannot be used to obtain an efficient estimator. So that the appropriate method for estimating the random effects models is Generalized Least Square (GLS) or Feasible Generalized Least Square (FGLS).

RESULT AND DISCUSSION

a. Indonesian Apparel Exports

Apparel industry in the globalization era produced separately across several countries in a Global Value Chain (GVC). Rayadiani (2015) mentioned that in most GVC, international leading companies shift their production in the GVC network to

carry out production contracts with suppliers in various developing countries such as Indonesia, Vietnam, Bangladesh and India, which offer the most competitive price.

While leading companies include retailers and brand holders headquartered in major markets such as USA, Japan and the European Union (Rayadiani, 2015). Indonesia's involvement in the GVC supported by the main export's destination countries for Indonesian apparel, such as Germany, Canada, United Kingdom, Belgium, and Nedherlands which are members of the European Union, as well as the USA and Japan (Rayadiani, 2015).

Based on Figure 1, there are differences trends in Indonesian apparel exports among ten importing countries. USA is the biggest market for Indonesian apparel. Between 2010 and 2016, the average of Indonesian apparel exports to USA reached USD 1,962 billion. The highest export value during this period occurred in 2011, reached USD 2.139 billion. Although it declined in 2012 and 2014, exports to USA still dominated by 50 percent of Indonesian apparel exports.

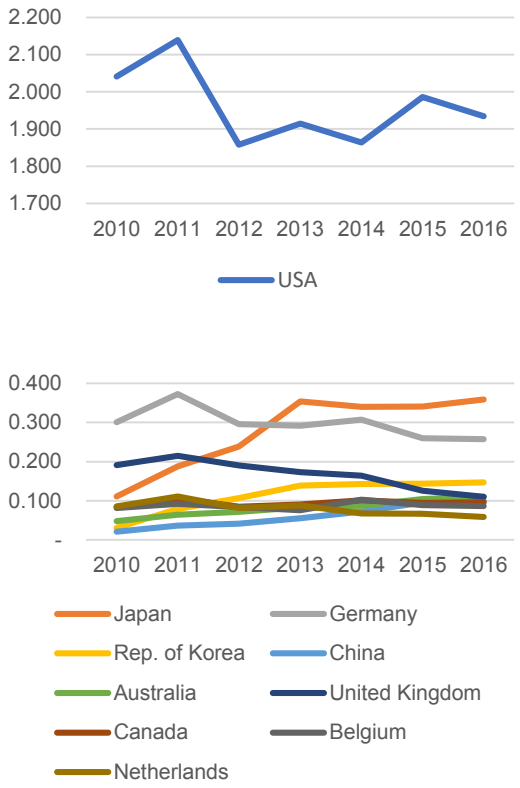

Figure 1. Apparel Export Value, 2010-2016 (billion USD)

Source : UN Comtrade (2018)

Japan as the second largest Indonesian apparel market with USD 276 million per year indicated a positive trend with the most significant growth among ten apparel export destinations. In 2010, apparel exports to Japan were only USD 111 million but in 2016 the apparel exports value reached USD 359 million, or 37.07 percent growth per year. The positive growth also occurred in Republic of Korea, China and Australia, but not as significant as Japan.

The downward trend in Indonesian apparel exports has occured in many European countries, such as Germany, United Kingdom, Canada, Belgium and Netherlands. Although apparel exports to Germany and United Kingdom still quite high, the decline occurred in this period needs to be wary. The declining of apparel exports in the European countries is due to market competition. This is an impact of the collaboration between Bangladesh and Vietnam with the European Union regarding 0% import tariff on textile products (Saxena, Salze-Lozac'h, 2010). While Indonesian textile products are still burdened by quite large import tariff around 8.3% (Lord, M. et al, 2010).

b. ICT Indicators in Indonesia and 10 apparel exports destination.

The use of electronic means and the internet can make the process of initiating and doing trade a lot of easier, faster, and less expensive. Moreover, ICTs allows firms to identify the market for the inputs they need in production and substantially reduces the cost of gathering and processing informations about the prices and input characteristics of different goods and services (Terzia, 2011).

As shown in Figure 2, Japan is the highest mobile-cellular telephone subscriptions with 147.66 per 100 of inhabitants in 2016 among ten main Indonesian apparel exports destination countries. While Indonesia acquires the highest ICT growth of mobile-cellular telephone subscriptions per 100 inhabitants which reached 69.49% over the past six years, from 87.12 subscriptions per 100 inhabitants in 2010 to 147.44 subscriptions per 100 inhabitants in 2016.

The highest growth occurred in 2011, where the growth of mobile-cellular telephone subscriptions reached 16.70% over the previous year. This makes Indonesia's position higher than the 10 main destination countries for apparel exports, which in fact are developed countries. As the 4th most populous country in the world, mobile-cellular telephone subscriptions in Indonesia is higher than China and USA, which has larger population than Indonesia.

Between 2010 and 2016, the mobile cellular telephone subscription growth in China and USA was lower than that in Indonesia, which was 53.95%, while USA was 33.01%.

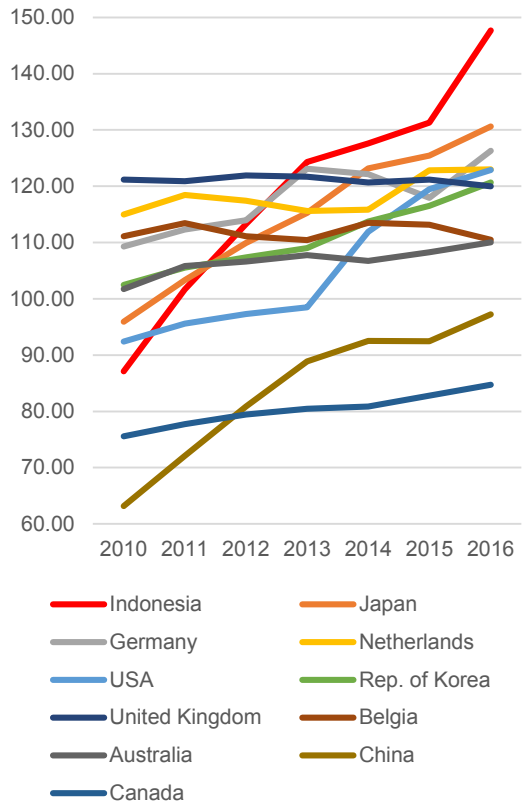

Figure 2. Mobile-cellular Telephone Subscriptions per 100 Inhabitants, 2010-2016

Source : ITU (2018)

Figure 3 showed that the percentage of internet users in apparel export destination countries has reached more than 70% since 2010. Even internet users in Europe countries such as the United Kingdom, Netherlands, Canada, and Germany have reached 90%.

This fact can be explained by earlier technological developments applied in these developed countries. Indonesian internet users in 2010 were only 10.92%, while increase to 25.37% in 2016 but still left behind developed countries.

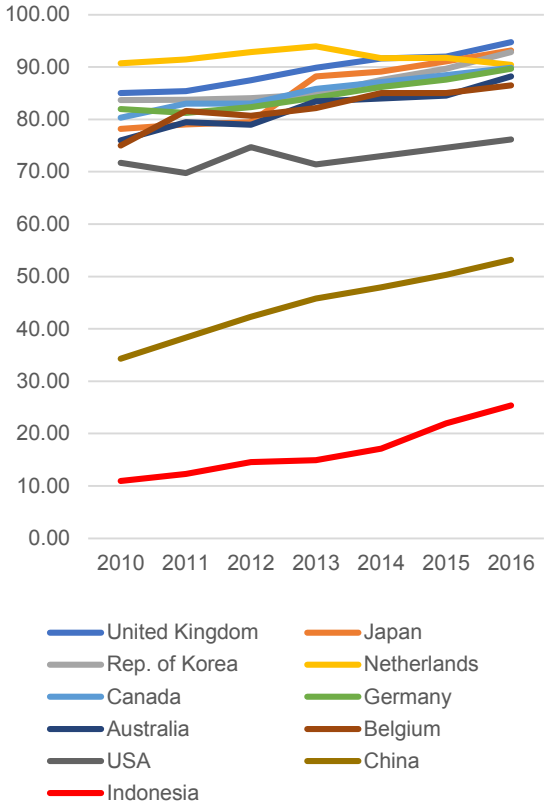

Figure 3. Percentage of Individuals Using Internet, 2010-2016

Source : ITU (2018)

However, internet user growth in Indonesia from 2010 to 2016 is very high, reached 132.29%, or 22% per year. While internet users in China as one of the developed countries in Asia only reached 53.20% in 2016 with an average growth of 9.18% per year.

Panel estimation results

The estimation results of random effect model for the impact of ICT, GDP, REER, Population, and Distance on Indonesian apparel exports are denoted

in Table 1. Based on the coefficients in Table 1, the coefficient of $ln\,(GDPX_{it})$ is negative but not statistically significant. During 2010 to 2016 Indonesia's economy continued to grow with average growth 5.39% per year, whereas the export performance of the national apparel industry has decreased. It is caused by low competitiveness of Indonesian apparel export product in the global market. Apparel product in Indonesia is produced with old machinery, less product diversification, faced by a lot of problems such as poor infrastructures, restricted energy supply, inefficient bereaucracy, limited information access, and limited financial credit (KADIN, 2011).

The peak volume of Indonesian apparel exports occurred in 2013 noted 470.4 thousand tons with USD 7.5 billion export value. This condition become the highest in the last 17 years.

However, since 2014, Indonesian apparel exports volume has continued to decline, with 1.57 average decline per year. Export value decrease from USD 7.5 billion in 2013 to USD 7.2 billion in 2016 (BPS, 2017) caused by the decrease of t-shirts and sportswear exports almost 9.3%.

Table 1. Estimation Results of Random Effect model

Variables	Coef.	Std. Error	Z
$ln\,(GDPX_{it})$	-1.4610	2.3292	-0.63
$ln\,(GDPM_{jt})$	1.3082*	0.4294	3.05
$ln\,(REER_{ijt})$	0.2040	0.3326	0.61
$ln\,(PopulationM_{jt})$	-0.3124	0.3866	-0.81
$ln\,(Distance_{ij})$	0.4622	0.4736	0.98
$(NetX_{it})$	-0.0269	0.0233	-1.15
$(NetM_{jt})$	0.0285*	0.0144	1.97
$ln\,(MobX_{it})$	0.9658	1.0105	0.96
$ln\,(MobM_{jt})$	1.7476*	0.6002	2.91

*indicates that the variable is significant at the 5% level of significance.

The coefficient of $ln\,(GDPM_{jt})$ is positive and statistically significant, namely estimated at 1.3082. It indicates that if importer countries GDP increase by one percent, Indonesian apparel exports increases by 1.3082%. Increasing GDP from importing countries indicates the increasing economic capacity of the country. In addition, increase of GDP causes the high consumption of a country. High economic consumption also illustrates the purchasing power for imported goods. If a country's high demand for goods and services cannot be fulfilled by domestic production, then will increase exports from other countries that provide them.

Associated with insignificant of $ln\,(PopulationM_{jt})$ estimation result, there are two possibilities. First, the apparel is no longer just primary needs. Apparel demands affected by trends or lifestyles. Japarianto & Sugiharto (2012) concluded that shopping lifestyle and fashion involvement significantly affected to the impulse buying behavior. The second is the tight competition of the main business in the European Union market. This is due to zero percent import tariff on apparel import from Vietnam and Bangladesh to the European Union. In addition, based on Gereffi & Frederick (2010) and Gereffi & Memedovic (2003) in Ardiyanti & Fakhrudin (2015) in the world map of apparel exporters, Indonesia is included in exporters experiencing market changes. Indonesia market share in USA and Japan is increasing, but markets in the European Union are declining.

REER coefficient is positive but statistically not significant. It indicates that export was not affected by the exchange rate. The higher REER of export destination country against the exporting countries will cause the cheaper commodity prices in the export destination country. So, export volume of exporting countries will decline as consumers in export destination country prefer to consume domestic commodities than imported commodities.

However, Bair (2005) and Gereffi et al. (2001) in Ardiyanti & Fakhrudin (2015) stated that in relation to trade, apparel is one of the commodities that has a characteristic as a buyer-driven commodity chain where there is asymmetry influence between suppliers and global buyers who generally lead-firms the brand owner. In some cases, global buyers whose lead-firms are companies that have retail networks and brand owners from developed countries such as the European Union, Japan, and USA.

Lead-firms determine design, brand giving, and product marketing in global supplier countries, most of them are developing countries as Indonesia. The manufactured apparel will be re-exported to global buyers. Thus, the number of exported apparel is not too affected by changes in exchange rates.

The coefficient of *Distance* is insignificant, while export destination countries ICT Indicators appropriately significant. This proves distance is insignificant as trade relations obstacle

when a country optimizes the role of ICT. According to the study of Terzia (2011) which states that electronic means and the internet can make the process of initiating and doing trade such as finding the right suppliers, specifying the product's requirements and quality, negotiating the price, arranging deliveries and marketing products a lot of easier, faster, and less expensive. Collecting information is a costly activity when it involves acquiring information across national borders and can be considered a substantial barrier to trade. With the internet and e-commerce applications, a whole range of these activities can occur without having buyers and sellers in close physically proximity. Thus, the volume and also the value of international trade will likely to increase.

Indonesia's ICT variables coefficient insignificantly affected to export value. Even though mobile-phone users are very high in Indonesia, they have not been able to equalize the high number of internet users. Although the growth of Indonesian internet users over the past six years has reached 132.29%, or 22% per year, but until 2016, the number of internet users in Indonesia were still relatively low, only 25.37%. Clarke & Wallsten (2006) in their study stated that in developing countries, many manufacturing enterprises remain unconnected. Internet access is less common in developing countries than in developed countries. It will give a greater advantage when enterprises in developing countries being connected to the internet when respect to export to developed countries.

Indonesia ICT index in 2016 released by BPS reached 4.34 or only increased by 0.46 from previous year and stayed in 111th rank of 176 countries. In ASEAN region, Indonesia ICT index is only better from Cambodia, Myanmar and Timor Leste.

Indonesia reached 3.19 for *use subindex* including individual using the internet. This subindex is the lowest, while the access and infrastructure sub-index reached 4.88, and the expertise sub-index reached 5.54.

International apparel buyers are using the internet to trade online and to develop close knowledge-based links with suppliers. E-business technologies are becoming increasingly important for Indonesian apparel producers as they are integrated into GVC. In many cases, the apparel market is based on personal relationships, it will not be possible to

create an internet-based transaction business instantaneously, so, a gradual approach is required (Moodley, 2003).

Indonesia is a country which rich of cultures and therefore has a big potential to develop cultural-pattern based apparel. However, the inequality and low ICT index in various Indonesia provinces is one of the reasons why ICT variables do not significantly affect the value of Indonesian apparel exports. DKI Jakarta is the province with the highest ICT Index of 7.41 in 2016. While Papua with 2.41 became the province with the lowest ICT Index (BPS, 2017).

It also supported by survey result conducted by the Ministry of Communication and Information (2016) that showed internet usage in Indonesia still low and inequal between region. Java Island was the highest region where internet usage by individuals reached 40.5%, followed by Sumatra Island (30.6%). While Papua Island was the lowest, where internet usage by individuals only reached 17.5 %, one of the problem was the unavailability of internet services.

CONCLUSION AND POLICY RECOMMENDATION

Indonesia is involved in the Global Value Chain on apparel industry with Vietnam, Bangladesh and India. It is evident from export destination countries whose international leading companies countries such as Germany, Canada, United Kingdom, Belgium, and Netherlands (members of the European Union), USA and Japan. Indonesian apparel exports to the European Union encountered a significant decline which was the impact of the collaboration between Bangladesh and Vietnam with the European Union regarding zero percent import tariff on textile products. While Indonesian textile products are still encountered quite large import tariff.

Panel gravity model showed that GDP and ICT variables of export destination countries are the variables determining Indonesian apparel value exports, while the Distance, Population, and REER are not significant. This is related to the close relationship between Indonesia and most of the export destination countries, which are global buyers, in the GVC. These state companies are lead-firms that act as determinants of design, brand-giving, and product marketing in global supplier countries such as Indonesia. Furthermore, manufactured apparel will be re-exported to global buyers.

Indonesia's ICT variables has no significant affect to apparel exports. Even though the mobile-cellular

telephone subscriptions per 100 inhabitants grows quite high over the past six years, but internet users in Indonesia are still very low. Whereas international apparel buyers are using the internet to trade online and to develop close knowledge-based links with suppliers. Besides, in many cases, the apparel market is based on personal relationships, it will not be possible to create an internet-based transaction business instantaneously.

Indonesia is a rich country in cultures with a huge potential to develop cultural pattern-based apparel and modest fashion. However, the inequality and low level of ICT index in various provinces in Indonesia has reduced the potential for apparel in remote areas to reach international markets. A main reason for insignificant contribution of Indonesia's ICT indicators to the apparel industry is the existing wide gap of internet user's percentage between regions caused by unavailability of internet services.

Expansion of good quality internet networks would enable designers, downstream industries and apparel traders to connect and produce cultural-based and modest fashion styles in a broader marketing chain.

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