Impact of E-Commerce Sector on Indonesian Economy

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ABSTRACT

The development on technology and innovation of digital technology has a huge impact on how people interact in the market. E-commerce gradually takes larger impact every year on economy. The objective of this article is to give a brief explanation of how e-commerce has affected Indonesian economy in these past view years. We used Vector Autoregression (VAR) and Input-Output analysis methods to give a wider view on how GDP affected by e-commerce. The result shows that e-commerce does affect GDP positively. And the development of innovation and technology give impact on GDP growth both positively and negatively. By I-O analysis, investment in e-commerce can be increase GDP growth around 0.389 percent and it will be increase the innovation sector. In conclusion e-commerce has a bright future because of the growing digital buyers and users of e-commerce transactions and e-commerce has a positive impact on the Indonesian economy so that relevant stakeholders should support e-commerce to a more advanced stage from now.

Keywords: e-commerce, economic growth, VAR, Input-Output Analysis

JEL Classification: D8, L8
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The development on technology and innovation of digital technology has a huge impact on how people interact in the market. E-commerce gradually takes larger impact every year on economy. The objective of this article is to give a brief explanation of how e-commerce has affected Indonesian economy in these past view years. We used Vector Autoregression (VAR) and Input-Output analysis methods to give a wider view on how GDP affected by e-commerce. The result shows that e-commerce does affect GDP positively. And the development of innovation and technology give impact on GDP growth both positively and negatively. By I-O analysis, investment in e-commerce can be increase GDP growth around 0.389 percent and it will be increase the innovation sector. In conclusion e-commerce has a bright future because of the growing digital buyers and users of e-commerce transactions and e-commerce has a positive impact on the Indonesian economy so that relevant stakeholders should support e-commerce to a more advanced stage from now.

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1. INTRODUCTION

1.1. Background Research

Technological changes over the past 10 years have accelerated. This changes affect the structure of the Indonesian economy, especially in the retail sector. Throughout the year 2017, some retail stores were forced to close because they continue to lose money. BCA survey in Jabodetabek 2017 reveals that most electronics stores have significantly decreased tenant turnover as happened in Glodok, Mangga Dua, and ITC Cempaka Mas with average down more than 25.3 percent compared to 2016. Whereas, on the one hand economic growth is still stable at 5.07% in 2017.

Figure 1. Growth of Household Consumption by Type (% YoY)

Source: BPS, 2017

BPS data also revealed that the people consumption, who fell in the last 4 years, is the consumption in the clothing or fashion sector from 5.32 percent in the third quarter of 2013 to 2 percent in the third quarter of 2017. While for food consumption tends to increase. On the other hand, transportation and communications consumption throughout 2016 grew steadily to 6 percent.

Then, the eMarketer data of 2017 reveals that as many as 45.8% of items sold on the online platform are apparel. According to that phenomena, there is a new analysis that the decrease in apparel consumption sales is the result of a shift in consumption patterns due to e-commerce.
In addition to changes in consumption patterns of society, the effect of e-commerce also affect the structure of labor, potential tax revenue, and multiplier effect on national industries. Nielsen data in 2016 revealed that the share of e-commerce is still below 1% of total national retail. This figure is still below the United States and China, each of 8% and 9% of total retail. Although the portion of e-commerce in Indonesia is still small but the perceived impact is quite large.

Given the changes in consumption patterns affecting the retail sector and the impact of online retail phenomena on the economy, we intend to conduct a study or research related to the potential of online retail in Indonesia as well as its impact on the national economic output.

1.2. Previous Study

The development of online transactions in Indonesia has increased tremendously in recent years. Data Statistics estimates that the total value of online transactions in Indonesia in 2013 reaches 1 to 2 billion US $. At this point, that number must be much larger given the rapid increase in online transaction market as can be seen in the following data.
Average sales of E-commerce per Digital Buyer in 2011 was US$ 282 millions and in 2016 had reached US$ 516 millions. In fact, when compared to India as a country that also experienced rapid development in online transactions, the average sales of Ecommerce per Digital Buyer India in 2011 was US $ 597 millions and in 2016 to US $724 millions. Business to Consumers sales growth in E-commerce is also above India as well as China in 2016. Indonesia recorded a growth rate of 22%. While India and China incised growth of 18.3% and 16.6% respectively.

Thus, the rapid development of online transactions in Indonesia should be considered as a potential and an opportunity to encourage domestic business actors to conduct digital transformation so as to compete with other countries.

The development of online transactions over the years and in the coming years is supported by several things. Among them is related to the size of the use of smart phones by the people of Indonesia. By 2017, according to the Internet Service Provider Association of Indonesia (APJII), the number of smartphone / tablet ownership in Indonesia reaches more than 130 million people. That is, about 1 in 2 people Indonesia has a smartphone / tablet in his hand.
Great smartphone ownership is also related to the size of internet penetration in Indonesia, which is more than 143 million people in 2017. This number increases about 11 million people from 2016, which amounted to 132 million people. This highly significant internet penetration supports online merchants transacting and expanding their business to larger markets. Proven, according to ATKearney, mobile phones are a tool that tends to be more widely used to sell online in developing countries, including Indonesia by 83%.

Utilization of the enormous potential as mentioned above is to transform digital industry moving offline to online. According to a survey conducted by Indonesia Data Corporation and Telkomtelstra, four business sectors are digitally transformed due to massive consumer demand are banking, insurance, retail and transportation sectors. The point is that the current ongoing digital transformation is driven largely by the changing demand from enormous consumers without dismissing other factors.

1.3. Objective

The objective of study of online retail prospect on Indonesian economy in general is to analyze the impact of e-commerce business phenomenon on Indonesian economy. The purpose of this research is specifically:

- Analyzing changes in business landscape in the retail sector as well as factors affecting shifting trends from conventional retail to online retail (e-commerce).
- Conduct empirical analysis of e-commerce impacts on Indonesia's economic output.
- Provide recommendations for stakeholders, especially the Government for e-commerce growth can increase significantly and provide a positive impact for the national economy
LITERATURE REVIEW
This research can be derived from Harrod-Domar model. This model explained about economic growth can be accelerated by: changing the saving rate, improving technology, and government interventions. This model has 3 assumptions: closed economy, kapital and labor in fixed proportions, and constant return to scale. This can be mathematically derivation written as

\[ S = s \cdot Y \]

where \( s \) is the average saving rate. In the conventional Keynesian model investment is given \( (I = I_a) \). In equilibrium saving is equal to investment. So we can write

\[ S = I \]

There is a production function \( Y = a \cdot K \) where \( a \) is the productivity of capital. So we can determine how a change in capital changes income with this function:

\[ \Delta Y = a \cdot \Delta K \]

So we can tell about growth will be increase when there are increasing investment or changes in kapital.

METHOD, DATA, AND ANALYSIS

3.1. Data
This study uses two research methods, namely: forecasting method, and input-output analysis method. To support this two methods, this study uses secondary data. Secondary data used are input-output data obtained from economy creative institution (BEKRAF) publication. The other one uses data from statista.com which produce the economy digital data. The forecasting method show us that how much the e-commerce can improve it sales. The input-output data is data showing the inter-linkages between economic sectors. this data consists of the demand structure and the input structure.

3.2. Vector Auto Regressive
Vector Auto Regressive is developed by Sim in 1980. His assumption said that there should not be distinction between endogenous and exogenous variables. This method is not build on a theory because sometimes economic theory cannot capture the relationship among the variables.
Mathematic model of VAR:

\[ X_t = \mu_t + \sum_{i=1}^{k} A_i X_{t-i} + u_t \]

The first step to run Vector Auto Regressive (VAR) model is making sure that the data is stationary whether at level or at difference. The result shows that GDP growth stationary at 1\textsuperscript{st} difference, while Technology and Innovation Index are stationary at 2\textsuperscript{nd} difference. The data is stationary at difference, in a different stage, so we use VAR indifference.

3.3. Input-Output Analysis

Input-Output (I-O) Analysis was developed by WW Leonthif in 1930. I-O Analysis is a mathematical model for studying interconnected economic structures linking between different sectors. The basic principle of I-O Analysis is to identify and disaggregate all flows of expenditures between various economic activities (sectors / industries), between economic and consumer activities, between economic activities and the provision of inputs in the structure of economic trade.

The analysis with the I-O model is based on a matrix-shaped table that provides information about the transactions of goods and services as well as the interrelationships between units of economic activity (sector) within a region over a certain period of time called Table I-O. Transactions between sectors in the table can be written mathematically as:

\[ x_i = \sum x_{ij} + \sum Y_i \]

Where : \( x_i \) = the output of sector i
\( x_{ij} \) = the number of sector i which used as inputs for sector j
\( Y_i \) = the final demand for sector i
The transactions between sectors in “Producers” can be converted into a matrix consisting of certain coefficients which describe a fixed purchase of input for each level of output (Amir & Nazara, 2005). This is obtained with the assumption of the absence of economies of scale and the absence of substitution between inputs. This coefficient mathematically written as

\[ a_{ij} = \frac{x_{ij}}{x_j} \]

\[ x_{ij} = a_{ij}x_j \]

So it show us this mathematically operation written as

\[ x_i = \sum a_{ij}x_j + \sum Y_i \]

So it can be written as

\[ X = AX + Y \]

Then, we can make next step for mathematically operation written as

\[ X = (I - A)^{-1}Y \]

Matrix \((I-A)^{-1}\) reflecting the multiplier effect of output, the impact of a one-sector production increase on the increase in production of other sectors. In this study, this methods to analyze economics benefit from the growing of online application system. More specifically, the I-O analysis in this study aims to calculate the impact on output (forward) when transportation sector/ICT output has change and the impact of growth on application base transportation on economy output (GDP).
In this research, we use 21 sectors, they are:

<table>
<thead>
<tr>
<th>Code 21</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>n01</td>
<td>Agriculture, Forestry and Fisheries</td>
</tr>
<tr>
<td>n02</td>
<td>Mining and excavation</td>
</tr>
<tr>
<td>n03</td>
<td>Processing industry</td>
</tr>
<tr>
<td>n04</td>
<td>Procurement of Electricity and Gas</td>
</tr>
<tr>
<td>n05</td>
<td>Water Supply, Waste Management, Waste and Recycling</td>
</tr>
<tr>
<td>n06</td>
<td>Construction</td>
</tr>
<tr>
<td>n07</td>
<td>Trading Car, Motorcycles and Repair</td>
</tr>
<tr>
<td>n08</td>
<td>Large and Retail Trade, Not Cars and Motorcycles</td>
</tr>
<tr>
<td>n09</td>
<td>Transportation and Warehousing</td>
</tr>
<tr>
<td>n10</td>
<td>Provision of Accommodation</td>
</tr>
<tr>
<td>n11</td>
<td>Information and Communication</td>
</tr>
<tr>
<td>n12</td>
<td>Financial Brokerage Service</td>
</tr>
<tr>
<td>n13</td>
<td>Financial Services</td>
</tr>
<tr>
<td>n14</td>
<td>Real Estate</td>
</tr>
<tr>
<td>n15</td>
<td>Company Services</td>
</tr>
<tr>
<td>n16</td>
<td>Mandatory Administration of Government, Defense and Social Security</td>
</tr>
<tr>
<td>n17</td>
<td>Educational Services</td>
</tr>
<tr>
<td>n18</td>
<td>Health Services and Social Activities</td>
</tr>
<tr>
<td>n19</td>
<td>Apps and Game Developer</td>
</tr>
<tr>
<td>n20</td>
<td>Creative Economy Services</td>
</tr>
<tr>
<td>n21</td>
<td>Other services</td>
</tr>
</tbody>
</table>

**RESULT AND DISCUSSION**

**4.1 Forecasting Sales and Proportion of E-commerce**

Our projection of Digital Buyer and e-commerce transaction sales in Indonesia concludes that the potential of online transactions in Indonesia is still very lucrative, at least until 2021. The number of digital buyers is estimated to increase almost double from the year 2015, which amounted to 22.2
million buyers to 38.34 million online shoppers by 2021. In fact, we also predicts that the value of e-commerce transaction sales in 2021 will increase by about 300 percent compared to 2015, which is 4.61 billion US dollars to 11.32 billion US dollars in 2021. The e-commerce transaction market in Indonesia is still very potential promising big profits in the next few years.

Figure 4.1.1. Projection of e-commerce sales (in billion US$)

Figure 4.1.2. Projection of Digital Buyers (in million people)
4.2. Vector Auto Regressive

There are two models of VAR that we would run. The first model will show the relationship between GDP growth and Technology and the second model will show the relationship between GDP growth and Innovation Index.

a. GDPG and Innovation Index

The model: \[ GDPG = 12,7880 + 0,1714 \text{ GDPG(-1)} - 1,3182 \text{ II(-1)} - 1,2184 \text{II(-2)} \]

Statistically GDP is affected by GDPG(-1), II(-1), II(-2). GDPG(-1) affects GDPG positively, while II(-1) and II(-2) affects GDPG negatively. The model means if GDPG’s previous year raises by 1 percent, the GDPG will raise for 0,1714 percent. But, if Innovation Index’s previous year raises by 1 percent, the GDPG will down for 1,3182 percent.

The shock on GDPG make GDPG to unstable. The shock on Innovation Index almost has no effect on GDPG, GDPG almost stable. Meanwhile, the shock on GDPG cause Innovation Index to unstable. The shock on Innovation Index almost has no effect on Innovation Index.

GDPG is affected by shock on GDPG for a hundred percent in the first period. Innovation Index started to give impact in the second period until 10 period. The impact of Innovation Index is not much but increasing every period. A shock in GDPG impacts Innovation Index for 98 percent for ten period. The Innovation Index’s shock only affects itself for almost 2 percent. The causality relationship of GDPG and Innovation Index can be described by Granger Causality Test. The result shows that GDPG significantly gives impact to Innovation Index but, Innovation Index has no impact on GDPG.
b. GDPG and Technology

The model: \( \text{GDPG} = 10.6712 - 1.2844T(-1) \)

Statistically GDP is affected by \( T(-1) \), it affects GDPG negatively. The model means if Technology’s previous year raises by 1 percent, the GDPG will fall for 1,2844 percent. The shock on GDPG make GDPG to unstable. The shock on Innovation Index almost has no effect on GDPG, GDPG almost stable. Meanwhile, the shock on GDPG cause Innovation Index to unstable. The shock on Innovation Index almost has no effect on Innovation Index.

4.3. Input-Output Analysis

The data from Creative Economy Institution, the sector that produces the most output is the culinary sector. Then followed by the craft sector, fashion, publishing, television, and apps and game developers. Industry apps and game developers is the No. 6 largest creative industry sector. This sector is also the largest potential sector. Currently in Indonesia, sales in e-commerce is growing rapidly. Tokopedia, Lazada, Shoopee, and Bukalapak are a few examples of e-commerce platforms that are currently triumphing.

<table>
<thead>
<tr>
<th>Sector of Economy</th>
<th>Creative Output</th>
<th>Percentage from Total Entire Economy</th>
<th>Percentage from Total Creative Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Architecture</td>
<td>29,983</td>
<td>0.15</td>
<td>1.69</td>
</tr>
<tr>
<td>2. Interior design</td>
<td>2,094</td>
<td>0.01</td>
<td>0.12</td>
</tr>
<tr>
<td>3. Visual communication design</td>
<td>740</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>4. Product Design</td>
<td>3,903</td>
<td>0.02</td>
<td>0.22</td>
</tr>
<tr>
<td>5. Film and Animation and Video</td>
<td>2,205</td>
<td>0.01</td>
<td>0.12</td>
</tr>
<tr>
<td>6. Photography</td>
<td>7,641</td>
<td>0.04</td>
<td>0.43</td>
</tr>
<tr>
<td>7. Kriya</td>
<td>313,018</td>
<td>1.56</td>
<td>17.66</td>
</tr>
<tr>
<td>8. Culinary</td>
<td>861,427</td>
<td>4.29</td>
<td>48.59</td>
</tr>
<tr>
<td></td>
<td>Produk</td>
<td>Output Added</td>
<td>Growth %</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------</td>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td>9</td>
<td>Music</td>
<td>4,195</td>
<td>0.24</td>
</tr>
<tr>
<td>10</td>
<td>Fashion</td>
<td>292,537</td>
<td>16.50</td>
</tr>
<tr>
<td>11</td>
<td>Apps and Game Developer</td>
<td>44,956</td>
<td>2.54</td>
</tr>
<tr>
<td>12</td>
<td>Publishing</td>
<td>111,372</td>
<td>6.28</td>
</tr>
<tr>
<td>13</td>
<td>Advertising</td>
<td>10,562</td>
<td>0.60</td>
</tr>
<tr>
<td>14</td>
<td>Television and Radio</td>
<td>83,154</td>
<td>4.69</td>
</tr>
<tr>
<td>15</td>
<td>Performing Arts</td>
<td>2,680</td>
<td>0.15</td>
</tr>
<tr>
<td>16</td>
<td>Art</td>
<td>2,355</td>
<td>0.13</td>
</tr>
<tr>
<td>A</td>
<td>Creative Economy</td>
<td><strong>1,772,822</strong></td>
<td><strong>8.82</strong></td>
</tr>
<tr>
<td>B</td>
<td>Other Sector</td>
<td><strong>18,315,890</strong></td>
<td><strong>91.18</strong></td>
</tr>
<tr>
<td>C</td>
<td>Total Entire Economy</td>
<td><strong>20,088,712</strong></td>
<td></td>
</tr>
</tbody>
</table>

This research used total investment on e-commerce in 2017. In that year, it’s investment was around USD4.8 miliar or Rp65.06 triliun. That number was derived from Indonesia Investment Promotion Center (IIPC). So we can use it to shock on Apps and Game Developer Sector. The results of the calculation of I-O obtained the following results:
The sector that gets the most influence from the investment in e-commerce sector is the information and communication sector that get additional output amounting to Rp1,05 trillion or an increase of 0.274 percent. The second sector is the procurement of electricity and gas which gets an additional output of Rp231.5 billion, up by 0.038 percent. The next is the financial services and intermediary services company. These results suggest that investment in the application services sector, will increase output in technology-related sectors.

He rise in the information and technology sector is driven by the use of mobile phones or laptops as a means to conduct e-commerce transactions. So the purchase of mobile phones and laptops will increase with the investment in e-commerce. Electricity consumption will also increase along with the investment in e-commerce because electricity is the power for mobile phones and laptops.

Another growing sector is the financial services sector of banks. Banks are still the economic actors who mediate the payment of sellers and buyers in the e-commerce market. Banks also provide various ease
of payment in the e-commerce platform to support transactions. Transactions in banks will also rise along with increased investment in the e-commerce sector.

**CONCLUSION**

The rapid development of e-commerce in Indonesia in recent years has led many to suspect that e-commerce will continue to experience a growth spurt in the next few years. In addition, the potential of Indonesia's digital economy is so great, such as internet penetration and mobile phone ownership levels are so high in the people of Indonesia increasingly make e-commerce is seen to have a bright future. Based on the results of our projected calculations, we found that sales transactions in e-commerce will continue to grow to 11.32 billion US dollars by 2021. In fact, the number of digital buyers is estimated amounted to 22.2 million buyers to 38.34 million online shoppers by 2021. In the other hand, investment in e-commerce can be increase GDP growth around 0.389 percent and it will be increase the innovation sector.

**IMPLICATION/LIMITATION AND SUGGESTIONS**

The limitation of this research is the limited data related to digital economy, especially e-commerce, which exist in Indonesia. Therefore, the limited data to make the research team has limitations in the use of research methods. Therefore, with more digital economic data in the future, the research of digital economy, especially e-commerce, the future will be better, including in the aspects of the use of research methods.

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