Seminar Component
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Title of Paper

Use of Digital Currencies in Measuring Indonesia's Digital Economy

Abstract

The definition of digital economy difficult to be agreed because there is no clear concept about the digital economy itself. Nevertheless, the study of this phenomenon began to develop a lot because it is indeed relevant to the economic situation of most countries in the world nowadays. With rapid technological developments, easy access to the internet network, and a lifestyle that demands that all transactions can be done quickly and practically, digital economy era is growing so fast. Several studies have tried to review how to measure state revenues derived from "digital economy sector". At the simplest level, many of them choose to utilize an economic framework that they already have and then focus on some specific sector that they think relates to digital economy, such as Information, Computer, and Telecommunication (ICT). The problem is, that kind of measurement can be hard to do for a country which does not have the instrument (a survey or adequate economic framework) yet, for example, Indonesia.

This paper offers an alternative way to measure the digital economy in terms of the nominal digital currency circulating in the country. The digital currency used comes from the nominal of APMK (Card-based payment instruments) and electronic money (e-money) that circulate in a certain period. This approximation is used because digital economic commonly associated with digital platform like e-commerce, which most of their payment system uses digital currency instead of using cash. One of the result of this paper is explaining that the percentage of the digital economy to nominal GDP Indonesia in 2017 reach 47.92%.

Given the importance of digital economy for the sustainability of the Indonesian economy in the future, BPS Statistics Indonesia is expected to seriously consider this matter. Because as stated, the development of digital economy can have a great impact on other sectors, especially the industrial sector in relation to the development of small and medium enterprises (SME) so that the broader impact of this, is the achievement of SDG's point 8 and 9 goals, which is inclusive and sustainable economy growth and achievements in the fields of Innovation, Industry and Infrastructure.

I.   Contents

II. Introduction

Economic development of a nation is important for the ongoing development process in a country. The success of economic development will have an impact on other fields both directly and indirectly. Where one indicator of own economic development is economic growth. In line with this, the United Nation through the "Sustainable Development Goals" program also contributed to economic growth as one of the focus of problems that must be considered by countries in the world, namely at point 8, decent work and economic growth. The economic growth referred to in this point is inclusive and sustainable economic growth

In discussing economic growth of a country, it is certainly cannot be separated from talking about economic conditions in the country itself. Analyzing these conditions is not simple, especially after countries in the world entered the era of Information and Communication Technology (ICT). Since its inception, the ICT sector grows so fast and has an impact on other sectors. Sectors as diverse as retail, logistics and education have changed and keep changing due to the spread of ICT.[14] Besides, Organisation for Economic Co-operation and Development's (OECD) publication (2014:15) states that mobile broadband is also widely available in many emerging and less developed countries. In sub-Saharan Africa, for example, subscriptions grow from 14 milion in 2016 to 117 million in 2013. In less than two years, the number of pages viewed from mobile devices and tablets is estimated to have risen from 15% to over 30% of total. Depending on country, smartphone users in the OECD may pay up to seven times more for a comparable basket mobile services.[20]

In the other hand, Costa and Grauwe (2001) said that innovations in information technologies have improved the prospects for the advent of a cashless society. Still i the discussion of the impact of ICT in monetary, the same thing was also stated by Freidman (1999) in his article who warned that the development of information technology would have implications for the reduced role of base money in payment transactions. One thing that is strongly suspected is the sector that being influenced by the existence of ICT is the economy of a country. The influence of ICT in this field

eventually gave birth to many new terms, such as information economics, new economics, and network economics. All these terms refer to the impact arising from the existence of information technology in the economic sector, where one of them is digital economy.

In the past few years, the digital economy itself has developed rapidly and globally. In 2015, digital economy recorded a total transaction of US $ 25 trillion from e-commerce activities. From 2006 to 2016, the digital economy grew at an average annual rate of 5.6 per cent, outpacing overall US economic growth of 1.5 per cent per year.[13] For example for the another country around the world, e-commerce in the Netherlands has increased as a share of total company revenue from 3.4% in 1999 to 14.1% in 2009. Similarly, between 2004 and 2011 this share increased from 2.7% to 18.5% in Norway and from 2.8% to 11% in Poland. Based on comparable data, as illustrated in the chart below, e-commerce is nearing 20% of total turnover in Finland, Hungary, and Sweden, and 25% in the Czech Republic.[14]

In Indonesia, digital economy itself is one of the topics brought up at the Group of Twenty (G20) Summit. It is an innovative business model to encourage economic development in countries with large economies in the world. Vice President of Indonesia, Jusuf Kalla, believes technological innovations in the economic field can encourage economic equality, creation of job opportunities, and expansion of financial inclusion.[15]

As one of the sector that listed below digital sector, the potential of the e-commerce industry in Indonesia cannot be underestimated. From the data analysis of multinational professional service firms, Ernst & Young (2014), it can be seen that the growth of the value of online business in Indonesia increases every year to reach 40%. In addition, it was also stated that at the end of 2014 the business value of Indonesia's e-commerce industry reached US $ 12 billion.

From the explanation above, the development of digital economy in Indonesia is really important to be watched not only to support the inclusiveness of economic growth as said in SDG's point 8, but also in relation with innovation and the

development of the another sector such as industry and services which also listed on SDG's goal point 9 : Industry, Innovation, and Infrastructure. Two of the target indicators from this point that can be achieve by encouraging the development of digital economy in Indonesia are point 9.2 and 9.3 :

1. Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.

2. Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.[16]

At this point, we have understood about digital economy and its potential for the Indonesian economy. Now the question is how does the government maximize this potential? the answer is, exactly, with data. Data obtained from the use of digital technologies can provide new sources of knowledge, innovation and profits, if analysed effectively and transformed into intelligence. As trade is increasingly becoming digitalized, cross-border data flows are becoming more important for international transactions. Activities affected by digitalization go beyond online trading and supply chain coordination, to using ICT for the integration of a wider range of activities into single systems, thus making value chains increasingly data driven.[17] Provision of accurate and specific data in measuring the development of digital economy and the sectors in it can be used as a basis for the government in formulating appropriate policies and taking actions in order to maximize the potential of the digital economy itself. Unfortunately, in fact, BPS Statistics Indonesia as a national data provider institution does not yet have a specific survey or method in measuring the digital economy's contribution to the national economy.

Responding to that problem (the lack of the data), this paper offers a solution that is provide another source of data that can be used to measure the contribution of Digital Economy towards Indonesia's national economy. The data used as an

approach to digital economy is the digital currencies which derrived from total transaction that used non-cash payment system in Indonesia This paper's writing is divided into three parts, the first part is the introduction, the second part is about Alternative Measurement for Digital Economy in Indonesia, and the last part is the conclusion.

III. Measuring Digital Economy in Indonesia

A. Digital Economy

1. Definition

In his book entitled The Digital Economy: Promise and Peril in the Age of Networked Intelligence, Don Tapscott (1995) began to raise the issue and introduce the term 'Digital Economy' in Western countries. In his book, he discusses how the internet will change the way people do business.

On the other hand, according to the Encarta Dictionary, digital economics has the meaning of "*business transactions that exist on the internet*", which includes the use of software, hardware, applications, and telecommunications in every aspect of the economy.

Mesenbourg (2001) breaks the digital economy into three main components, which as follows:

1. E-business infrastructure

   Such as hardware, software, networks, and human capital.
2. E-business

   How business is conducted, any process that an organization conducts over computer-mediated networks.
3. E-commerce

   Transfer of goods, for example : online shopping.

Therefore, digital economy can be interpreted as an economic and business activity based on digital technology. In other words, digital economy is the implementation of economic and business activities through the internet-based market and the world wide web (www).

2. Potency and Difficulty

In the introduction point, it was explained how the digital economy began to have a large contribution to the economy of the countries in the world. This information is certainly not surprising, given that the role

of the digital economy in the economic sector does not need to be questioned. In Indonesia itself, this can also be seen from the response of economic actors such as firms and banks who are competing to overhaul their systems in order to adjust to consumer demand which needs of fast and practical transactions. In addition, some of the things that make digital economy so easily accepted in society are due to the following reasons:

1. The ease of buying and selling activties of goods and services
   Innovations carried out by digital economy actors make sellers have many platforms to maximize the transaction activities. For consumer, this certainly provides convenience, especially when looking for items that are rarely found in conventional stores. As for sellers, the existence of these platforms makes it easier for them to find consumers so that the benefits will also be maximized.

2. The development of Small and Medium Enterprises (SME) in Indonesia
   The existence of a digital economy is believed to be a bridge in connecting the needs of the community with the movements of various business sectors, one of which is a small and medium business unit. If the conventional market of the business unit is difficult to get the opportunity to develop. Through the digital economy, they can interact directly with consumers through e-commerce which is currently mushrooming.

3. Digital Economy : Borderless and timeless[6]
   Borderless is defined as the absence of territorial constraints in transactions, because all interactions are connected by the internet network. This has become an important point especially for Indonesia, considering that this country is an archipelagic

country, which is largely separated by the sea. Then timeless, is defined as the absence of a time limit for digital transactions because the digital economy can operate twenty-four hours a day. Both of these can be the main attraction for economic actors

The reasons above make the potential for developing the digital economy in Indonesia to be very large, this makes the government pay more attention to the sectors included. Even the Indonesian Minister of Communication and Information, Rudiantara, has also revealed that it is not impossible that the e-commerce industry will become one of the backbone of the national economy. He also hopes that the e-commerce industry can continue to be developed and support the Indonesian economy which is predicted to become the world's new economic power by 2020. [9] However, back to the main point of the problem, that the Indonesian state (represented by BPS Statistics Indonesia) does not yet have specific data regarding the development of digital economy.

B.   Alternative Measurement for Digital Economy in Indonesia

1.   The Quantity Theory of Money

Departing from the problems presented in the previous point, this paper tries to offer a solution to find alternatives in providing data for the government regarding digital economy measurement. Before discussing further about this, let us discuss first about *The Quantity Theory of Money* which was popularized by an economist named David Hume (1711-1776).

a) Transactions and the Quantity Equation

Mankiw (2003) demonstrate that people hold money to buy goods and services. The more money they need for such transactions, the more money they hold. Thus, the quantity of money in the economy is related to the number of dollars exchanged in transactions.

The link between transactions and money is expressed in the following equation, called the quantity equation :

$$M \times V = P \times T \quad \text{... (3.1)}$$

From the equation (3.1), we know that the right-hand side of the equation tells us about transaction, and the left-hand side tells us about the money used to make transaction. T represents the total number of transactions during some period of time, while P is the number of dollars exchanged, therefore PT equals the number of dollars exchanged in a year. In the other hand, M is the quantity of money, V is called the transactions velocity of money.

b) From Transaction to Income

Mankiw (2003) also argues that the value of Y can be denoted as the amount of output and P is the price of one unit of output, it can be said that the total value of the total output is PY.

On the other hand, when discussing national income, it also uses the same variables, namely Y as real GDP, P is GDP deflator, and PY is nominal GDP.

c) Alternative Measurement

If we look again at equation (3.1), we can find that the right-hand side of the equation (PT) has a equal definition to nominal GDP discussed in point (b) (PY), which is the multiplication of output/number of transactions with the price, or can be said as a total transaction in a certain period.

The main thought of this alternative measurement takes the idea of the equations and simple explanations above. So, in its preparation, it will utilize a combination of the two available data, namely data on the money supply (nominal of total transaction) from Bank Indonesia, and data on nominal GDP from BPS Statistics Indonesia.

2. Economic Transaction : Non-cash Payment System

The widespread adoption of ICT, combined with the rapid decline in price and increase in performance of these technologies, has contributed to the development of new activities in both the private and public sector. Together, these technologies have expanded market reach and lowered costs, and have enabled the development of new products and services. These technologies have also changed the ways in which such products and services are produced and delivered, as well as the business models used in companies ranging from multinational enterprises (MNEs) to start-ups. They also support activity by individuals and consumers and have led to the creation of new payment mechanisms including new forms of digital currencies. [14]

a) Digital Currency
Digital currency is a type of currency available in digital form and having some monetary characteristics.[18] Like traditional money, these currencies may be used to buy physical goods and services. The emergence of what are frequently referred to as

"digital currencies" was noted in recent reports by the Committee on Payments and Market Infrastructures (CPMI) on innovations and non-banks in retail payments.[18] They have identified three key aspects relating to the development of digital currencies. The first, as said at the beginning of the paragraph, assets that typically have some monetary characteristics and have zero intrinsic value, featured in many digital currency schemes. The second, the way in which these digital currencies are transferred, typically via a built-in distributed ledger. Last, the third is the variety of third-party institutions, almost exclusively non-banks, which have been active in developing and operating digital currency and distributed ledger mechanisms.

b) Non-cash payment system

As discussed in point (c) alternative measurement, this paper will use data of nominal of total transaction as a measure of digital economy contribution to the national economy, and as explained in point (a) digital currencies, the transaction included is only limited to transaction with non-cash payment system.

The data available at Bank Indonesia regarding non-cash payment system statistics has 5 types of data, which is:

1. Real Time Gross Settlement (RTGS)

2. Kliring

3. Card-based Payment Instrument (APMK)

4. E-money

5. Transfer of Funds

From the data above, in this research two types of data will be used as elements that are considered to reflect "digital economy", namely APMK and e-money. The choice of these two variables takes into account the type of transaction, the amount of the transaction, and the freedom to conduct transactions by the public.

c) Card-based Payment Instrument (APMK)

According to Bank Indonesia (2009), APMK is a payment instrument in the form of a credit card, Automated Teller Machine (ATM) card and/or debit card. The APMK data used in this study is the nominal transaction of various elements of the APMK officially recognized by Bank Indonesia, whether debit/credit or cash/shopping/transfer nominal.

d) Electronic Money (E-money)

According to Bank Indonesia (2009), e-money is a payment instrument that fulfills the following requirements :

- Published on the basis of the value of money deposited in advance by the holder to the issuer
- The value of money is stored electronically in a media such as a server or chip
- Used as a way of payment to traders who are not publishers of the electronic money; and
- The value of electronic money deposited by the holder and managed by the issuer is not a deposit as referred to in the law governing banking

The data used in this study are nominal electronic money transactions, or the value/nominal of spending transactions carried out using electronic money for a certain period.

C. Study Cases : Indonesian Economy from 2010-2017

1. Indonesia's Economic Condition

From the explanation above, now we will see how much the value of the nominal of digital economy in Indonesia by accumulating the nominal of transactions completed with the non-cash payment system, and seeing its development by comparing it using the nominal value of Indonesia's GDP. Consider the following table:

Table 3.1. Nominal GDP (trillion Rp), Digital Economy (trillion Rp), and Percentage of Digital Economy in Indonesia from 2010 - 2017

Years	Nominal GDP	Digital Economy	Percentage of Digital Economy (%)
(1)	(2)	(3)	(4)
2010	6,864	2,165	31.55
2011	7,831	2,660	33.97
2012	8,615	3,268	37.94
2013	9,546	4,023	42.15
2014	10,569	4,703	44.50
2015	11,526	5,183	44.97
2016	12,401	5,911	47.67
2017	13,587	6,510	47.92

From the table (3.1), we can see that the new variable, namely digital economy, which is an accumulation of nominal payments for non-cash transactions, has a positive trend and increases every year. This is in line with what was said in the previous section of the discussion which

said that digital economy developed so rapidly and began to dominate the economy of countries in the world.

From the table we also can see that the potential of digital economy in Indonesia is indeed very large, in 2010, the percentage of digital economy from total national GDP was 31.55%. But in 2017, the percentage has almost touched half of total nominal GDP, to be exact 47.92%. The huge potential of the digital economy and the sectors that are in it will be further analyzed at the next point.

2. Economy VS Digital Economy Growth

Look at the graph below :

Graph 3.1 The Growth of Economy and Digital Economy in Indonesia
from 2011-2017
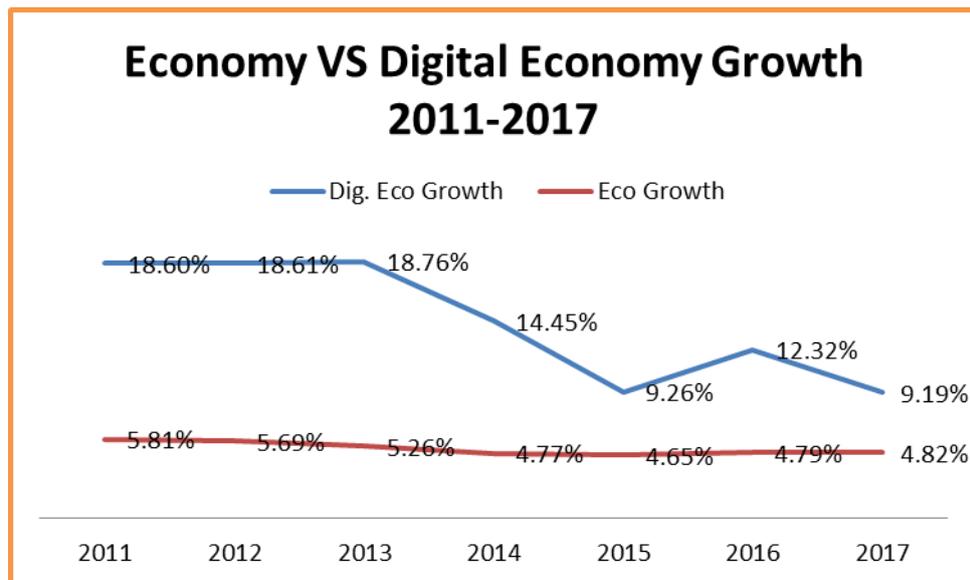
From the graph (3.1), we can see that every year, the growth of digital economy variables in Indonesia always moves more than 2 times faster than Indonesia's own economic growth which only moves in the range of 4-5%. This shows that sectors under the digital economy are always growing rapidly and have the potential to become a reliable sector in driving the economy.

The drastic decline in the growth rate in 2015 reached 9.26%, where in the previous year the growth rate of digital economy was 14.45%, which could be an indication that there was an inappropriate policy for the year. This can be caused by the lack of success of the anticipation carried out by the government in promoting the progress of sectors under the digital economy. Whereas, Airlangga Hartanto, Indonesia's Minister of Industry said that The Ministry of Industry itself continues to

encourage the growth of new industrial entrepreneurs in welcoming the opportunities of the digital economy era. This is one of the implementation of Making Indonesia 4.0 road map, both through the development of Small and Medium Industries (SME) and encouraging the growth of skilled Human Resources (HR). He continued that digital economic era provides unlimited opportunities for entrepreneurs. If based on experience in the era of the third industrial revolution, those who become entrepreneurs are only those who are already 39 years and above. But with the digital economy, those who become an entrepreneur, can be even younger about 20 years. At the end, he stressed that the big aspirations of digital economy development and industrial revolution 4.0 were for Indonesia's economic growth. It is projected, in 2030, Indonesia will become the top 10 country with the strongest economy in the world. [19]

With the existence of the measurement of digital economy as write in this paper, the government is expected to be more successful in reading the direction of economic movements, more specifically for digital economy. In addition, with clear measurements, it is hoped that the Indonesian government can realize the huge potential of the digital economy itself. The policies that can be carried out by the government in maximizing this potential are as follows :

- Strengthening investment in information and communication technology as a media as well as a bridge for every economic activity and trade
- Support entrepreneurship and innovation in research and development in every economic activity, as well as technology development to integrate these activities, for example: marketing, customer service, and environmental and health protection.

- Support e-commerce based companies both in terms of electronic transaction documentation, as well as electronic payment, and online payment.
- Developing digital openness, among others by opening the widest possible access for individuals who want to use digital economy to increase productivity and competitiveness.

III. Conclusion

Alternative measurements of digital economy in Indonesia in this study were carried out by accumulating the total nominal non-cash transactions for a certain period. This is done based on macroeconomic theory regarding the money supply and utilizing the availability of existing data.

The purpose of this alternative measurement is as a reference for the government in facing a new economic era dominated by a digital economy. The unavailability of data can be an obstacle to decision making and policy formulation carried out by the government, therefore the used of digital currencies to measure digital economy's contribution towards national economy as write in this paper are expected to be used as an another data source for products official statistics.

Given the importance of digital economy for the sustainability of the Indonesian economy in the future, BPS Statistics Indonesia is expected to seriously consider this matter. Because as stated, the development of digital economy can have a great impact on other sectors, especially the industrial sector in relation to the development of small and medium enterprises (SME) so that the broader impact of this, is the achievement of SDG's point 8 and 9 goals, which is inclusive and sustainable economy growth and achievements in the fields of Innovation, Industry and Infrastructure.

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