# How The Effect of Investment Policy at Information and Communication Technology for Digital Economy Implementation toward Macroeconomic Indicators and Sectoral Performance, in Indonesia?

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**Abstract:** The purpose of this study is to analyze the effect of investment policy of Information and Communication Technology (ICT) on digital economy toward macroeconomic indicators and sectoral performance, during the period of 2014-2017, in Indonesia. The data used in this study is secondary database from Input Output (I-O) table and SNSE from Statistical Central Bureau and also from Information and Communication Technology Ministry. Aanalytical method used is a Computable General Equilibrium/CGE model. In this study, the relation between the availability of ICT infrastructure and macro and micro economic has been demonstrated in the simulation.

The results of the simulation consist of macro economics indicators: (i) Trade-GDP Balance Ratio, Real GDP, Import-Export, Nominal Wages, Real Wages, Household Consumption, Inflation; (ii) Sectoral Performance: Amount of Output/Production, Employment, Community Consumption, Output and Output prices, Export and Import. Arranged based on optimum Pareto from aggregate performance of 27 affected sectors, both in terms of Productivity in producing output (GDP, Trade Balance, Income, Indirect Taxes) and in the Employment.

The results of the analysis show that the impact of public policy in investment in the ICT sector, as has a positive impact on all macroeconomic indicators and sectoral performance. For this reason, the recommendation related to public policy is that the government needs to encourage the issuance of a legal standing; both at the central and regional and sectoral levels, which can oversee public policies in each sector in the development and utilization of ICT. This study has been proved that the role of ICT on the national economy is increasingly needed as a sustainable driver of national and sectoral economy.

Based on the results of the analysis of the economic aspects above, it is necessary to implement the appropriate public policy transformation strategy. In addition, it needs to be accompanied by public policies to increase investment in the ICT sector in order to achieve digital inclusion in all other regions and industrial sectors. Iimplications of public policy that are needed are: creating a positive effect from the development of ICT on other industrial sectors and the need for synchronization between institutions (sectors) and the central and regional levels, in an effort to optimize the role of the ICT sector which contributes to macroeconomic indicators and sectoral performance.

In addition to the strategy needed to transform in all aspects of the economy, it is also necessary to harmonize public policies at the central and regional levels. Public policy that encompasses the driving factor of the digital economy. As a system, public policy needs to be evaluated, harmonized, synergies both horizontally (between government agencies and sectors) and vertically (central and regional levels), as well as between different hierarchical sectors. Public policy has a role to achieve justice for all elements of society of economic actors.

**Keywords**: public policy; productivity; ICT; digital economy; macroeconomics, sectoral performance.

## Introduction

Today, digital technology has turned the global economy towards a digital economy. All dimensions of digital technology have been penetrate and influencing all setors of industrial activity in the global economy and the growth of Information and Communication Technology (ICT) as the trigger. The development of ICT encourages the creative industry sector massively and gives birth to the concept of digital economy. This condition can be seen from the development of the history of the world economy, where the history of the world economy has gone through 4 (four) era's in human life, namely: the era of agricultural society, the era of machinery after the industrial revolution, the era of multinational corporations (globalization) and currently entering the digital economy era (innovation and creativity aged)

Facing problems in the digital economy era, transformation of all the variables that influence them is needed. Changes in the current economic model even reach radical levels as disruptive technology or disruptive innovation (Assink, 2006). The digital economy will be able to provide benefits for improving macroeconomic indicator and sectoral performance, if the application uses the right strategy. The rapid development of the digital economy includes various activities: in communication, collaboration, cooperation between countries, companies or individuals, and can benefit all parties (see Knickrehm et.al in Accenture, 2016). This digital economy potential data are urgently needed to develop the right strategy, to develop and strengthen the digital economy sector in Indonesia. It is necessary to formulate government policies that are closely related to all industrial sectors towards the digital industry in the present and future (industry 4.0). To encouragee and facilitate the innovative and creative digital economy platforms in creating sharing economy, labor, technology, regulation and inclusiveness of economic actors at all levels and sectors of the national economy, is a must.

Furthermore, to be able to follow the rhythm of economic models in the digital economy era, Tapscott (1996) had identified 12 important characteristics, as follows: (i) Knowledge; (ii) Digitization: conversion of products and services to digital; (iii) Virtualization: transformation of physical forms into virtual; (iv) Molecularization: the conversion of mass media to molecular / digital media: (v) Internetworking: economic networks with interconnection and the reach of broad economic entities; (vi) Disintermediation: the elimination of producer and consumer intermediaries; (vii) Convergence: convergence of computing, communication, and content; (viii) Innovation: business innovation; (ix) Prosumption: blurring the gap between producers and consumers; (x) Immediacy: real-time economy at high speed: (xi) globalization: unlimited knowledge; and (xii) Discordance: the emergence of very large contradictions.

In this digital economy era, national economic growth in the future is closely related to the ability of the state and society to use ICT. The use of ICT (as mention above) in the development of the digital economy has touched almost all industrial sectors; all levels ranging from micro-scale businesses to large businesses. Productivity has increased along with the use of ICT as a tool for production, economic and business transactions and collaborations, including in sectors: on line transportation, Financial Technology (Fintech), e-commerce and so on. These services grew as a result of increasing accessibility of ICTs and their utilization of innovations sectorally. Digitizing the industrial sector makes it more effective and efficient, encouraging sectoral productivity growth.

The transformation process is carried out in stages, the results are reflected in the achievement of the output produced. One of the drivers of the digital economy, in the form of infrastructure and infrastructure, still needs to be improved. This is because: (i) ICT infrastructure development is carried out in a sectoral, unbalance deployment; (ii) ICT Infostructure has not been utilized properly, among others: data center, big data, population data, potential resource data, customer data, insurance data and so on; (iii) Stimulation is needed to the ICT industry, in the form of incentives, or policies that are in accordance with needs; (iv) Lack of coordination between the central and local governments, so the results in several regions are different; and (v) Lack of right of way provisions in the regions, a policy to facilitate the construction of infrastructure in public utilities, such as cable ducts, towers, cable installations in buildings and public facilities, poles and so on. Hence, the purpose of this study is to analyze the impact of public policy on the digital economy on macroeconomic indicators and sectoral performance, which is driven by factors in increasing investment in the ICT sector.

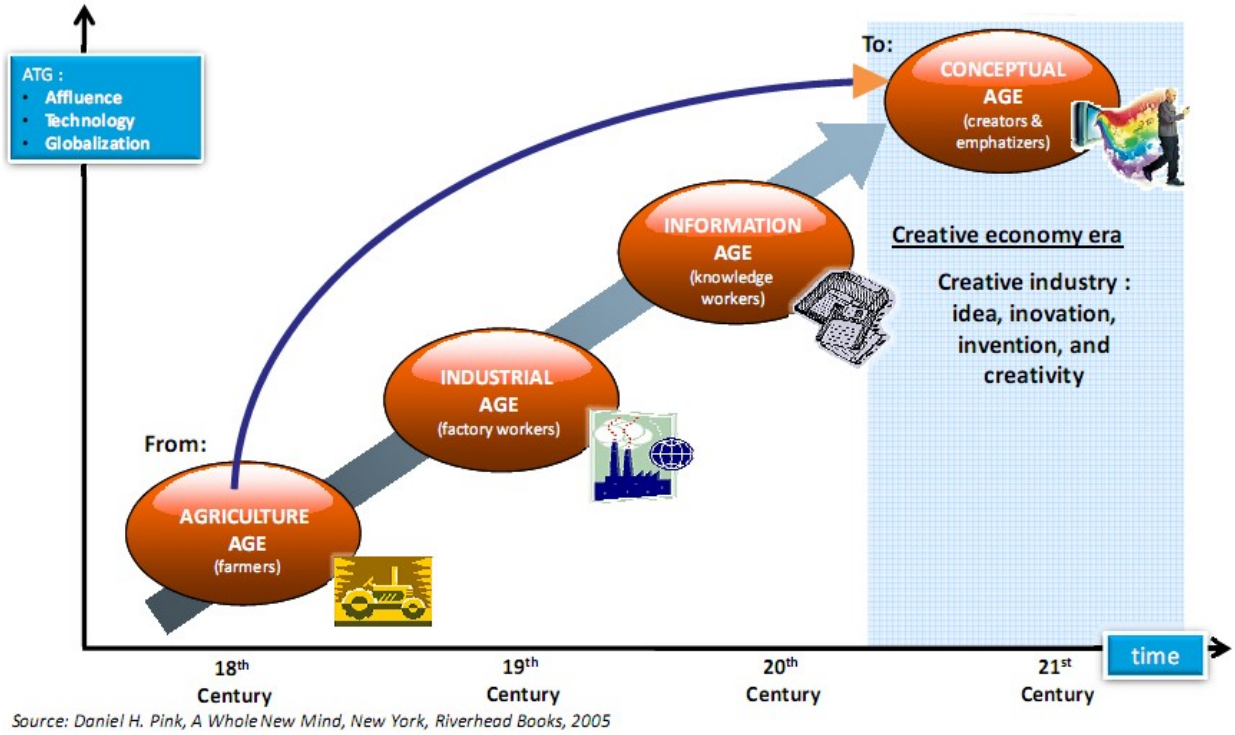
### Theoretical Background

Information and Communication Technology (ICT) can be interpreted as a large umbrella terminology that includes all technical equipment in process and deliver every informations. The word of technology itself comes from the Greek that is "technologia", or "techne" which means "expertise" and also "logia" means "knowledge". In a narrow sense, technology can be interpreted as referring to objects that are used for the convenience of human activities, such as machinery, tools, hardware, and so on (World Bank, 2012).

Mean while Hartman (2000) defines a digital economy as a virtual media of business that is run by business people, values are created and exchanged, transactions occur, and relationships between several parties by using the

internet as media ". Whereas the version definition of the Encarta Dictionary is "Business on the internet: the marketplace that exists on the internet. The definition is more focused on transactions and markets that occur in the world of the Internet. From this opinion it can be concluded that the definition of a digital economy is an activity or economic activity that focuses more on digital facilities and has an impact on the economy and is expected to increase profits for those who do it. The results of the study, ITIF Fetsch (2016), Digital Economy are measured by several indicators grouped into five components: knowledge-based work, globalization, economic dynamism, transformation into digital economy, and technological innovation. Overall the development of economic theory according to its development can be seen in Figure 1 below.

Figure 1. Economic Theory Development




Source: Modified from Schwab (2015) and Pink (2005).

The digital economy phenomenon above, ICT is very influential on other industrial sectors, referred to as disruptive effects, also towards sectors: finance, trade, transportation, media, health, education, defensece and security, agriculture, fisheries, exploration of natural resources and so on.

However, to achieve these conditions, public policy support is needed to increase investment in infrastructure development, especially ICT infrastructure and infostructure. In the ICT sector, the term digital inclusion is a way to give everyone the right to have the right and ability to gain access to ICT services (internet). The next stage can get the benefits of ICT access that it uses, both socially and economically, in the book of Bunga Rampai MASTEL (2017). The realization of digital inclusion is needed to integrate the region and the industrial sector in an integrated manner.

**Research Methodology**

The main data used to answer the various objectives of this study is the Input Output (I-O) table and the Social Accounting Matrix (SAM) table. These data can be used to view and analyze backward and forward linkages and the multiplier effect on the ICT sector by using and constructing the Computable General Equilibrium database. The Input Output (I-O) table used is the I-O Table in 2010 and the SAM table in 2008, which was published by the Central Bureau of Statistics (BPS) in 2015. The 2010 I-O table needs to be updated to the 2015 I-O table. This uupdating is intended so that the model can accommodate various changes the Indonesian economy that takes place dynamically. Furthermore, a mapping between sectors is carried out in the two main data sources.

Other supporting data are Gross Domestic Product (GDP), Investment in the ICT Sector and Manufacturing, Capital Stock, Labor, Wage Rates, Levels of Research and Development Spending, and Developments in World Commodity Prices. The data is collected in the form of time series according to the period needed and obtained from: (i) publication of the Statistics Agency (BPS); (ii) Ministry of Communication and Information; (iii) Ministry of Commerce; (iv) Ministry of Industry; (v) Central Bank such as Indonesian Economic and Financial Statistics; (vi) Investment Coordinating Board (BKPM); and (vii) Other related institutions. These data are used, for example to calculate share to see the relationship between the Indonesian economy between sectors and regions or other countries. These data will also be used to obtain the magnitude of the shock (historical simulation, decomposition and public policy) in conducting policy simulations.

According to Oktaviani (2011), to construct the database and the model this paper need an elasticity coefficient and several other parameters. These quantities are estimated from the time series data or calculated in a model such as the share of input between domestic used by various industries. If there is a problem with limited data in time, the value of elasticity and parameters will be taken from the results of previous studies by using the econometric method with the latest data; both in the case of Indonesia and other countries that have sector / industry characteristics and macroeconomic diversity that are close to the conditions Indonesian economy.

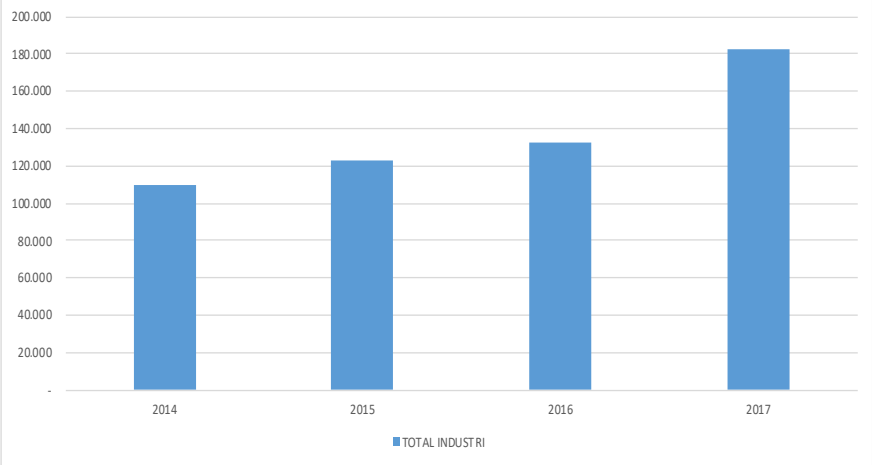
**Analysis Results**

This research analyzes a number of alternatives to test the drivers of digital economy, towards indicators of national economy and sectoral performance. Public policies those have been issued in order to increase investment in the provision of ICT infrastructure and infostructure (digital inclusion). At present the provision of infrastructure and ICT infrastructure, still not evenly distributed (digital divide). Overlaps infrastructure development only in lucrative locations but ignores remote and un-lucrative areas. The government's duty is to achieve digital inclusion through public policies that encourage the participation of the ICT industry sector. The purpose of digital inclusion is to provide an opportunity for everyone to have the right and ability to get internet access, MASTEL (2017). Public policies related to investment in ICT, up to 2017, include: (i). Investments that underlie national policies, Law No. 25 of 2007 concerning Investment, as a basis for investment in Indonesia; (ii). Universal Service Obligation ICT (USO ICT), Regulation of the Minister of Communication and Information Technology number 17 of 2016 concerning Implementation Guidelines for Tariffs on Non-Tax State Revenues; (iii). Modern Licensing obligations for ICT Operators, or modern licenses, are one of the mandates stipulated in Telecommunications Law No. 36/1999. In this modern license it usually contains the obligation to deploy network infrastructure, including holding commercial services to develop disadvantaged areas; (iv). Opportunities in digital business ventures, through Government Regulation Number 82 of 2012, concerning the Implementation of Electronic Transactions and Systems; (v). List of Negative Investment List (DNI) to the ICT industry, through Presidential Regulation Number 39 of 2014 concerning list of limitation of investment business sectors. (DNI 2014); and (vi). Determination of ICT as a National Strategic Project (NSP), through Presidential Regulation No. 58 of 2017, concerning the Acceleration of the Implementation of National Strategic Projects.

The simulations carried out in the analysis in this chapter, by giving a shock to the increase of ICT investment in all related sectors, averaged 25.88%. The figure is taken based on real data on the growth of the value of ICT investments during the period 2014-2017. In total, the average growth of ICT investments in Indonesia in the 2014-2017 period is equal to an average of 25.88%. Then from the increase in investment, it will be analyzed how much it will have an impact on the national economy. The aggregate investment growth results are shown in Figure 2. bellow.

Then the simulation results were carried out simulation tests of the magnitude of the impact of increasing investment growth. The simulation output above examines the impact on: (i). Macroeconomic indicators: Trade-GDP balance ratio, real GDP, Import-Export, Nominal wages, Real wages, Household consumption, Inflation; and (ii). Sectoral performance: Amount of output / production, Absorption of labor, Community consumption, Output and output prices, Export and import. Arranged based on optimum pareto from aggregate performance of 27 affected sectors, both in terms of productivity in producing output (GDP, trade balance, income, indirect taxes and so on) and in the absorption of the workforce.

Figure 2. Increased ICT Investment for the Period of 2014-2017
Source: Various sources according to information




Source: Data processed

**Macroeconomics Impact**

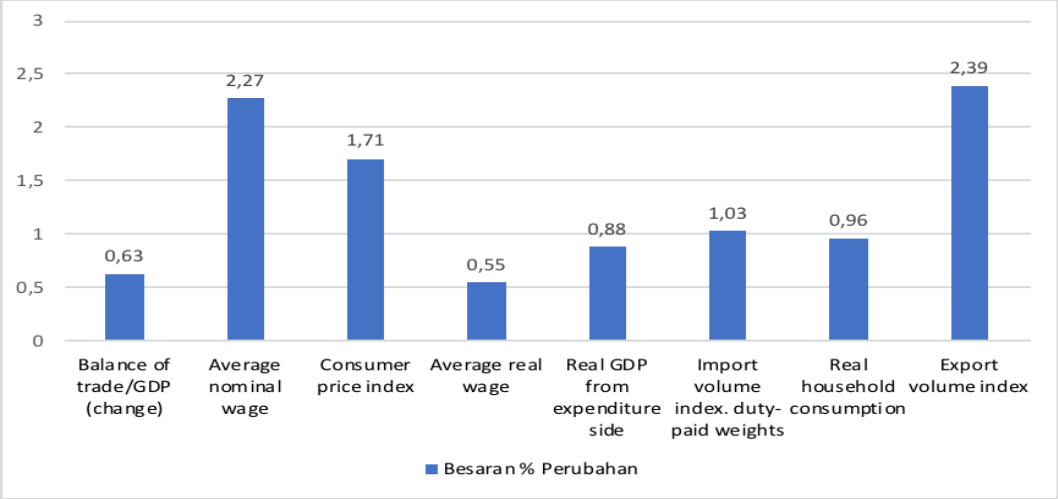
Table 1. The Impact of Increased Investment in ICT on Macroeconomic Indicators

| Description | The amount of changes (%) |
|---|---|
| *Balance of trade/GDP (change)* | 0.63 |
| *Average nominal wage* | 2.27 |
| *Consumer price index* | 1.71 |
| *Average real wage* | 0.55 |
| *Real GDP from expenditure side* | 0.88 |
| *Import volume index, duty-paid weights* | 1.03 |
| *Real household consumption* | 0.96 |
| *Export volume index* | 2.39 |

Source: 2018 CGE-ICT data processing results.

In that Table 1, in general, with increasing investment in the ICT sector it will have a positive impact on national macroeconomic indicators. This can be seen from the increase in economic growth (increase in real GDP) by 0.88%. Increased GDP (economic growth) caused by increasing GDP forming components from the expenditure side such as increased investment driven from the ICT sector increased 25.88%.Increased household consumption by 0.96% and increased exports by 2.39%. The increase in GDP is also driven by increasing in terms of income. This can be seen from the increase in nominal income of society in aggregate by 2.27% and followed by an increase in people's real income of 0.55%. Comparison diagram in figure 3. bellow.

**Figure 3. Impact diagram of investment in ICT for macroeconomic indicators (results of 2018 CGE-ICT data processing)**




Source: Data processed

The simulation results show an increase in investment in ICT, has a positive impact on several macroeconomic variables, but an increase in the variable price price index (inflation rate) is caused by an increase in real consumption of households.

**Sectoral Impact**

The impact of changes in the ICT sector investment variables on sectoral performance can be observed from changes in 6 microeconomic variables such as: employment, community consumption, sectoral output and prices as well as exports and imports. In the CGE model, these 6 variables are related to one another when moving from the initial balance position to the new equilibrium position. Increasing the rate of economic growth at the macroeconomic level as explained earlier is the result of the changes that occur at the sectoral economic level. At the sectoral level, output growth and output prices vary greatly between sectors, as well as growth in employment, public consumption, exports and imports.

**The Impact to Employment Sector**

An analysis of the impact of increasing ICT investment on sectoral performance will begin by looking at the impact on changes in employment in all sectors. In the Table 2, it can be seen that with the simulation of an increase in investment of 25.88% there will be a change in employment in all sectors, both workers classification: low skilled and high educated workers (high skilled). Positive impact on high skills in almost all sectors. The highest increase for high skilled in the sector: government services (10.59%), textile, leather and footwear (3.10%), food, beverage and tobacco industries (2.84%) and financial services (2.77 %). The negative impact for low skills, a decline in the sector: ICT (-1.57%), trade (-1.37%), chemical and rubber industry (-2.30%), construction sector (-16.03%), forestry (-7.70%) and several other manufacturing industries with varying ranges.

Increased investment in the ICT sector, has an impact on employment in all sectors, both low-skilled and high-skilled workers, with varying percentages in each sector. In general, the workforce that has a positive impact is the high skilled workforce. From the simulation results, it can be seen that there is an increase in employment in almost all sectors for the high skilled group. The highest increase for high skilled labor occurred in the government service sector (10.59%), textile, leather and footwear (3.10%), food, beverage and tobacco industries (2.84%) and financial services (2.77%). While on the other hand, the absorption of labor for low-skilled groups in general has decreased. For example for the ICT sector (-1.57%), trade (-1.37%), chemical and rubber industries (-2.30%), construction sector (-16.03%), forestry (-7.70%) and several other manufacturing industries with varying ranges.

Table2. below illustrates the impact of increasing ICT investment, which will reduce the absorption of low skilled labor in almost all sectors except the ICT sector. However, the need for high-skilled labor has increased across sectors except the sectors: forestry, wood industry, printing paper industry, non-metal quarrying industry, metal industry and construction.

**Table 2. Impact of Investment Enhancement in ICT on Employment (2018 CGE-ICT data processing results)**

| Sector | Employment | |
|---|---|---|
| | Low Skilled Worker | High Skilled Worker |
| Agriculture | -0,92 | 2.48 |
| Ranch | -0.96 | 2.45 |
| Forestry | -7.70 | -4.30 |
| Fishery | -0.92 | 2.48 |
| Mining | -2.24 | 1.17 |
| Food and Tobacco Industry | -0.57 | 2.84 |
| Textile Industry for Textile and Leather Products | -0.31 | 3.10 |
| Wood industry | -9.71 | -6.30 |
| Paper and Printing Industry | -3.74 | -0.33 |
| Petroleum Refining Industry | -2.42 | 0.99 |
| Chemical and Rubber Industry | -2.30 | 1.11 |
| Manufacture of Non-Metallic Galleries | -9.33 | -5.93 |
| Metal industry | -6.74 | -3.33 |
| Industrial Computers, Electronics and communication devices | -3.13 | 0.27 |
| Electric Machinery Industry | -2.00 | 1.40 |
| Motorized Vehicle Industry | -1.47 | 1.94 |
| Other Industries | -0.08 | 3.33 |
| Gas Electricity and Clean Water | -1.50 | 1.90 |
| Construction | -16.03 | -12.63 |
| Trading | -1.37 | 2.03 |
| Transport Services | -1.25 | 2.15 |
| Hotels, Restaurants and Accommodation | -1.12 | 2.28 |
| ICT | -1.57 | 1.84 |
| Financial Services | -0.63 | 2.77 |
| Real estate | -1.57 | 1.84 |
| Government Services | 7.18 | 10.59 |
| Other Services | -1.16 | 2.25 |

Source: Data processed

The analysis continued by looking at the impact of increasing ICT investment on changes in community consumption in each household group. Changes in consumption that occur at the sectoral level and household groups are the resultant of changes at the macro level. This is reflected in the aggregate increase in national household consumption which increased by 0.96%.

**The Impact to Various Labor Groups Sector**

Table 3, shows the impact of increasing investment in the ICT sector on the consumption demand of people in various groups. In the Table 3, can be seen that the increase in ICT investment can increase public consumption in various household groups. In general, the largest increase occurred in urban households, both urban 1, urban 2 and

urban 3. In sectoral terms, the largest increase in consumption, among others: wood industry and wood products, metal industry, paper industry and printing goods, electric machinery industry and transportation services.

**Table 3. Impact Chart of Investment Increased in ICT on Community Consumption Levels in Various Labor Groups (2018 CGE-ICT data processing results)**

| Sector | *RURAL* | | | | | *URBAN* | | |
|---|---|---|---|---|---|---|---|---|
| | *1* | *2* | *3* | *4* | *5* | *1* | *2* | *3* |
| Agriculture | 0.02 | 1.14 | 1.52 | 0.52 | 1.28 | 3.30 | 1.45 | 2.93 |
| Ranch | 0.25 | 1.20 | 1.59 | 0.74 | 1.23 | 2.97 | 1.58 | 2.55 |
| Forestry | 2.92 | 4.25 | 5.55 | 6.54 | 4.96 | 5.26 | 5.48 | 7.10 |
| Fishery | -0.26 | 0.25 | 0.31 | -0.58 | 0.13 | 1.50 | 0.31 | 1.27 |
| Mining | 1.35 | 2.08 | 2.63 | 2.70 | 4.14 | 5.52 | 4.40 | 6.71 |
| Food and Tobacco Industry | -0.06 | 0.88 | 1.18 | 0.16 | 0.80 | 2.65 | 1.04 | 2.15 |
| Textile Industry for Textile and Leather Products | 0.32 | 1.24 | 1.75 | 1.35 | 1.54 | 3.03 | 1.76 | 3.28 |
| Wood industry | 5.65 | 8.42 | 11.19 | 13.21 | 9.36 | 9.38 | 10.88 | 18.54 |
| Paper and Printing Industry | 1.99 | 3.78 | 5.11 | 5.00 | 4.05 | 5.47 | 4.96 | 9.35 |
| Petroleum Refining Industry | -0.48 | -0.17 | 0.04 | -0.05 | -0.14 | 0.17 | 0.01 | 0.76 |
| Chemical and Rubber Industry | 0.38 | 1.51 | 2.09 | 1.99 | 2.03 | 3.43 | 2.37 | 4.20 |
| Manufacture of Non-Metallic Galleries | 1.52 | 2.72 | 3.70 | 3.86 | 2.88 | 3.47 | 3.55 | 6.92 |
| Metal industry | 2.83 | 5.24 | 7.06 | 6.93 | 5.42 | 7.00 | 3.84 | 7.50 |
| Industrial Computers, Electronics and communication devices | -0.52 | -0.20 | 0.03 | -0.01 | -0.19 | 0.05 | -0.01 | 0.89 |
| Electric Machinery Industry | 1.48 | 4.11 | 5.97 | 5.32 | 4.15 | 6.28 | 5.65 | 13.08 |
| Motorized Vehicle Industry | 0.51 | 1.81 | 2.57 | 1.68 | 1.71 | 3.28 | 2.43 | 6.00 |
| Other Industries | 0.95 | 2.93 | 4.25 | 3.41 | 2.81 | 4.59 | 3.98 | 9.87 |
| Gas Electricity and Clean Water | 0.13 | 0.89 | 1.34 | 0.74 | 0.80 | 1.74 | 1.24 | 3.51 |
| Construction | 0.89 | 2.12 | 3.04 | 2.88 | 2.05 | 2.69 | 2.83 | 6.83 |
| Trading | -0.17 | 0.21 | 0.29 | -0.58 | 0.09 | 1.12 | 0.27 | 1.28 |
| Transport Services | 0.26 | 1.57 | 2.38 | 1.46 | 1.36 | 2.73 | 2.18 | 6.46 |
| Hotels, Restaurants and Accommodation | -0.39 | -0.18 | -0.09 | -0.46 | -0.23 | 0.20 | -0.11 | 0.58 |
| ICT | -0.18 | 0.41 | 0.74 | 0.15 | 0.29 | 1.05 | 0.66 | 2.65 |
| Financial Services | -0.57 | -0.66 | -0.95 | -1.98 | -0.74 | 0.25 | -0.87 | -1.33 |

| Sector | *RURAL* | | | | | *URBAN* | | |
|---|---|---|---|---|---|---|---|---|
| | *1* | *2* | *3* | *4* | *5* | *1* | *2* | *3* |
| Real estate | 0.03 | 0.18 | 0.28 | 0.14 | 0.15 | 0.31 | 0.25 | 0.81 |
| Government Services | -1.58 | -2.26 | -3.14 | -4.90 | -2.28 | -0.73 | -2.88 | -5.51 |
| Other Services | -0.20 | 0.20 | 0.36 | -0.46 | 0.06 | 0.89 | 0.31 | 1.84 |

Source: Data processed

Increased consumption in urban household groups 1-3 are less consistently followed by households in rural groups. In some sectors, rural household consumption is a slight decline, as in the sectors: food, beverage and tobacco industry (rural 1), petroleum refining industry (rural 1, 4 and 5), electronics, communication and equipment industries and the service sector finance.

This is an increase in household consumption that is relatively greater in the urban group than in the rural group, indicating that there is an increase in investment in urbanization equal to high skilled labor. In contrast to houses in rural groups, more identical to low-skilled workers, they don't feel the impact of an increase in investment in the ICT sector, as seen from the relatively lower consumption. The increase in consumption is certainly influenced by changes in income and employment opportunities. From the above diagram, it can be seen that there is an increase in investment in the sector that has increased in almost all sectors, except the government services and financial services sector which have declined.

The provision of ICT infrastructure and infotructure is not yet available even (digital divide) between urban communities and rural communities, so that economic growth has not been evenly distributed across nation. In addition, it also needs the level, quality of education, expertise and the amount according to the needs in the region.

**The Impact to Output and Output Prices Sector**

Furthermore, the analysis continues by looking at the impact of increasing investment in the ICT sector on the outputs and output prices of each sector. It can be seen that increasing investment in the ICT sector can provide changes to output and sectoral output prices with varying magnitudes. In general, some sectors have increased output and output prices. At the macro level, this is reflected in the increase in national output (economic growth) and the Consumer Price Index (Inflation) which increased by 0.88% and 1.71% respectively (Table 4 below).

**Table 4. Impact Investment Diagram on Output and Output Prices (Results of 2018 CGE-ICT data processing)**

| Sector | *Output* (%) | Prices (%) |
|---|---|---|
| Agriculture | 0.79 | 1.86 |
| Ranch | 0.98 | 1.63 |
| Forestry | -3.56 | -2.46 |
| Fishery | 0.56 | 2.35 |
| Mining | -0.05 | 1.05 |
| Food and Tobacco Industry | 1.12 | 1.91 |
| Textile Industry for Textile and Leather Products | 1.65 | 1.29 |
| Wood industry | -2.61 | -4.17 |
| Paper and Printing Industry | -0.66 | 0.07 |
| Petroleum Refining Industry | -0.19 | 0.95 |
| Chemical and Rubber Industry | 0.10 | 0.95 |
| Manufacture of Non-Metallic Galleries | -4.83 | -0.73 |
| Metal industry | -2.69 | -0.28 |
| Industrial Computers, Electronics and | -0.46 | 0.59 |

| Sector | *Output* (%) | Prices (%) |
|---|---|---|
| communication devices | | |
| Electric Machinery Industry | 0.35 | 0.76 |
| Motorized Vehicle Industry | 0.67 | 1.29 |
| Other Industries | 1.67 | 0.93 |
| Gas Electricity and Clean Water | 0.30 | 1.44 |
| Construction | -7.01 | -4.13 |
| Trading | -0.18 | 2.37 |
| Transport Services | 0.56 | 1.37 |
| Hotels, Restaurants and Accommodation | 0.27 | 2.27 |
| ICT | 0.20 | 1.76 |
| Financial Services | 0.05 | 3.52 |
| Real estate | 0.15 | 1.45 |
| Government Services | 6.42 | 4.70 |
| Other Services | 0,12 | 2,26 |

Source: Data processed

Sectorally, the largest increase in output occurred in the government services sector (6.42%), food, beverage and tobacco industries (1.12%), textile, leather and footwear (1.65%) and other manufacturing industries ( 1.67%). Meanwhile, the highest increase in output prices occurred in the government services sector (4.70%), financial services (3.52%), trade (2.37%), fisheries and hotels and restaurants (2.27%). Even though there is an increase in prices, this can be compensated by increasing sectoral output, which means that it occurs increase in the nominal and real income of the community, Table 4 above.

**The Impact to Exports and Imports Sector**

Increased investment in the ICT sector has also proven to be able to boost export performance. In aggregate, the increase in exports that occurred was the resultant impact of increased exports in various sectors as can be seen in bellow Table 5. On the other hand it appears that imports are more controlled.

Exports increased in all sectors, especially in the manufacturing sector, such as the wood and wood products industry, which increased 5.08%, the forestry sector increased 4.23%, the metal industry and the non-metallic minerals industry. Meanwhile, on the other hand, there was a decline in imports in several sectors such as the forestry sector (-7.32%), the wood industry and wood products (-11.40%), the metal industry (-5.25%), the mineral goods industry non-metals (-5.84%) and the electronics, communication and equipment industries (-0.1%). Diagram in Table 5 below.

**Table 5. Impact Chart of Investment Enhancement in ICT on Exports and Imports (2018 CGE-ICT data processing results)**

| Sector | Export | Import |
|---|---|---|
| Agriculture | 2.07 | 4.03 |
| Ranch | 2.18 | 4.57 |
| Forestry | 4.23 | -7.32 |
| Fishery | 1.83 | 5.12 |
| Mining | 2.47 | 1.24 |
| Food and Tobacco Industry | 2.04 | 4.64 |
| Textile Industry for Textile and Leather Products | 2.35 | 3.59 |
| Wood industry | 5.08 | -11.40 |

| Sector | Export | Import |
|---|---|---|
| Paper and Printing Industry | 2.97 | -0.58 |
| Petroleum Refining Industry | 2.53 | 0.56 |
| Chemical and Rubber Industry | 2.53 | 1.02 |
| Manufacture of Non-Metallic Galleries | 3.37 | -5.84 |
| Metal industry | 3.14 | -5.25 |
| Industrial Computers. Electronics and communication devices | 2.70 | -0.10 |
| Electric Machinery Industry | 2.62 | 0.69 |
| Motorized Vehicle Industry | 2.35 | 1.36 |
| Other Industries | 2.54 | 3.29 |
| Gas Electricity and Clean Water | 2.28 | 3.77 |
| Construction | 5.07 | -7.97 |
| Trading | 1.82 | 0 |
| Transport Services | 2.32 | 4.43 |
| Hotels. Restaurants and Accommodation | 1.87 | 4.47 |
| ICT | 2.12 | 3.34 |
| Financial Services | 1.24 | 7.81 |
| Real estate | 2.27 | 2.56 |
| Government Services | 0.65 | 5.64 |
| Other Services | 1.87 | 4.58 |

Source: Data processed

ICT investment increases the accessibility of ICT services and achieves digital inclusion evenly, reaching various sectors of community life. In commerce industry, ICT has a big impact, where a business transaction is recorded on-line, will be processed and at almost the same time (real-time) the results of processing or information can be seen, without being limited to space and time. Through ICT services, national products and services can be introduced and offered globally, easily and effectively.

But on the other hand, the development of ICT makes it easy to carry out goods purchase transactions online from abroad, through: electronic goods trading (e-commerce) at the level of business entities and consumers across countries. Coupled with the regionalization of free trade, such as: NAFTA, MEA and so on, causing increased trade volume in several industrial sectors. Therefore, the government should protect domestic product. However, policy stimulants to improve the capabilities of domestic industries in the national mainstay sector.

The diagram above shows that an increase in investment in ICT, contributes to the improvement of export and import performance. The decline in imports occurred in the sectors: forestry, wood industry, paper and printing industry, non-metal excavation, metal and construction industries. But there is still an increase in imports higher than exports in several sectors, the highest in the financial sector and government services.

**Conclusion and Suggestion**

This study aims to examine the impact of using a strategy for implementing it. The simulation of the ICT development is generally the result of the digital transformation process. The driving forces of the digital economy by increasing investment in ICT. Analysis of the simulation results, some conclusions can be drawn in accordance with the formulation of the problem. The positive impact of digital economy driving factors, in accordance with the test results, increasing investment in ICT, for macroeconomic indicators and sectoral performance. It can be concluded that an economic actor is needed to increase investment in providing ICT infrastructure and infostructure across sectors and nation even based on macroeconomic indicators and sectoral performance.

Based on the results of the analysis of the economic aspects above, it is necessary to implement the appropriate public policy transformation strategy. In addition, it needs to be accompanied by public policies to increase investment in the ICT sector in order to achieve digital inclusion in all other regions and industrial sectors.

The implications of public policy that are needed are: creating a positive effect from the development of ICT on other industrial sectors and the need for synchronization between institutions (sectors) and the central and regional levels, in an effort to optimize the role of the ICT sector which contributes to macroeconomic indicators and sectoral performance.

In addition to the strategy needed to transform in all aspects of the economy, it is also necessary to harmonize public policies at the central and regional levels. Public policy that encompasses the driving factorof the digital economy. As a system, public policy needs to be evaluated, harmonized, synergized both horizontally (between government agencies and sectors) and vertically (central and regional levels), as well as between different hierarchical sectors. Public policy has a role to achieve justice for all elements of society of economic actors.

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