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ICT SECTOR ECONOMIC INDICATORS USING IO TABLE ANALYSIS DURING BIG DATA ERA

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ABSTRACT

The Purpose of this research is to analyze the impact of Investment toward economic indicator components of particular sector,to show how strategic BPS IO Table part of structured Big Data. ICT Service Sector was selected as one of the most impacted sector by massive data growth during Big Data era using economic indicatorssuch as Import; Indirect Tax; Labor Absorption.
The Model proposed by this research was based on IO Table Matrix using Leontief Ground theory;
The Methodology of this research was by constructing propositions from Leontief Inverse formula.
This research data used secondary IO Table Matrix 36x36 from BPS (Indonesian Central Statistic Board) IO Table 175x175 (2008) updated. In addition, by performing Forward and Backward linkage analysis.
This research was limited to ICT Service Sector (31) of IO Table 36 x 36 matrixes for period of 2009-2013, updated from BPS IO Table (2008).
Nowadays, Practical and Managerial implication shows that Industry Stakeholders in ICT Sector can have sovereignty and independent economic indicators obtained such as Import; Indirect Tax; and Labor Absorption made available from local BPS IO Table.

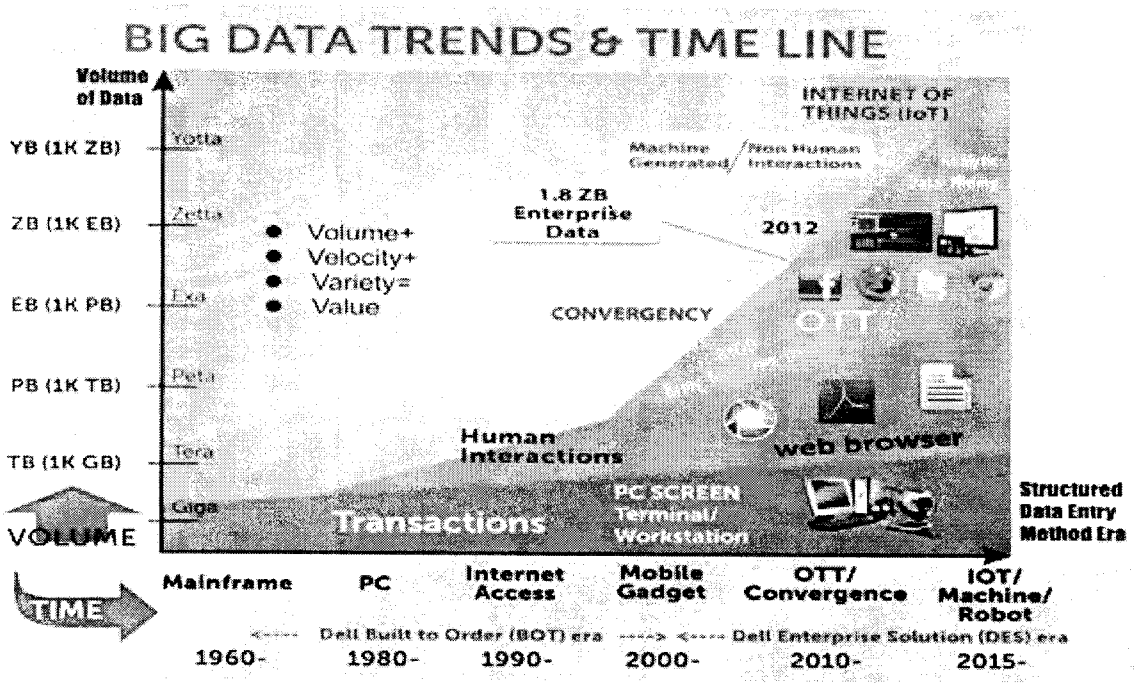
Keywords: *big data, gross value added, ICT investment, ICT service sector, input output table, leontief theory.*

INTRODUCTION

The World undergoes Mega-Trends: Big Data, Cloud Computing, Gadget and Multimedia Convergence (OTT) and IOT, part of the IT Revolution era (Rusdiah, 2014). Starting with PC era, as PC became ubiquitous since 1980, and Internet grew globally since 1990, leaving Mainframe/ Mini-Computer reside in the back-office, causing global urban society with their PC became more connected, removing barrier of time, space and national borders. Bill Gate's keynote address theme "Information at your finger tip" during Comdex Fall November 12,1990, the author happened to be present there (Gilder, 2002), follows by "Information is Power" mentioned during WSIS+10 in Paris (Unesco, 2014).

More series of Data Growth Explosion triggered data volume massive growth by 600% during 2010 to 2015 (IDC:2013), that reached 1.8 Zeta Bytes by 2017 due to OTT traffic globally. The Internet address grew from 3 Billions (2014), to 15 Billions devices connected in 2015 with the advent of IOT (Internet of Things), which more than double the total human population in the world (GfK, 2014). These are the phenomena and indicator of the massive growth and trends of Big Data accumulated by Cloud, Convergence, OTT and IOT that will come and studied in this Dissertation Research. Indonesian PC Population 30 Millions (12.5%), Mobile Phone 290 Millions (116%) and Internet User was 107 Millions (43%) in 2014 (Rusdiah, 2015).

Figure 1: IT Era, Data Growth and Explosions Trend



Source: From Dell Enterprise Forum (2013) Kuala Lumpur updated by this Research

Big Data growth had progress seamlessly (silently) since the advent of PC (1980s) as Data Entry ubiquitously at home, office, schools etc. surpassed previous Mainframes and Minicomputers in

digitizing previous analog archieve data stored on paper (hardcopy), mostly in the form of Structured and Quantitative Data as in Figure 1. Including the Secondary BPS IO Table used by this research is part of Economic Empirical Structured of Big Data surveyed nationally every 5 years in Indonesia. Example of proposed Big Data Analytics (BIDA) is, the prediction and planning of El Nino in 2015 that might be more severe that the devastating ElNino in 1997 that caused draught; water and food crisis, forest fire.Although in the last two years, the tremendous growth of Big Data with the advent of Internet, Multimedia (text, image, voice or triple play) and Social Media or OTT (Over The Top), such as Facebook, You-tube, Twitter, Yahoo has surpassed the accumulation of Structured data, to be the majority Non-Structured and Qualitative type of Data, part of Big Data, which are more massive than ever. Moreover, the journey of Big Data growth continued exponentially, entering the next wave of IoT technology in 2015, see Figure 1 (Rusdiah, 2014).

Unfortunately, many of these OTT Global players are footloose industries and free riders, while contributes very huge traffics, but invest very little in developing domestic internet broadband infrastructure, leaving the investment burden only to domestic telecommunication and ISP, which could create awful bottleneck and Internet traffic jam in the future. Analystconfirmed Indonesian OTT users has reach Global top ranking, 4th for Facebook, 3rd Twitter country etc, hence thegrowth of Global ICT Sector and Internet traffic will be massive.

Then, it is a question whether the domestic ICT Industry could sustain the Big Data and the third Information Revolution and Data Traffic Explosions or not? Are we ready? Can Indonesia and emerging economies able to predict independently, plan, sustained and harness this potential massive data explosion and Big Data revolution, according to Cyber Readiness Index1.0 (Hathaway, 2013)?

Investment is strategic prime mover of National Development. Recent Development problems aroused in selecting which sectors to invest that can produced higher Gross Value Added (GVA) such as Enterprise Profit, Tax and other components, due to scarce domestic investment fund and limited economic resources, such as high skill labor.

This research will socialize and complement the use and application of Secondary Traditional Structured of Big Data collected by BPS every 10 years since 1971, known as Indonesian IO Table on ICT Services Sector for anticipating and planning for this phenomenon trend of Big Data. Statistic Data has important role in Indonesian Economic Development" (Kompas, 23 September 2014).

On the following chapters, this study will constructs several new Propositions from the basic Leontif IO Theory and BPS IO Table (2009-2013) to produce new National Economic Indicators for planning and develop the National industry and trade, to be sustainable in the future, focusing on the ICT Service sector (31) to anticipate the Big Data phenomena (Noor Juliansyah, 2011:65).

The ICT industry sectors are many, ubiquitous, converging (dynamic) and diffused to many other Sectors, but unfortunately the Secondary IO Table data from BPS is limited, exclusive conservative, time-lagging (Wan Xing, 2011).

ICT sectors are diffused and ubiquitous, hence the ICT sectors in 66x66 IO Table (BPS, 2005) matrix were diffused in many other Sub sectors (KBLI Code) ubiquitously as follows:

1. IO Code 48: ICT H/W (Gadget) in "Manufacture Machine, Electrical Machine & Apparatus";

2. IO Code 53: "Trade";
3. IO Code 60: "Communication" of 66x66 Matrix;
4. IO Code 62: "Real Estate & Business Services". This will relate to ICT Services (31) in Matrix 36x36 focus of this dissertation using BPS Published Data Statistics of 2008 (BPS:2000; 2005).

From the above diffusion example, this dissertation's Data Analysis will focus on ICT Service Sector (31) of BPS IO Table 36x36 (BPS:2008) as Secondary Data, which are diffused into Six ICT Services Activities such as: (1) Computer Programming; (2) Computer Consultant and Management Computer Facility (Data Center); (3) Information Technology and Other Computer Services; (4) Data Processing (includes Big Data analytics); (5) Data Storage in Server (Hosting); (6) Portal Web which includes OTT and Clouds; (BPS, 2005).

This Research is limited to the role of Investment in ICT Service Sector (31) consist of Software Programming; Internet Applications (OTT) and Data Center facilities from year (2009-2013).

THEORETICAL FRAMEWORK AND CONCEPT

Keynesian Aggregate Demand Theory, Fiscal Policy and Investment

Based on Keynes supply and demand aggregates analysis, when the total economy output (GDP by Expenditure Approached) is equal to AD, Y= Yd, then the economy reach equilibrium (Yilin Jeffrey Forest, 2014), or in economic macro:

$$Y = C + I + G + (X - M) \text{ (Wan Usman, 2004:23-25)} \quad (2.1)$$

Y (Economic Output) = Yd (National Aggregate Demand (AD));
I = Corporate Investment; G = Government Spending (/Investment)
X = Export; M = Import; C = Household Consumption/ Expenditure

In IO TABLE Matrix, Total Aggregate Demand is found in Quadrant II is called "Final-Demand" (Sector 3090) or demandby all actors such as household, private sectors, government. (Wan Usman, 2004:44-49). This Sector 3090, "Final Demand" is also known as "Gross-Domestic-Product-Consumed" according to Jensen in "The Leontief Open Production Model or IO Analyst" (Jensen, 2001:5).This displays columns of spending by households, governments, changes in industry stocks, and industries on investment and net exports.

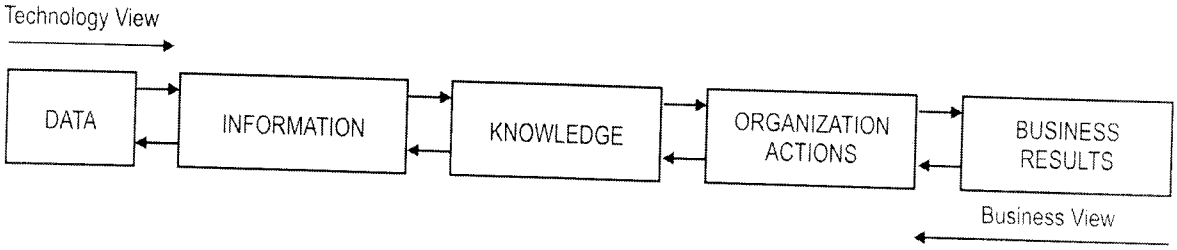
DIKAR–Data Transformation Theory, Big Data and Economic Value

Figure 2.1 is known as Venkatraman's DIKAR Theory shows transformation of Big-Data into Information, then into Knowledge, Action and into Economic Results or Benefit. ICT can transform Data or Information Asset of an Enterprise or Nation into economic benefit and sustain goal (Nafziger

Wayne:1997). This will lead to "Information is Power" which followed the path of DIKAR from Data to Action (UNESCO, 2014).

First sample of Big Data Analytics (BIDA) is that it is ridiculous, that during harvest period there is shortage of rice and Kompas headline last week said that the power was in the big traders. This is an example of assymetrix information, where the traders had the power of information and stock of rice, while Government (Bulog) and farmers did not have information and power to distribute rice to the market (Kompas, 2015 May 4). Another example of assymetrix information or power, when Freeport McMoran, US based company had all detail online Information (including satelit image) about Gold, Copper and other precious metal Deposit in Grassberg and Tembaga Pura, Papua This lead to the exploitation and huge investment of PT Freeport Indonesia in Papua, while our Government don't dare to exploit it for national development due to lack of data. Other example of BIDA is the predictions and planning of El Nino described in the Introduction section. Only BIDA can provide the fast analysis and comprehensive answers of this disaster and crisis. This Assymetrix Information is also happening in other commodities and mining, ie: Oil, Gas, Coal, Palm Oil and Fisheryetc. During Big Data era, Power belong to, who has the Strategic Information and Data, which is the new Commodity of the Future.

Figure 2: Information in Context (Verikartaman, 1986)



In the era Big-Data, Explosion of data volume due to Internet Cloud and Convergence of Computing and Mobile Technology, Data Analytic by Business Intelligence became strategic to excel in competition.

Four Characteristics of Big Data denoted as four "V": (1) Volume is big and enormous contain Terabytes of data scattered in many data source, media, institutions and locations with the decrease in Data Storage cost and storage technology; (2) Variety: Many form of data, structured (text document in PC, database) or unstructured (voice, video, photos or multimedia) scattered in OTT applications in Internet or related Government institutions etc. Massive growth of Unstructured-Data are exponential due to Convergence, Social Media and Multimedia (Data, Voice and Video) in the last 2 years has surpassed the steadily growth of Structured-Data since the PC Revolution. Presiden Jokowi reshuffled several Coordination Minister, such as Minister of Polhukam, Economics and Maritime due to lack of coordinations to face the 2015 economic rupiah crisis, in this case aggregating island of data for BIDA. This dissertation show that IO Table is one of many economic indicator structured data provided by BPS that may be used in BIDA; (3) Velocity of Analytic process is crucial since the data available is huge but the timing is tight and information lifecycle is very short, before the data

become obsolete. Example is how NSA (National Security Agency) in US used BIDA to engage in assymetrix proxy war against terrorism; (4) Value of data gathered and analyzed should be strategic conformed with the notion "Information is power", when BIDA produce Insight (Knowledge) and ForeSight for Planning and Actions.

This dissertation finding also declared that IO Table collected by BPS thru National Survey every five years is important Structured Data part of Big Data, that leads to Strategic and Powerful National Economic Indicators analyzed by this Dissertation. This Big Data growth phenomena can be predicted using IT Services Sector (31)'s Economic Indicators as Knowledge Output of this dissertation, deducted using BPS Secondary Structured Data (36 sector IO Table Matrix (2008 base year) with Leontief Model as ground theory of this dissertation. Due to the limitation on data availability based is on Base Year 2008 and Published Year 2010, therefore the prediction might only show the tip of Big Data era.

Gross Value Added (GVA) And Micro Economy Production Theory

GDP by Production approached by OECD definition: "An Aggregates measure of production equal to the sum of Gross Value Added or GVA plus Taxes minus Subsidies = GDP (Productions) (ONS (2014).

Output Value derived from the cost of production consist of Direct-Cost or Variable-Cost (ie: Raw-Material) or can be output of other industry sectors as input, also known as Intermediate-Input in Quadrant I of IO-Table), and various resources related proportionally to the output quantity produced, which is explained using Micro Economic Theory of Productions, Cost and Short Run Cost (Awh Robert 1976:151-157; 213-215).

Fixed-Cost or Overhead in the period of productions such as Salary, Depreciation, Indirect-Tax, Import and Operational or Entrepreneur-Surplus, categorized as Primary Input or GVA (Gross Value Added) in Quadrant III of IO Table Model Sector 209, based on Leontief IO Model.

Gross Value Added (GVA – Sector 209) or Primary-Input is the difference between Total-Intermediate-Input (sector 190) and Total-Input (sector 210) in Table IO, while Intermediate Input (or Cost) in IO Table is the transition goods and services used as input in productions activity. GVA can be found along the column of Row 209 in Quadrant III of IO Table – Primary Input); BPS 1991:8-9). Other IO research, analysis of fishery Sector in Java (Dault Adhyaksa, 2009).

This version of GDP by Production Approach, when summed this is called "Gross Product Originating" or "Gross Domestic Product by Industry" or output base according to Leontief Open Production Model presentation (Jensen Iris:2001, December 15). This dissertation used BPS Data: Producer Price for 36x36 sectors.

PT Sucofindo, contracted by Ministry of Industry (MoI) used TKDN (Local Content/Value) Certification to measured value added as prerequisite participating in Government procurement or tender (Kaukab Muhammad, 2010).

From this understanding, GVA is the variable for some development planning analysis tools, according to Development Planning Instrument for Analyzing Inter Sectoral (BPS 1991:4). GVA is an important component to understand how strong an investment in affecting component of productions

cost and the productivity of the investment. GVA in Quadrant III is also called "Primary Input", which is the input from Import; Wages & Salary; Operational Surplus; Indirect Tax; Depreciation.

From Theories of Classic, Endogenous Economic Growth to Convergence and Dependency

Herewith is the General Development theory from Neo Classic theory, Endogenous Economic Growth to Dependency Theory. In Neo-Classic Theory where X = F (Capital, Labor) has only two independent variable, while Leontief Theory based on X = (A-I)-1 Final-Demand, has more independent variables by constructing many more new proposition.

The New Growth or Endogenous Growth theory by Paul Romer (1986) (Romer M Paul 1990:271) and Robert Lucas (1988), concluded that Economic or Output growth, is a consequence of the rate of increase in Labor-Input; Capital-input; and Technical progress; and accumulation of productions accompanied by Technical Change account for the Economy Long Term Growth (Gilpin Robert 2001:108-110). Thus X = F (Capital, Labor, Technology).Over the long term, economic growth is dependent upon extra new Technological Progress variable, which raises Labor productivity due to efficiency of input used. The basic paradigm of WSIS and MDG believed that Information Technology (IT), the tool of this dissertation focus, is the new advances of 21st century that could reduce poverty and foster economic development faster in LDC (Least Developing Countries).

Unfortunately, with Internet economy foreign OTT players became free-rider in LDC economy piggy back on domestic Telecom company and Freeport, US investment in Grassberg, Papua due to Assymetrix Information, which suit more the dependency and NEG theory below.

A new development theory of the International Political Economy (IPE) is New-Economic-Geography (NEG) theory, which questioned why do economic activities, especially high-tech industries tends to be heavily concentrated in Developed Countries (DC) ? This persistence of regional concentration of economic activities in the Dependency Core/Periphery model of capitalist imperialism and exploitation should be ended. Indonesia should developed its local domestic IT industries to be more competitive and slowly become independent avoiding becoming the dependent peripheral economy (Gilpin Robert, 2001:120-121). As Krugman demonstrated in his Geography and Trade, the core/periphery structure is explained by the interplay of economic forces and historical development (Krugman Paul, 1994:184-185). Foreign big OTT players provides different kind of dependency model that developed and depends on local LDC Internet and Telecom players infrastructure as free-rider, without contributing to LDC economy development via tax, domestic investment and local value added, furthermore can't be sustained.

Input-Output (I-O) Concept of Leontief Theory

From I-O Model can be derived how much the inter sectors flow of goods and linkages in an economy (Wan Usman, 2004). This IO Table inter linkage and dependency refer to the following concept and assumptions: Product of one sector is always consumed in other sector.

In preparation of Impact Analysis, the main tools used in this dissertation is the multiplier factor (I-A)-1 of Leontief theory in the model: X = (I-A)-1 (F-M), which will link Independent Variable ie: Investment of a sector to its many Dependent or Output Variable. For the purpose of

projection, then Final Demand (F) is assumed as exogeneous variable or instrument which need to be determined first outside the I-O Model (Wan Usman, 2004).

GVA or Primary Input can be the GDP (P) by Productions or output, while Final Demand or Primary Output can be the GDP by Expenditure or GDP Consumed, synthesis with Keynes Aggregate Demand theory. Thus there are many measurements of GDPs with different methods and each produce different value and assumption. It is common for Statistic Office (ie: BPS) to balance (and harmonized) these different GDP value by different methods every year(Mahajan Sanjiv, 2007).

Total WorkForce Labor absorbed as the impact of Final Demand component can be deducted via Labor Coefficient (Wan Usman, 2004).

Countries survey the required data nationally or regionally based on a set of standards for the data's collection by United Nations called System of National Accounts. Ie: 1993 SNA standard. The data collection and preparation process for the I-O Table is intensive and are often published typically 5-7 years after (or Lag). This research is based on BPS 2005, (2008 published/updated) data and are adjusted to provide 2009-2013 I-O Table data (Jensen Iris; 2001; BPS, 2005).

Input along the Row of IO Table show the allocation of output produced by one sector to fullfill the needs of Intermediate Demand (Good for Productions) and Final Demand (Goods for Final Usage). The Output shows the composition of a sector creating value added and provide output to all Sectors along the row. While input along Column show the structure input that are used in each sector in the supply chain of productions named Intermediate Input and Primary Input. (Meirnyk, William H, 1965).

In an IO Table all sectors are viewed as Producers and Consumers as in Tableau Economique proposed much earlier by Quesnay, then the systems is known as Closed IO Table model, while Leontief's IO Model is an Open Static Table, because it includes all the Final Demand components such as HouseHold Consumption, Government Consumption, Formation of Capital (Investment) and Net Export as Sectors. (O' Connor, E.W Henry, 1975).

Although I-O Model provides comprehensive economic data, but it must be understood that I-O Model Analysis has also major weakness, which is the Coefficient Matrix (Matrix A) is assumed constant (in static stage)for a certain period (Wan Usman, 2004). Meanwhile that this Coefficient Matrix static method for limited certain period (5 year) observation might also be outdated. To overcome this static weakness, some economy statistical expert has developed Dynamic Model I-O, by making Coefficient Matrix [A] dynamic, which is complex. The method is by frequent update of I-O Matrix A with R.A.S method (RAS modified A(t)=R.A(0).S) developed by Richard Stone (BPS, 2005; Agawal Vicky Bhilai, 2009; Rizal, Rina Octavia, 2014). Where element matrix A is the Technology Coefficient, R is the technology substitution element of change in Output, and S is the change in input.

Figure 3: Quadrant Model of I/O Matrix (Arif Sarino, 2010) updated by author

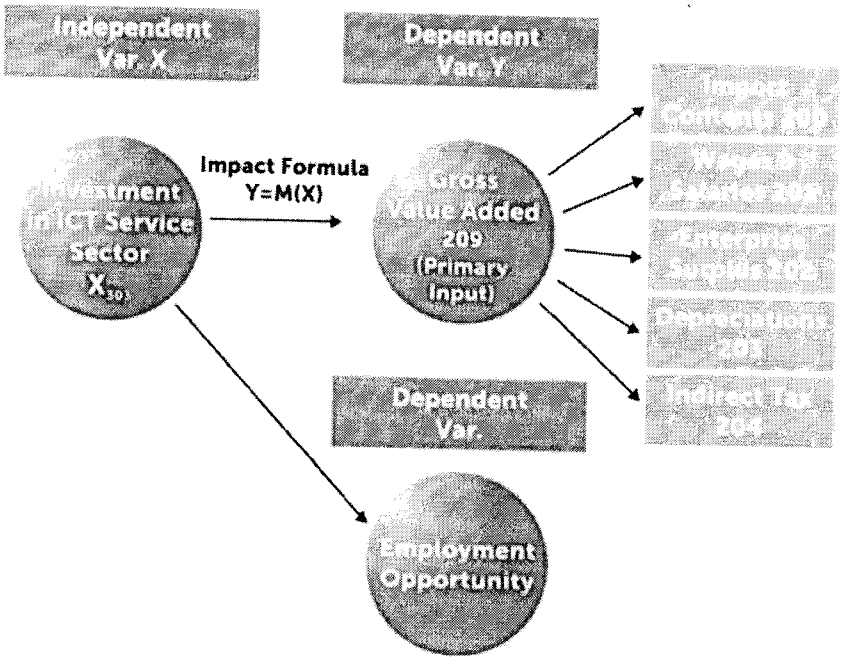
List Intput \ Output Alocation		DEMAND: Intermediate Demand – Productive Sector 1 ··· 172	180	Final Demand 301 ··· 306	Total 309	Total Output 310	STOCK/ INVENTORY 509	600	Grand Total Output 700
Input Antara/ Intermediate Input	1 . . . 172	I Block / Quadrant I		II Block / Quadrant II					
	190								
Impor	200								
Input Primer/ Primary Input	201 . . . 205	III Block / Quadrant III		Block / Quadrant IV					
Total GVA	209	GDP Nas. →							
Grand Total Input	210	National Output →							

Observing inter sector transactions or commodities using specific IO Table Framework by Quadrant, which is modified for this dissertation to provide statistics description in matrix form by quadrant focus classification, that provide information on transactions and its inter sector economic relation by quadrant of a nation in a yearly time frame (Eurostat, 1986).

Research Framework

Based on the Leontief IO Ground Theory synthesis with other theories, some new propositions would be constructed in this Research Dissertation, with the following independent and dependent variable were deducted, which would become the research isntruments using BPS Secondary Data (IO Table 2009-2013) (Noor:2011) (Sarwono J: 2002). Figure4: Impact Analysis: Relations among One Independent Variable (X) To Many Dependent Variables (Ys) in Y = M(X) propositions.

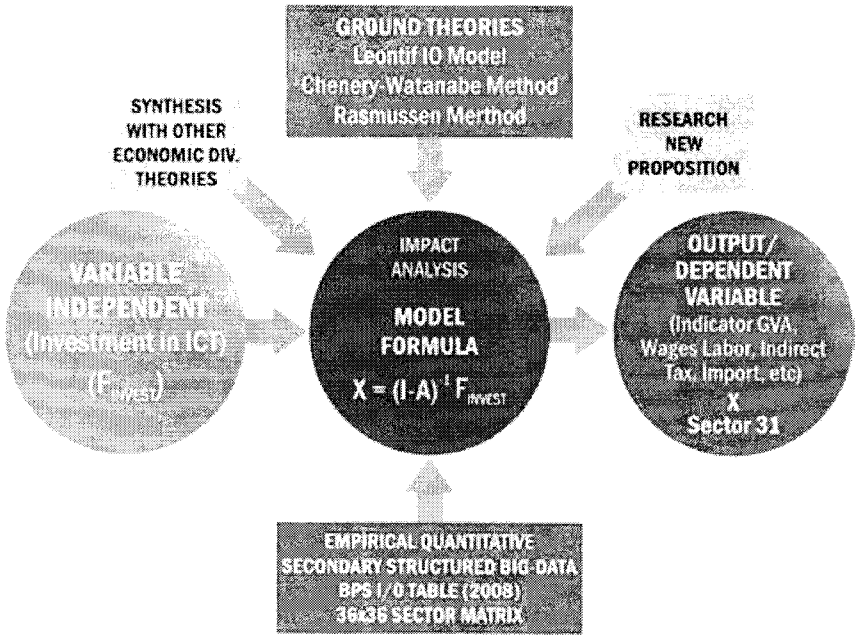
Figure 4: Research Framework & Variables: Impact Analysis



METHODS

This research designed is based on Quantitative methods using Leontief I-O Model/Ground theory, which is deducted on BPS IO Table 2010 Matrix 36x36. ICT Service Sector (31) Investment as Exogenous (instrument) variable will impact several Endogenous (Dependent Variable), such as Gross Value Added (GVA) and others as in Figure 5 (Sugiyono, 2008; Noor Juliansyah, 2011).

Figure 5: Model Variable, Ground Theories & Impact Analysis Instrument



These endogenous and exogenous variables are connected in the above equation, that was deducted from the basic Leontief theory. Endogenous will be the independent variable Xij to give impact to variable Y in equation y = M(X). Variable Y is said to be endogenous (dependent) within the causal model M if its value is determined or influenced by independent variables X (excluding itself) according to Dynamic Econometrics, Oxford University (Hendry, 1995).

This Research Dissertation model is One to Many variable, uses Leontief Model/Based Theory and developing many new Propositions equations deducted on IO Table Matrix obtained from BPS (secondary data) as tools to determine the Impact of sole Endogenous/Independent variable, Investment to produce many several Exogenous dependent variables which are the Economic Indicators as output. These variables will be the instruments connected by new Proposition equations based on Leontief Invers, that will be deducted using BPS IO Table IO Matrix 36x36 as (secondary) data.

Construction of New Propositions To Have More Research Instruments/Variable

Using the Classic Leontief I/O Model/Ground Theory, many new propositions can be constructed using Primary Input Sectors and Final Demand and the Coefficients deducted. These new finding of

propositions can provide many economic indicators and statistics information as output instruments which is impacted by independent variable Investment.

To find more output (dependent) variables below, let examined the relationship between endogenous GVA (or NTB) against component of Final Demand, in this case Investment as Independent exogenous Variable or Instrument in the following Proposition:

$$\mathbf{GVA}_{\mathbf{investment}} = \mathbf{vi\ (I - Ad)\ -1Fd\ 303\ or}_{\mathbf{invest}}\ \mathbf{or}\ \ \mathbf{GVA = n\ [I\text{-}A]\text{-}1}_{\mathbf{Invest}}$$

GVAinvest = GVA Dependent Variable as a result of Investment in ICT/Telematika;
vi = GVA Coefficient, below it is represent by 'n'; (I – Ad) -1 = Leontief Inverse; Fd 303 or invest = or Fd invest = Investment in ICT Service Industry.

So now with the new propositions, there is relationship between GVA with Investment in ICT Services (31) to determine the effect of ICT Investment as instrument in providing value to GVA variable: GVA = ñ [I-A]-1 I

GVA= Gross Value Added ñ= Coefficient of GVA
[I-A]-1 = Leontief Inverse Coefficient Matrix I= Investment in ICT Sectors

To determine how big is the Import Content, a new proposition can be constructed from the result from the independent variable of Investment in ICT Sectors in the following formula:

$$M = \acute{m}\ [I\text{-}A]\text{-}1\ I$$

M= Import Value ḿ= Import Coefficient

To determine how big is the Indirect Tax, a new proposition can be constructed from the result from the independent variable of Investment in ICT Sectors in the following formula:

$$T = \check{T}\ [I\text{-}A]\text{-}1\ I$$

T= Indirect Tax Ť= Coefficient Indirect Tax

To determine how big is the Total Number of Workforce/Employment opportunity, a new proposition can be constructed from the result from the independent variable of Investment in ICT Sectors in the following formula:

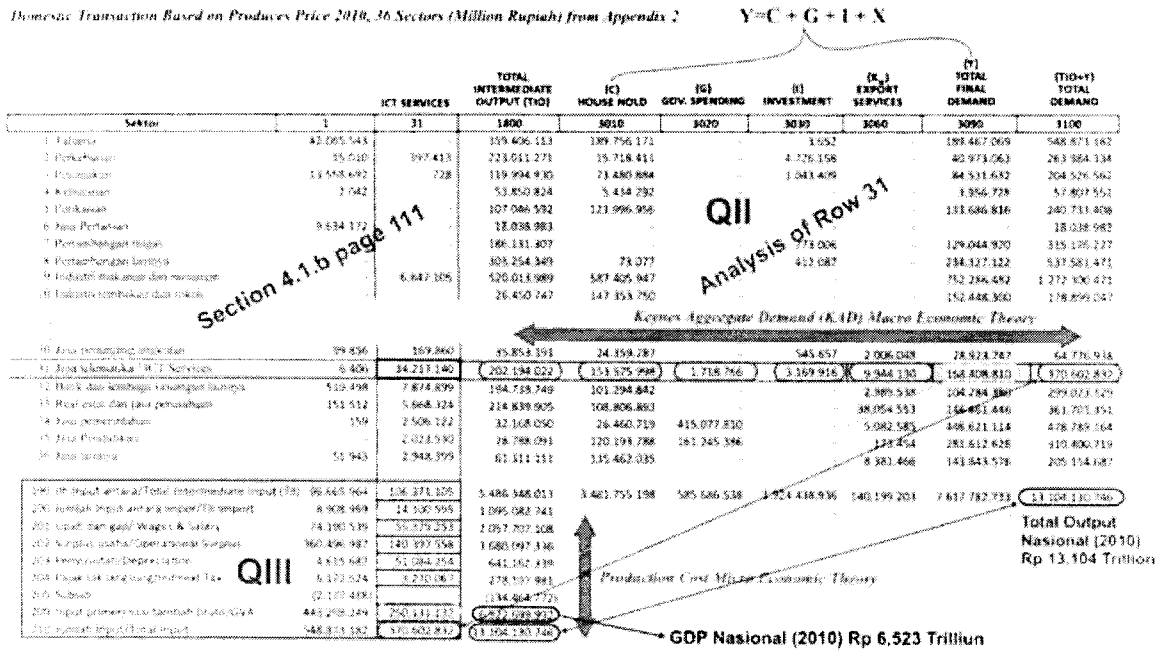
$$L = \check{\imath}\ [I\text{-}A]\text{-}1\ I$$

L= Number of Employment Opportunityĭ= Employment Opportunity Coefficient.

RESULTS AND DISCUSSION

1. Research Result (Finding): Sector Economic Indicators of ICT Services (BPS:2010)

Table 1: Final Demand Section of IO Table (Quadrant II dan Quadrant III)



Source: BPS (2010) adjusted/enhanced for this research

GDP (E) or GDP Sector by Expenditure is called GDP Consumed Rp 168 T(2010) Section 2.2.2 p. 27

GDP Sector 31 by Production Rp 250 T (Section 2.4 p.39) or GDP by Industry.

GDP National Rp 5.523 T (2010) intersection (1800) & 209

Total Grand Input = Total Grand Output Sector 31 Rp 370.6 T (2010)

1.a Synthesis of Keynes Aggregate Demand & Leontief Ground Theory

The Final Demand part of IO Table on row 31 (ICT Services Sector) is analyzed first using Macro-Economic of Keynes Aggregate Demand (KAD) Theory, where Y = C + G + I + X and Table 1 (Wan Usman, 2004).

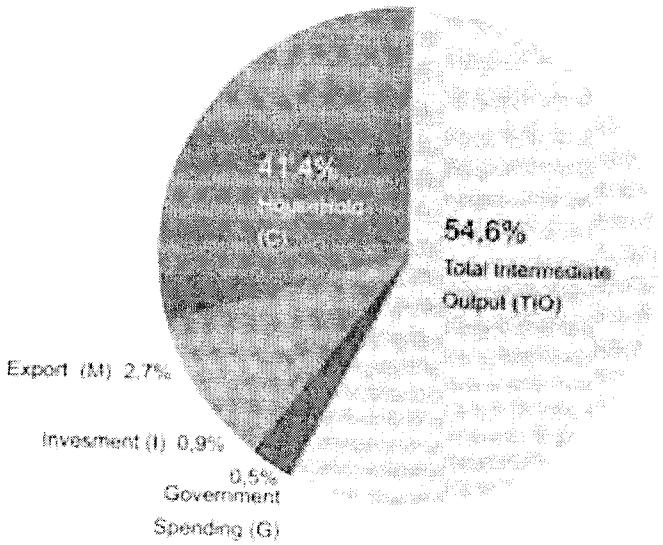
In IO Table: Y = Total Final Demand (Sector 3090); C = Household Consumption(Sector 3010); G = Gov. Spending (Sector 3020); I = Investment (Sector 3030); X = Export Services. In IO Table, such as the following:

Figure 6: Quadran II : Final Demand Analysis

Primary Output Component of Table I/O (Quadrant II)

SECTOR	DESCRIPTIONS	TOTAL	% of 311	% of Y'
1800	Total Intermediate Output (TIO)	202,194.022	54.6	120
3010	House Hold (C)	153,575.998	41.4	91
3020	Government Spending (G)	1,718.766	0.5	1
3030	Invesment (I)	3,169.916	0.9	1.8
3040	Stock Change (S)	-	-	-
3060	Export (M)	9,944.130	2.7	5.4
3090	Total Final Demand (Y)-GVA	168,408.810	45.4	100
311	Total Demand (TIO + Y)	370,602.832	100	220

Note: 3090 - Y'- GDP (Expenditure) Sector 31



Source: Designed for this Disesertation from BPS (2010)

The Pie Diagram show distribution of ICT Services according to component of KAD, such as House Hold 41.4% at Rp.153,576 Trillion (2010) which was High and Significant, used mostly by young generation accessing Internet (Rusdiah, 2003); Allocation for Investment in Sector 31 was 0.9% (2010) while Government spending in Sector 31 was only 0.5%) which was still small.

Intersection of Total Intermediate Output (TIO) Sector 1800 and Row 31 (ICT Services Sector) shows the value was Rp.202 Trillion (54.6%) which was total output distribute to all 36 Sectors). Since the percentage of TIO is 54.6%, which was bigger than 50%, therefore ICT Services Sector 31 had stronger forward linkage, which becomes an enabling and facilitating National Industry and leading sector.

Export (M) Column 3060 for ICT Service Sectors (31) is 2.7% or Rp 9.944 Trillions (2010) can be Software and Creative industry products such as Internet Applications Developer for Game and Animations content.

Total Final Demand Sector 3090 is Rp.168.4 Trillions (2010), according to Keynes Aggregate Demand, referred as GDP Consumed for ICT Service Sector 31.

1.b Synthesis of Micro Economy Production Cost & Leontief Theory

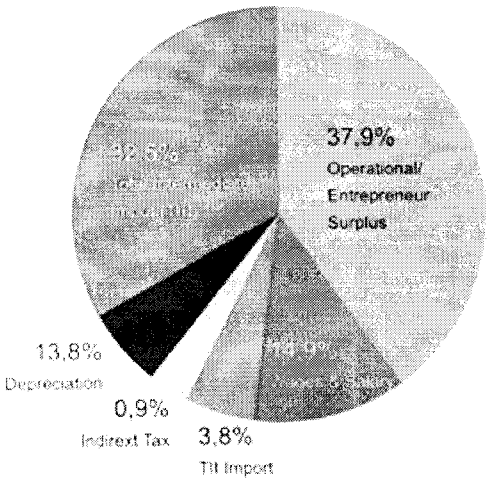
IO Table (IOT) Analysis using synthesized Leontief IO Model (LIOM) and Micro Economy Production Cost Economy Theory with Variable and Fixed Cost (Ahw Robert 1976:213-240) to provide more Economic Indicators or Dependent Variables as shown in the next Pie Chart using BPS IO Table (2010): Quadrant III: GVA Analysis.

Intersection of Column 31 and Row (209) Total Primary Input/GVA is Rp 250 Trillions (2010), which is GDP (P) by Productions or Gross Product Originating for Sector 31. Total Intermediate Input (TII) is only 32.5%, means that contribution of all 36 sectors output to Total Input of ICT Service Sector (31), which is less than 50% or weak backward linkages.

Figure 7: Quadrant III: GVA Analysis (by Productions)

Primary Input Component of Table I/O (Quadrant III)

SECTOR	DESCRIPTIONS	TOTAL (Million Rp)	% of 210	% of GVA
190	Total Intermediate Input (TII)	106,371,105	32,5	42,5
200	TII Import	14 100 595	3,8	5,6
201	Wages & Salary	55,379,253	14,9	22,1
202	Operational Surplus	140,397,558	37,9	56,1
203	Depreciation	51,084,254	13,8	20,4
204	Indirect Tax	3,270,067	0,9	1,3
205	Subsidi	-	-	-
209	Primary Input/GVA	250,131,132	67,5	100
210	Total Input	370,602,832	100	148



Source: Designed for this Dissertation from BPS (2010)

Contribution of Wages/Salary (14.9%) and Operational Surplus (37.9%) of Column 31 (ICT Service Sector) is more significant compared to Indirect Tax (0.9%), which is very small, due to free Internet tax regulation on Ecommerce transactions, still "wild wild west" condition of Cyberspace. Import of ICT Service Sector is also low at Rp.14.1 Trillions (3.8%).

BPS IO Table (36x36) and Pie chart, show that the Total Intermediate Input (TII) Row 190 ofICT Services (31) is Rp.106.37 Trillions (32.5 % of (Grand) Total Input (Row 210) at Rp.371 Trillion. From Section 2.9.20 WalrasGeneral Equilibrium Theory, Total-Grand-Input(Row 210) match Total-Output (Column 3100).

2. Impact of ICT Service Sector Investment as Independent Variable

ICT Service Sector (31) Investment was Rp 3,170 Trillion (2010) intersection Row 31 and Column 3030 (SeeDomestic Transaction Based on Producer Price 2010 36x36 matrix). BPS analyst compiled further investment data for the other 4 years to obtain 5 years (2009-2013). While Government Spending Column (3020), Row (31) for ICT is Rp 1.719 Trillions(2010) or 0.5%, showed that Private Sector Investment (3030) or 0.9% (2010) in accordance with data from Bappenas and BKPM.

From Table IO, the Investment for ICT Services Sector (31) Rp 3.17 Trillion (2010) was consider significant by private sector, although the Investment for Sector (27) Land Transportation Rp 4.7T is bigger and the largest is Investment for Constructions Rp1,767T.

This is also a warning for the ICT regulator (ICT Ministry) to balance the Growth of domestic broadband Infrastructure (Investment) with the growth of Global OTT Traffic and Data as Big Data era will come soon; otherwise this research predict the built up of bottleneck and Internet Traffic Jam in near future. In other words, regulator must force all OTT players to invest also on domestic Telecom Broadband infrastructures in the future and not only depending on domestic infrastructure as Free-Riders. PP No 82 Year 2012 (Government Regulation) by Ministy of ICT on Electronics System and Transaction Operational (Penyelenggaraan Sistem dan Transaksi Elektronik – PP PSTE) is an effective regulation that enforce Global Internet players (OTT) to invest in Indonesian domestic Internet Infrastructure by showing its present and opening its Data-Center in Indonesian territory. While many Global OTT players such as Google, Facebook a bit reluctant to follow PP No 82 Year 2012 and still lobbying the Government via AmCham (American Chamber of Commerce).

2.a. Impact on Import Content

Import Content as impacted by ICT/Telematika Services Sector (31) Investment average is only Rp 138.66 Billion, or 4.2%, which is relatively low compared to the average ICT/Telematika Service Sector Investment of Rp 3.29 Trillion.

Table 2: Import Content (Million Rupiah) as impacted by ICT Service Investment

Year	ICT Service Investment (Million Rp)	Impact on Import (Million Rupiah)	Growth %
2009	2,970,425	125,165.68	6.7
2010	3,169,916	133,571.78	4
2011	3,295,842	138,877.96	4.5
2012	3,442,196	145,944.95	4
2013	3,574,532	150,621.21	-
Average	3,290,582	138,656	-

Sources: Compiled by Researcher

This Sector 31 has very low import content because it is the Services and creative component of ICT, and it is not Hardware component of ICT Sector, that is estimated to have more than 70% import content.

Import Content of Total ICT Product was USD 6,95 Billion or Rp 69.5 Trillion (2010) according to BPS 2011 data (Figure 1.5) while Total Import of ICT Service Sector (31) was only Rp.14.1 Trillion (2010), Intersection with Row 200 (Total Intermediate Input Import), which was smaller and only 20% of Total ICT Product Import.

Indonesia import of smartphone $ 1.97 Billion/53 Million unit (2013) was equivalent to Rp25 Trillion with high import content will create huge deficit in trade balance (Jakarta Post, 2015 April 27), which pushed the Ministry of Trade to impose additional Luxury Tax (PpnBM) 10% on ICT gadget products, especially Smartphone (See Figure 1.5 Section 1.1) using minimum TKDN or local content scheme of below 20% (2015) to 40% (2017).

While Export for ICT Service Sector (31) is Rp 9.94 Trillion (2010), an intersection with Column 3060 (Export Services M). Thus, Research Finding: ICT Service Sector (31) has Deficit of only Rp 4.2 Trillion, smaller compared to deficit of ICT Gadget and Total ICT Sectors.

2. b. ICT Service Investr ent, Gross Value Added (GVA) & GDP

The analysis shows that GVA or Primary InputCoefficient (Row 209) for ICT Services Sector (31) is 0.6749, relatively high.

Using Production method, GVA or Primary Input (Row 209) values Rp 250.131 Trillion (2010) isGDP (P) by Production or Industry Sector (31).

GDP (P) for Sector 31 is is only 3.8% of National GDP Rp 6,522.6 Trillion (2010), an intersection GVA Row (209) and Column TIO (1800) according to Leontief Open Production Model or I-O Analysis (Jensen Iris:2001). This National GDP is 6,522.6 Trillion (2010), which grew to Rp 10,062 Trillion (2014) (Kompas:2015 April 4).

UsingConsumption method, Final Demand (Yd) values Rp 168.4 Trillion, also refer as GDP (C) or GDP by Expenditure for ICT Service (31), is the Total Final Demand or Yd Column (3090) is GDP by Expenditure 2.5% of National GDP. Research Finding: Although in theory GDP (C) = GDP (P), but in practice there are significant different between GDP (P) Rp 250.131 Trillion and GDP (C) Rp 168.4 Trillion for Sector ICT Service (31).

The average ICT/Telematika Services Investment (Sector 31) is Rp 3.29 Trilion, derived from Investment (or Fixed Capital Formation).

Table 3: GVA as impacted by ICT Service Investment

Year	ICT Service Investment (Million Rp)	Impact on GVA (Million Rp)	Economic Output (Million Rp)
2009	2,970,425	2,320,332	3,289,705
2010	3,169,916	2,469,436	3,511,036
2011	3,295,842	2,463,563	3,458,000
2012	3,432,106	2,572,959	3,812,184
2013	3,574,532	2,671,877	3,958,741
Average	3,290.582	2,459.631	3,644.274

Sources: Compiled by Researcher

The Average of Gross Value Added (GVA) impacted by Investment is Rp 2.459 Trillion. GVA is 74% of ICT Service Sector Investment which is very high and lucrative for FDI and Local Investor. Since this is the Service and Software side of ICT industry, it still have high GVA and low import content. The impact of ICT Service Investment on Economic Output is Rp 3,64 Trillion or 110.7%. Research Finding: ICT Service Sector is lucrative sectors for Investors (local and OTT players), these finding shoud be socialized by BKPM and Government. Average Investment Growth (2009-2013) is only 4.8%, very small considering the world is entering the Big Data era.

2.c. Impact of ICT/Telematika Service Investment on Indirect Tax

The analysis from Section 4.1. shows that the Coefficients of Indirect Tax of Sector ICT Services (Column 31)is derived from intersection with Indirect tax (Row 204) is only or 0.88% (2010) or Rp 3.27 Trillion (2010). This percentage is very low because Tax on Internet transactions or eCommerce is still not regulated yet by Trade Ministry Decree under the Trade Law,thus the law enforcement is still in the gray area, although the value of ecommerce transaction is increasingmassively lately. Indirect Tax is similar to Depreciation, is considered smallest for this ICT Service Sector (31), since there is data lag of 6 years, while ecommerce will only seen to take off recently less than 4 years, so it wont show the significant increase in Indirect tax.

According to Indonesian Ecommerce Association, ecommerce in Indonesia was USD 6 Billion (2013) increases 400% to USD 26 Billion (2014) or even USD 50 Billion (Kompas: 2015 March 16).

In 2013, Indonesia had 74 million middle income and will grow to 141 Million (200%) in five years, thus there are plenty of opportunities for Indirect Tax.

Discussion on scope and definition of Indirect tax includes Import/Export Tax (PPN BM), Vat Tax (PPN) and Excise (Cukai).

INTRODUCTION

Pension funds as long-term fund management institutions who received contributions from the Employer and active participants, namely employees or workers, and the placement of investments in instruments that were set to receive revenue so that can meet their obligations to make payments of pension benefits. Pension Fund sought to maximize its revenue, but it also managed investment portfolios for a short-term payment obligations and the preparation for the fulfillment of long-term liabilities. Pension Fund in Indonesia was specifically regulated by Law No. 11 of 1992. Before enactment - Law No. 11 of 1992 the pension program was carried out by the Employer in various forms, among others:

1. The establishment the pension fund foundation and employee benefits of which based on Arbeidersfondsen Ordinance (State Gazette of 1926 No. 377), which was the implementing regulation of Article 1601 the second part of the Civil Code, in which employers or employees collected contributions to the provision of retirement benefits (Wahab, 2005).
2. Involved employees in the insurance program that provided periodic or at once payments when the participant is were entitled to receive pension benefits.
3. The Company internally collected funds to be paid to the employee when the employee concerned entered retirement age with the concept of pay as you go (Wahab, 2005).

Since introduced in 1992 until December 31, 2008 there were 288 Pension Fund consisting of 262 employers' Pension Fund and 26 employer's Pension Fund (Pension Fund Annual Report, 2008). From the standpoint of the financial sector, Pension Fund has a very important role as an institutional investor. Pension Fund collect,ed combined and invested source of funds that allowed participants to earn income on retirement. Payment of dues was usually done during the work period, which ranged between 30-40 years (Opened potential financial resources of Indonesian domestic funds: The Role of Non-Bank Financial Institutions, World Bank 2006). Until December 31, 2008 Pension Fund in Indonesia has managed the assets of Rp 91.2 trillion, which has largely been placed on long-term investments (amounting to 76.8% of total investment assets) (Pension Fund Annual Report 2008). Second, the pension plan was a tool and strategy for the companies to maintain a qualified workforce because pension program was one of the compensation and incentive programs and the third, reducing the social impact for a country because any workers retired have had income in old age without burdening the next generation. Since the enactment of Law on the Pension Funds, the implementation of the pension plan must comply and refer to Law No. 11 of 1992 on the Pension Fund. In accordance with the provisions of Law on Pension Funds, the type of pension fund institution consisted of two, namely: Employer Pension Fund and Financial Institution Pension Fund.

Employer pension funds were pension funds established by persons or entities that hired employees, as the founder, to organize a Defined Benefit Pension Plan or Defined Contribution Pension Plan, for the benefit of part or all of its employees as participants. The purpose for the establishment of the employer pension fund for employers was to provide continuity of income for employees when they retired. Pension Fund was formed by the founder as a whole to finance the pension plan

The impact of investment of ICT Services Sector (31) toward Working Force (2009-2013).

Research Finding: Within five years the Investment on ICT Services Sector could create average 21.637 people. For every Rp 10 Billion of Investment in ICT Service Sector (31) creates 70 job opportunity (2010). Most of the Labor are high skill IT Labor from Vocational school (SMK) in ICT or from ICT Colleges or University and many Certificate Program from ICT Vendors. This research recommends that Regulator should empowered this ICT Service Sector (31) by increasing the capacity of Skill Labour and the productivity of Labour and also give more investment and development of ICT education using Link and Match model between school and industry.

CONCLUSION

The novelty of this dissertation research is the construction of several new Propositions, that produces many new Dependent-Variables using only single Independent-Variable, Investment for ICT Service Sector, constructed from basic traditional Leontief Ground Theory. Research methodology is to link single Independent-Variable ICT Service Investment to many new dependent variable output, such as GVA and Indirect Tax. Including Labour force/opportunity using formula derived from constructed propositions. Furthermore, is the significant usage of classic Leontief ground theory synthesis with micro and macro economy theories resides in Secondary BPS IO Table IO, part of Structured Big Data analytic on Economy to produce many more strategic economic indicators for ICT Service Sector (31) for industry sector planning and development.

Managerial Implication

The DIKAR Model transforms Data into Information, Knowledge and further into Action and Result, which shows that "Information is Power" moreover during Big Data era. Regulator and Policy Maker need industrial supporting data and sector indicators produced by this study to develop policies for making the sector conducive for trade, industries and consumer protection, such as Policy on Local Value Added (TKDN); Policy on reducing trade deficit on Smartphone; Policy on Balancing OTT massive traffic bandwidth increase with local broadband infrastructure etc. Furthermore, FDI investor and Domestic Industrial Players need data for their marketing plan, compliance, strategy and road map.

There will be bigger data, internet user growth and explosion due to IOT (Internet of Thing) or M2M (Machine to Machine) starting 2016, which will increase the Internet population from 3 Billions (2014) to 15 Billions in 2015, therefore the use of data analytic & information as well as ICT Service Sector Industry will significantly accelerated and progress, especially would be detected and tracked by future research in ICT Service Sector (31) starting in 2016.

Unfortunately the 6 years Lag of BPS data used by this research (2009 to 2013), adjusted from BPS 2008 published data, causing this Research Finding only show mild and steady acceleration of data of Investment, GVA, Economic Output and Import indicators of ICT Service Sectors. This is in contrast with the industry forecast of ICT Service Sector big leap forward mentioned in the

research background. Fortunately, BPS will plan to release statistical data update based on 2010 newer published Data end of 2015 (Kompas: 2014 November 28) (Kompas: 2015 May 9). Future research will further use newer update IO Table (or SUT), which could produce better prediction of massive series of data growth during Big Data Era in Indonesia (Kompas: 2014 November 28; 2015 May 9).

Following this Research recommendation, Regulator and Industry stakeholders could better anticipate and plan for these Megatrends that would accelerate ICT Service Sectors (31) business due to the explosion of Global OTT Free-riders and IOT Internet connection. The local Telecom operator and ISP could anticipate this research recommendation to sustain the Internet traffics and data growth from Internet traffic congestions, with infrastructure investment growth in the future. By then, our next generation can ride joyfully through the Big Data Revolution rather than overrun by it.

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