

Input output analysis to determine sustainable development planning in Indonesia

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Abstract: Indonesia is one country in Southeast Asia that shows good economic growth for over a decade after the Asian Monetary Crisis. However, the growth rate start decreased in the last few years and this is known as the impact of the global crisis that occurred in 2008 and until today. The decline in economic growth occurred in 2015 were only 4.7%, compared then growth in 2014, reaching 5.2%. This condition is caused by the weakening of international demand and slowing growth of international investment in Indonesia.

As is known, Indonesia is a large country, rich with the potential of natural resources and human resources. With this condition, the opportunities of substantial of high economic growth will easily reached by Indonesia. However, Indonesia's economy is still highly depending on the global economy. At this time, the conditions of global economy is uncertain, hence it will impact on the economic growth in Indonesia. So need for the Government of Indonesia to create another more potential sector from inside of Indonesia.

Based on the above conditions, this study aims to analyze the potential sectors, where able to trigger economic growth in Indonesia. These sectors will be evaluated from Input-Output tables Indonesia in 2010 that based on Supply and Use Tables (SUT). Input-Output is a matrix that describes the transaction of goods and services between sectors of the economy at any given time. Matrix input-output can explain the interrelationships between economic sectors (Index backward linkage and index forward linkage). A sector which has a high forward linkage, have enough thrust strong compared to other sectors, while sectors that have high backward linkage, indicates that the sector has a high dependence on other sectors. So the Input Output table can be used as a tool for projecting the economy in Indonesia. Input Output Table that compiled by the Indonesia Central Statistics Agency (BPS), hereinafter can be analyzed to determine the structure of the economy is better and integrated.

Based on the results of research on input-output tables Indonesia in 2010, the output of Indonesia reached Rp. 13,104,130 million. From the total output, the largest contribution respectively come from the Manufacturing sector in the amount of 34.15%, Construction is 14.69%, Wholesale & Retail Trade and Repair of Cars & Motorcycles is 10.37%, Agriculture, Forestry and Fisheries (identical with an agricultural country) amounted to 8.12%. While the sector that has the smallest contribution is the Water Supply, Waste Management, Waste and Recycling at only 0.37% and other service sectors amounted to 0.81%.

The National Gross Value Added in 2010, resulting in a structured starting from the Manufacturing sector with a contribution of 26.28% (biggest), sector Wholesale & Retail Trade and Repair of Cars & Motorcycles (12.4%) and Mining & Quarrying (by 12, 4%). Meanwhile, the sector of Water Supply, Waste Management, Waste and Recycling has gross value added of the smallest in the amount of 0.395%. The results also indicate that the sector which has a highest forward linkage index is Retail Trade sector, in addition to Cars and Motorcycles. Forward Linkage Index is equal to 7.04446 which mean that each increase of one unit of this sector will increase output of other sectors that use this as input sector amounted to 7.04446 units. The

Manufacturing sector and Preservation of Meat have a highest backward linkage index, that is at 1.4031, followed by other Food Industry sectors.

Furthermore, the results also obtain the Leontief inverse matrix, which can be used to see the forward index and the degree of sensitivity of each sector. Degree of sensitivity is used to see how the sector generates an output to be used as input for other sectors. The sectors that have the highest degree of sensitivity is the Wholesale and Retail Trade sector in addition to Cars and Motorcycles with the degree of sensitivity of 7.08739 and is followed by Electricity sector. Based on the results obtained, the policies issued by the government is expected to strengthen stimulus directed to increase production capacity, strengthen competitiveness and improve the fiscal sustainability in the midst of global economic challenges.

Keywords: Potential Sector; Economic Growth; Input-Output Analysis; Backward Linkage; Forward Linkage.

Introduction

Indonesia consists of several regions that have a diverse economic structure. Indonesian economic structure can be seen from the role or contribution of each economics sector. In the early stages of development showed that the main sectors was oil and gas that had an important role in the formation of the income of this country. However, the decrease in their contribution as a main sector in every regions does not mean their value added was dropped, in fact their value added always increase. Why? Because the changes in the economic structure of one region in Indonesia is influenced by the potential of the region itself, among others: (i) natural resources (such as like: soil, climate, mining, marine) and (ii). human resources (such as like: labor that have educated and skills to be able to process the existing resources) (see also, Wahyuni, 2013). Hence, a sector of economics can not be said as a leading sector when their spread effect just a little above their average. The leading sectors in the Indonesian Input-Output (I-O) tables is the sectors those have an index of power spread and degree of sensitivity above average or above one (>1).

I-O table is a matrix that describes the transaction of goods and services between sectors of the economy at any given time. I-O table matrix could explain the interrelationships between economic sectors. So it can be used as a tool for economic forecast in every countries. In Indonesia, the report analyzes of its I-O table was calculated through Supply and Use Tables (SUT) basis approach and last calculation was done on year 2010. I-O Table compiled by the Central Statistics Agency (BPS) which can be analyzed to determine the structure of the economy. The leading sectors is a sector of economic activity that has the potential, performance, and better prospects than other sectors that are expected to drive the economic activities and other derivatives and also has a relatively large role compared to other sectors in accelerating the economic growth. The data from I-O table also reflect the current conditions in order to create the decisions in effort to develop an economic sector in the region and national level, that would be more effective and efficient when it is based on the consideration of the relationships across all economic sectors in moving the economy as a whole (see also Pradhita, 2011; Suryani, 2013; Kweka et al, 2003; Mudzakir, 2002)

Some other researchers (see for example, Putra, 2011; Anas, 2015; Stanny, 2009; Juhari, 2008; Yulianto, et al, 2012; Purnomo, 2008; Sunarti, 2016; Rika, 2010 and Indriani et al, 2013 concluded that the in Indonesia, contribution of the forestry sector in the creation of output, value added and employment nationwide is relatively small and declining trend in the period 1995- 2008. The wood industry sub-sector contributed greater than the primary forestry sub-sector. Based on the index linkage forward and to the backward, the forestry sector is not the leading sectors with the amount of the index to decline. But, forestry subsector has the ability to encourage sectors downstream that use the output of production sub-sector primary forestry, while the sub-sectors of the wood industry has the ability to attract the upstream sector by using its output as production inputs. From the analysis of multipliers and impact analysis, the conclusion that the forestry sector is included in the sector, which has large multiplier effects on the national economy.

The father of economics knowledge Adam Smith, split into 5 stages of economic growth which starts from past hunting, livestock period, the period of cultivation, trade period, and the last is the industrial stage. According to this theory, society is moving from a traditional society to a modern capitalist society. In this theory Smith saw employees as one of the inputs to the production process. The growth process will be occur simultaneously and have the corresponding relationships with one another. Improved performance in a sector will increase the attractiveness

for capital accumulation, promote the progress of technological, and expand the market. It will encourages economic growth more rapidly.

Based on the results of research on I-O tables Indonesia in 2010 (BPS/Statistical Research Bureau, 2014), the output of Indonesia reached Rp.13,104,130 million. From the total output, the largest contribution respectively come from the Manufacturing sector in the amount of 34.15%, Construction is 14.69%, Wholesale & Retail Trade and Repair of Cars & Motorcycles is 10.37%, Agriculture, Forestry and Fisheries (identical with an Agricultural country) amounted to 8.12%. While the sector that has the smallest contribution is the Water Supply, Waste Management, Waste and Recycling at only 0.37% and other service sectors amounted to 0.81% (see table 1.)

Table 1. National Output 2010

No	Sector	Ouput (Million Rp)	Percentage (%)
1	Agriculture, Forestry, and Fisheries	1,064,400.319	8.12
2	Mining and Excavation	980,110.772	7.48
3	Processing Industry	4,475,012.592	34.15
4	Procurement of Electricity, Gas	199,757.683	1.52
5	Water Supply, Waste Management, Waste and Recycling	47,840.575	0.37
6	Construction	1,924,924.391	14.69
7	Wholesale and Retail Trade and Repair Cars and Motorcycles	1,359,083.505	10.37
8	Transportation and Warehousing	592,507.963	4.52
9	Provision Accommodation and Eat Drink	434,821.064	3.32
10	Information and Communication	370,602.832	2.83
11	Financial Services	299,023.129	2.28
12	Real Estate Real estate	193,689.025	1.48
13	Company Services	168,012.326	1.28
14	Government of Administration, Defense and Compulsory Social Security	419,610.328	3.20
15	Educational Services	310,400.719	2.37
16	Health Services and Social Activities	158,707.401	1.21
17	Other Services	105,626.122	0.81
	TOTAL	13,104,130.746	100.00

Source: BPS, 2014

In the sector of agriculture, forestry and fisheries sub-sector which provides the largest share of this sector is paddy sub-sector amounted to 22.33%, sub-sectors of fish and fishery products amounted to 13.16% of cultivation and poultry sub-sector and the results of 12, 08%. For mining and quarrying sub-sector which provides the largest share of this sector is the petroleum sub-sector amounted to 22.71%, coal sub-sector amounted to 22.57% and copper ores sub-sector amounted to 10.07%. The manufacturing sector, the share of each sub-sector is almost the same. Sub sectors provide the greatest share of the manufacturing sector, namely sub paddy and rice processing, sub-sector of animal and vegetable oils and industrial sub-sectors or assembling computers and computers with \pm 5% share.

The construction sector has five sub-sectors where building construction sub-sector provides the largest share is 32.87% and the sub-sectors of roads, bridges, and ports provide a share of 31.33%. Sub sectors of wholesale and retail trade in addition to cars and motors provide share dominance is 71.95% for the trading sector. Sector provision of accommodation and eating and drinking, the largest share by sub-sector of the restaurant at 86.64%, while the sub-sectors of road transport sub-sector with the largest share is 53.32% for the transportation and warehousing sector.

Analyzing the leading sectors in a region and also other cross-sectoral engagement a very important role in supporting economic growth in the region / territory. Based on the background of the problems that have been described previously, the purpose of this research is: (i). Knowing the degree of relatedness between sectors in order

to obtain an overview of the contribution of a sector to the economy as a whole; (ii). Knowing sectors seeded in Indonesian economics to determine policies that should be run; and (iii). Measuring the level of public revenue index in every existing sectors.

Materials and Methods

Materials

Understanding productivity is very different from the production. But production is one component of business productivity, in addition to the quality and the outcome. Production is an activity that is related to outcomes and generally expressed by production volume, while productivity related to the efficient use of resources (inputs to produce comparable levels between output and input). Increased productivity and efficiency are the main source of growth for sustainable development. Conversely, a high and sustainable growth is also an important element in maintaining the sustainability of the increase in long-term productivity. With the amount of labor and capital are the same, output growth will increase faster if the quality of both of these resources increases.

Although theoretically the factors of production can be specified, the measurement of its contribution to the output of a production process is often faced with various difficulties. Besides that, the place of humanity, either as unskilled workers as well as managers, from a production activity would also not the same as the machine or other production equipment. As it is known that the output of any economic activity depends on humans who carry out these activities, the human resources are the primary resources in the implementation of the company's activities.

The concept of productivity is labor productivity. Of course, labor productivity is affected, conditioned or even determined by the availability of complementary factors of production such as tools and machinery. However, the concept of productivity is referring to the concept of productivity of human resources. In general, the concept of productivity is a comparison between the output (output) and input (input) per unit time. Productivity can be increase (Ravianto, 1985: 19);

1. Productivity (P) increased when Input (I) decreased, Output (O) fixed
2. Productivity (P) increased when Input (I) decreased, Output (O) increased
3. Productivity (P) increased when Input (I) fixed, Output (O) increased
4. Productivity (P) increased when Input (I) increased, Output (O) increased but the amount of increase in output is greater than the increase in inputs.
5. Productivity (P) is increased in the Input (I) decreased, Output (O) decreased but the number of Input decline is smaller than the decline in output.

The concept can certainly be used in calculating productivity in all sectors of activity. According Putti (1989: 345) increased productivity can be achieved by pressing the smallest all sorts of costs included in utilizing human resources (do the right thing) and increases the maximum output (do the thing right). In other words, the productivity is a reflection of the level of efficiency and effectiveness of work in total. Principles in productivity management are effective in achieving its objectives and efficient use of resources. The elements contained in productivity: (i). Efficiency.

Productivity as the ratio of output / input is a measure of the efficiency of resource use (inputs). Efficiency is a measure of comparing the use of inputs (input) planned to use the actual input accomplished; (ii). Effectiveness. Effectiveness is a measure that gives an idea of how far the target that can be achieved both in quantity and time. The greater the percentage of the target, the higher the level of effectiveness; (iii). Quality. In general the quality is a measure that states how much the fulfillment of the requirements, specifications, and consumer expectations. Quality is one measure of productivity. Although difficult to quantify quality by the ratio of output / input, but it is clear that the quality of input and process quality will be improve the quality of the output.

Productivity is the ability to generate or the level of results obtained by a person. People who have high productivity is a person who can achieve a lot of results in life. According to Husein (1998) productivity is a view that quality of life should be better than yesterday and tomorrow better than today. Fabricant (1962) defines productivity as the ratio of the output obtained with the inputs used. Kenderick and Creamer (1965) define productivity that classified into three types: total productivity, partial productivity and total factor productivity (Sinulingga, S., 2010: 2).

Productivity is the ratio of output that can be measured (tangible output) and input that can be measured (tangible input). Inputs and outputs are measurable (intangible), can not be used to measure productivity. However, no measurable inputs and outputs need to be identified in order be input to management in making decisions related to customer contracts (Sumanth, 1984: 4). According to Blocher, Chen, Lin (2000: 847) Productivity is the relationship between how much output is generated and how many inputs required to produce that output. Supriyono (1994: 414)

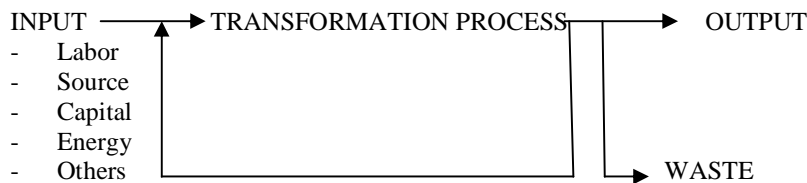
argues productivity is associated with producing efficiently and specifically aimed at the relationship between outputs and inputs used to produce these outputs.

Meanwhile, according to Private and Sukotjo (1998: 281) Productivity is a concept that describes the relationship between the results (the amount of goods and services produced) with resources (labor, raw materials, capital, energy, etc.) used to the production of goods. According Sinungan (2000: 8) productivity can be defined as the ratio between the totality of expenditure at a given time divided by the totality of inputs during the period. Two important aspects of productivity is efficiency and effectiveness.

Efficiency deals with various inputs are combined or how the job is done. It is an ability to produce more than the minimum number of inputs. This means how to reach a certain volume level with high quality, in a shorter period of time, with minimal expenditure. While the effectiveness with regard to the fact whether the expected results or the level of output that can be achieved or not (Putti, 1998: 77).

Based on the above definition can be concluded that the company or organization must pay attention to how they convert resources (inputs) into outputs. Output can be manufactured product, the goods are sold or services rendered. The output is an important tool because without outputs or get results means it is not productivity. This demonstrates the effectiveness in achieving an outcome, so the product can be defined as how efficiency input is converted into outputs for input factors stated resource usage to a minimum. Productivity is a measure of corporate performance that shows how well the utilization of inputs into outputs. The process of transformation of inputs into outputs can be seen in Figure 1.

Figure 1: Transformation Input Output Process.



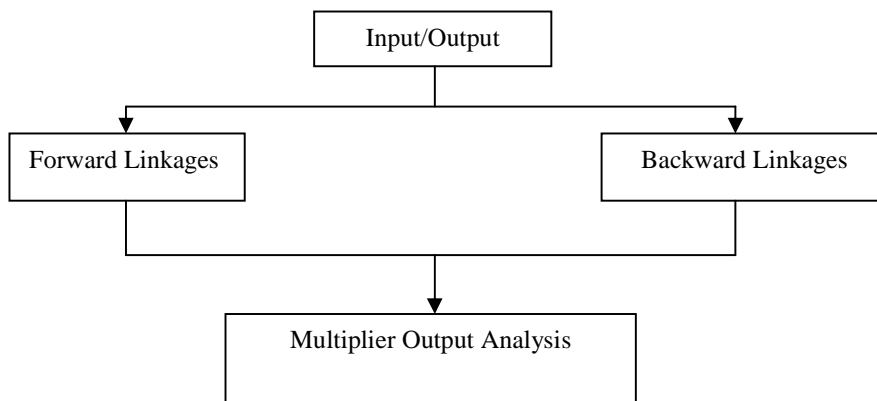
Source: Sinulingga, 2010)

Input is any resources used in the production and shaping of production such as labor costs (man-hours), materials, energy, capital which includes equipment and machinery, etc. According Pardede (2005: 71), inputs or resources are various types of goods and services that the company needs to be processed to make other goods or services. Types of resources including raw materials and supplies, machinery and equipment, labor, and technology. The output is the result of production activities that are beneficial to the company (revenues). Output can be a sale, the amount of production, etc. Measurement productivity is addressed to the management to understand the corrective action against the utilization of resources in increasing production output.

Method

Based on the theoretical basis and a review of previous research, the framework of this study as follows:

Figure 2. Research framework



This study includes the national economy with the object under study is the role of sectors in the national economy in 2010. This type of research used in this research is descriptive quantitative research, the research is based on secondary data, journals, articles and literature related to the problems research and analyzed by analysis of input-output models. The main data used are the data tables Transaction Input Output (I-O) National Year 2010 conducted by BPS. Through inter-sector transactions in the form of input and output in the production process can be seen contributions, multiplier effects and the level of inter-relationship between one sector to other economic sectors.

A. Basic Concept of Input Output

I-O model presents information about the transaction of goods and services as well as interconnections between units of economic activity for a certain period of time are presented in table form. The contents along the lines show the allocation of output and the stuffing according to the column shows the use of inputs in the production process. In an Input Output which is open and static, transaction used in the preparation of input-output tables must meet three basic assumptions (CBS, 2000), is: (i). Homogeneity, is the assumption that every sector of the economy is only producing one type of goods and services with a single input arrangement and no automatic substitution of the input from different sectors; (ii). Proportionality, is the assumption that the relationship between input and output on each production sector is a linear function, artinyakenaikan and decreased output of a sector will be proportional to the increase and decrease in the input of the sector concerned; and (iii). Additive is the assumption that the total effect of production activities in various sectors is the sum of the effects on each activity.

Based on these assumptions, the input-output table as a quantitative model has limitations, namely that the coefficients of inputs or technical coefficients assumed to be fixed (constant) over the period of analysis or projections. Then the manufacturer can not adjust the input changes or modify the production process. Because of technical coefficients assumed to be constant, the technology used by sectors of the economy in the production process are considered constant. As a result, changes in the quantity and price of inputs will always be proportional to changes in the quantity and price of output. Although it contains limitations, the model input output remains a complete economic analysis tools and comprehensive (CBS, 2000).

B. Basic Input Output Framework

The basic framework of the model I-O consists of four quadrants as shown in Figure 3.1 with the following explanation: (i). Quadrant I: Shows the flow of goods and services produced and digunakan by sectors of the economy in the process produksi an economy. This quadrant shows the distribution of goods and services for the use of a production process that is also called as a transaction between (intermediate transactions); (ii). Quadrant II: Indicates the final demand (final demand) and imports. Namely the use of final demand for goods and services not for the production process which usually consists of household consumption, government expenditures, gross fixed capital formation, changes in inventories (stock), and exports; (iii). Quadrant III: Shows the primary input of the production sectors, namely all of the remuneration of each factor of production that typically includes wages and salaries, operating surplus, depreciation and net indirect taxes; and (iv). Quadrant IV: Shows the primary inputs are directly distributed kesektor-sector final demand. This information is used dalam Sistem Social Accounting Matrix (SAM), otherwise known as the data the Social Accounting Matrix (SAM).

C. Analysis of Input Output

Input output analysis consists of three parts: (1) analysis of the performance consists of contributions of output, the contribution of final demand, the contribution input; (2) a multiplier analysis which consists of multiplier output (output multiplier), multipliers household income (income multiplier) and the multiplier employment (employment multiplier); (3) analyzing the structure consists of a link, either linkage to the front (forward linkage) and backward linkages (backward linkage), and the analysis of changes in economic structure by comparing Multiplier Product Matrix (MPM).

Forecasting the strength of the model inputs and outputs are located matrix inverse Leontief (Leontief Inverse Matrix) is. With this matrix we can predict any changes in final demand exogenous variables, such as government spending, the economic system simultaneously. Matriks invers Leontief $(I - A)^{-1}$ too much information about the impact of linkages between sectors of production, including the impact of backward linkages (backward linkage effect) and the impact of linkage to the front (forward linkage effect).

If increase production sector, the increased demand for inputs from other sectors, it is often called backward linkages (backward linkage). A sector with a value greater than the backward linkage with other sectors means that the expansion in the production of the sector will lead greater impact on the economy, in the sense that attract larger

production activities in providing input for the sector *i*. On the other hand, the increased production of sector *i* also resulted in an increase in bidding for other sectors (forward linkage). A sector with a value of relatively large forward linkage will encourage other economic sectors that use *i* sector output as production inputs to increase its activity (Nazara, 2000).

Results and Discussions

1. Final Demand Table

Final demand consists of household consumption and Non-Profit Organization Household (LNPRT), government consumption, gross fixed capital formation (GFCF), changes in inventories and exports of goods and services. From table 2 total Indonesian request, the request provides the biggest contribution in the amount of 41.87%, followed by household consumption and LNPRT amounted to 26.57% and the contribution PMTB of 14.69%.

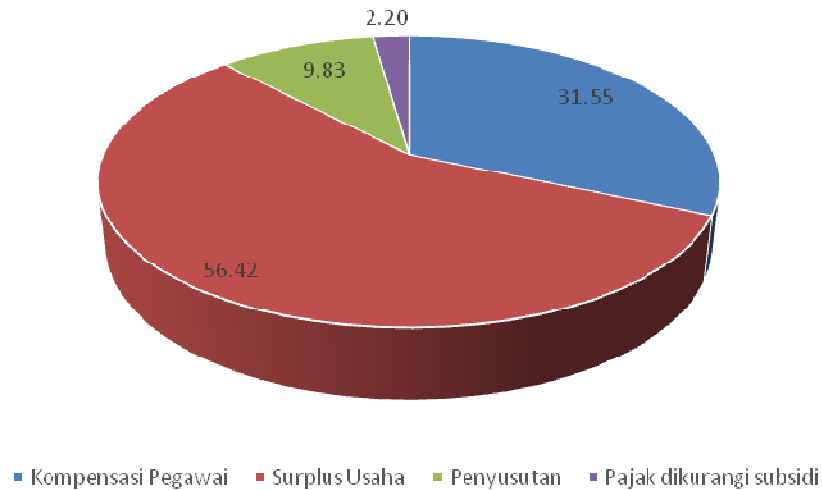
Table 2. Total Request National Year 2010

No	Demand Components	Value (Billion IDR)	Percentage (%)
1	Intermediate demand	5,486,348.013	41.87
2	Household consumption and LNPRT	3,481,755.198	26.57
3	Government Consumption	585,686.538	4.47
4	PMTB	1,924,438.936	14.69
5	Change in Inventory	34,883.741	0.27
6	Export of Goods and Service	1,591,018.320	12.14
	Total	13,104,130.746	100.00

Household final consumption demand, the manufacturing sector provides the biggest contribution is 38.87%, the next sector and Retail Trade and Repair Car and Motorcycle 13.54%. Final demand from government consumption is most contributed by the government to the sector Administration, Defense and Compulsory Social Security amounted to 61.74%. Government consumption is also used for educational services by 27.53% and health and social services of 9.13%. From the structure of government consumption can be seen in outline how to use the government budget.

Demand of GFCF contributed most of the construction sector as much as 91.83%. This is because the GFCF used one of them as an investment. While final demand from changes in inventories contributed by the mining and quarrying sector and the manufacturing sector each about 20%. The end demand of the export of goods, a sector that provides the greatest contribution is the manufacturing industry amounted to 63.15% and mining and quarrying sector amounted to 24.45%. Both sectors have been the mainstay of Indonesia's exports. As for the export services sector, provision of accommodation and food and beverage into the sector with the biggest contribution of 27.99%, followed by service sector companies amounted to 24.53% and the transportation and warehousing sector amounted to 22.37%. In total final demand, the manufacturing sector is the largest contributor in the amount of 31.25% and the construction sector amounted to 23.25%.

The gross value added generated tables Input-Output a homogeneous industries NTB group generated through secondary processes. The implications of the transfer process of secondary products will be made input composition changes both intermediate inputs and primary input. NTB composition of the image of Indonesia in 2010, it appears that the employee compensation of Rp. 2057,707 million (56.42%), operating surplus of Rp.3,680.097 million (56.42%), depreciation of Rp.641,142 million (9.83%) and taxes minus subsidies of Rp.143,733 million (2.20%).

Figure 4. Gross Value Added in 2010

Compensation of employees is the remuneration for employees on the job in the form of wage salaries and social insurance. Compensation of employees has the biggest contribution of the manufacturing sector by 24% this is because the processing industry has the biggest contribution in the structure output Indonesia. Furthermore, wholesale and retail trade sector, and repair cars and bikes that contributes 12.11% and the construction sector and public administration respectively by 11%. On the above sector workers mostly work in the formal sector wage salaries that have been standardized.

Surplus greatest effort came from the manufacturing sector (26.38%), mining and quarrying sector (16.84%) and agriculture, forestry and fisheries (15.45%). Surplus effort is remuneration and income on asset. For ownership of the manufacturing sector could be a rental machine, while for agriculture, forestry and fisheries can be either lease agricultural land. The manufacturing sector also provides the biggest contribution in the shrinkage of 28.9% which is the depreciation of machinery and buildings. Besides the transportation and warehousing sector also contributed sizeable is 13.27%. Taxes less subsidies to the manufacturing sector also provides the biggest contribution that is equal to 44.55%.

National gross value added in 2010 was Rp.6,522,699.992 structured billion from the processing industry sector with the largest contribution is 26.28%, and Retail Trade sector, and Repair Cars and Motorcycles and mining and quarrying sectors each with a contribution of 12.4%. Sector Water Supply, Waste Management, Waste and Recycling has NTB smallest value is 0.395% due share of this sector was also little impact on national output.

2. Analysis Of Input-Output Table

Input output table can be processed to obtain the Leontief inverse matrix which can further be used to see the index spread and the degree of sensitivity of each sector. As has been described above that, the input-output model used widely to see the linkages between production sectors in divulging the economy. Index backward linkages (total backward linkage) of a sector shows the relevance of the effect caused by one unit of final demand in the sector to the total purchase of inputs of all sectors in the economy.

Table 3. Index backward linkages

SECTOR		DIRECT	INDIRECT	VALUE
S-056	Processing And Preserving Meat Industry	0.71126	1.56696	2.27822
S-073	Others Food Industry	0.71434	1.54015	2.25449

Description: Sorted By Largest

From the index backward linkages can be known sub-sector which has an index of the highest backward linkages. Sub-sector with an index value of backward linkages highest industry sub-sector of processing and preservation of meat. This means that when there is an increase of one unit of output of this sector will be need another sector output as production inputs of 0.71126 units. Output from other sectors will be used by the secondary sector as intermediate inputs in their production process. It is then simultaneously will be lead to increased use of the output of other sectors as inputs by 1.56696 units. So that in total will be result in increased use of output throughout the economy amounted to 2.27822 units.

This also applies to other sectors. The second highest-impact sectors simultaneously for the economy are other food industry sectors that will increase the use all output amounted to 2.25449 units of sectors of the economy when the sector increased by 1 unit. From the table above it can be seen that the sectors that boost the economy came from the manufacturing sector. This could be the foundation that by increasing the output of the industrial sector by 1 unit will increase the overall output of the economy is higher than in other sectors. While the increase in agriculture, forestry and fisheries are not too big impact on the economy.

Forward linkage index (total forward linkage) shows the corresponding relationships of influence caused by one unit of the final demand of a sector of the total sales output of all sectors in the economy. Index forward linkages can be seen in the table below;

Table 4. Forward Linkage Index

SECTOR		DIRECT	INDIRECT	VALUE
S-163	Wholesale And Retail addition to Car And Motorcycle	7,04446	4,46342	11,50788
S-155	Electrification	2,37138	2,90942	5,28080

Description: Sorted By Largest

The sector that has the highest forward linkage index is wholesale and retail trade sector in addition to cars and motorcycles. Direct linkage index forward that is equal to 7.04446 which means that each increase of one unit of this sector will be increase output of other sectors that use this as input sector amounted to 7.04446 units. In other words, one unit of the sector is used as input to other sectors in the amount stated. Then simultaneously increase the sector sparked use user sector output as input to other sectors amounted to 4.46342 units. So overall increase of 1 unit of this sector will increase output of other sectors amounted to 11.50788. Multiplier value of this sector is very high compared with other sectors such as the electricity sector are on the increase in economic output due to an increase of 1 unit this sector is only 5.28080 units. Both of these sectors have high forward linkage index for these two sectors is needed in the production process of other sectors.

Table 5. Power Spread

SECTOR		POWER SPREAD	
		AMOUNT	INDEX
S-056	Processing And Preserving Meat Industry	2,27822	1,40310
S-073	Other Food Industry	2,25449	1,38848
S-146	Other Transportation Equipment Industries**	0,36479	0,22467

Description: Sorted By Largest and Smallest **

Index spread of high power is > 1 indicates the sector still has a dependency or high exposure to other sectors. While the sector with lower deployment index < 1 indicates the sector has a low dependence on other sectors. From table 8 above it can be seen that the manufacturing and preservation of meat has spread index higher at 1.4031, followed by other food industry sectors. This is in line with an index value of backward linkages in which the two sectors most in need of other sectors as intermediate inputs. Whereas the lowest dependence on other sectors are other transportation equipment industries.

Table 6. The degree of sensitivity

SECTOR		DEGREE OF SENSITIVITY	
		AMOUNT	INDEX
S-163	Wholesale And Retail addition to Car And Motorcycle	11,50788	7,08739
S-155	Electrification	5,28080	3,25230

Description: Sorted By Largest

Degree of sensitivity is used to see how the sector generates an output to be used as input for other sectors. If the degree of sensitivity of > 1 means that the sector has a degree of sensitivity than average degree of sensitivity across all economic sectors. Meanwhile, if the degree of sensitivity of < 1 means that the sector has a degree of sensitivity is below the average across all sectors of the economy in other words, this sector is less used for the input of other sectors. The sectors that have the highest degree of sensitivity is the wholesale and retail trade sector in addition to cars and motorcycles with the degree of sensitivity of 7.08739 and is followed by electrification sector. This means that the two sectors are most widely used in other sectors as inputs into the production process. Only 60 of the 192 sectors that have a degree of sensitivity sector > 1 .

Conclusion and Limitation

1. Conclusion

From the analysis of the problem of input-output analysis it can be concluded as follows:

- 1) Sub-sector with the highest index value of backward linkages is industry sub-sector processing and preservation of meat. The second highest-impact sectors simultaneously for the economy are other food industry sectors that will increase the use of output seluruh economy.
- 2) The sector that has the highest forward linkage index is wholesale and retail trade sector in addition to cars and motorcycles. In addition, other sectors that have the highest forward linkage index after the wholesale and retail trade sectors other than cars and motor adalah electricity sector are on the increase in economic output. Both of these sectors have high forward linkage index for these two sectors is needed in the production process of other sectors.
- 3) The manufacturing and preservation of meat have a high index of deployment Paing followed by other food industry sectors. This is in line with an index value of backward linkages in which the two sectors most in need of other sectors as intermediate inputs. Whereas the lowest dependence on other sectors are more pegangkutan appliance industry sectors.
- 4) The sector that has the highest degree of sensitivity is the wholesale and retail trade sector in addition to cars and motorcycles with the degree of sensitivity of 7.08739 and is followed by ketengalistrikan sector. This means that the two sectors are most widely used in other sectors as inputs into the production process. Only 60 of the 192 sectors that have a degree of sensitivity sector > 1 .

2. Policy Implications

Based on the conclusion of the study, the author tries to reveal some of the policy implications that can be used as one of the considerations for policy makers to create a policy related to in an effort to determine the planning of sustainable development in Indonesia: (i). Maximize the use of the output of other sectors and subsectors. Optimization of output and input from other sectors and sub-sectors can be done to maximize the production of other sectors that use the output of the sub-sector; (ii). Infrastructure development programs in other sectors that could potentially give a mighty influence in the economy, where increased production of the sector is expected to be affect for product from other sectors. Infrastructure development should take precedence in sectors that simultaneous potential but still untapped; and (iii). Development of technology in other sectors is a must. Intervention at any sector of technology can improve the productivity of the sector. In technology development, to be followed by the development of human resources so that these technologies can be applied.

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References

- [1] Anas, Muhammad Azwar. (2015). Peranan Sektor Industri Pengolahan dalam Perekonomian Provinsi Jawa Tengah dengan Pendekatan Analisis Input Output, Jurusan Ekonomi Pembangunan, Universitas Negeri Semarang.
- [2] Blocher, J. Edward., Kung H. Chen. and Thomas W. Lin. (2000). *Manajemen Biaya*, Terjemahan A. Susty Ambarriani, Salemba Empat, Jakarta.
- [3] Indriani, Lismuba dan Mukhyi, M. Abdul. (2013). *Sektor Unggulan Perekonomian Indonesia: Pendekatan Input-Output*, Jurusan Manajemen, Universitas Gunadarma
- [4] Juhari, Imam. (2008). Dampak Perubahan Upah Terhadap Output dan Kesempatan Kerja Industri Manufaktur di Jawa Tengah. *Jurnal Ekonomi dan Kebijakan*. Jurusan Ekonomi Pembangunan Fakultas Ekonomi Unnes. Volume 2, Nomor 2.
- [5] Kenderick dan Creamer. (1965). *Jurnal Teknik Industri*, Volume 8 No,2 Desember Halaman 116.
- [6] Kweka J., Morrissey O., and Blake, A. (2003). The Economic Potential of Tourism In Tanzania, *Journal of International Development*, Vol 15, 335–351.
- [7] Mudzakir, A. Kohar. (2002). Peranan Sektor Perikanan Pada Perekonomian Jawa Tengah : Analisis Input Output. *Thesis*. Universitas Diponegoro, Semarang.
- [8] Negara, Kurniawati. (2010). Analisis Peranan Sektor Kehutanan Dalam Perekonomian Indonesia: Pendekatan Input Output, Universitas Indonesia.
- [9] Ningtyas, Betha Rosy. (2013). Dampak Pembangunan Sektor Pertanian Terhadap Perekonomian Jawa Timur: Studi Kasus Penerapan Model Input Output. *Skripsi*. Jember : Fakultas Ekonomi Universitas Jember.
- [10] Pradhita, L. (2011). *Analisis sektor unggulan dalam perekonomian DKI Jakarta (Pendekatan Input-Output)*, Jurnal Fakultas Ekonomi Universitas Gunadarma.
- [11] Purnomo, Didit. (2008). Analisis peranan sektor industri terhadap Perekonomian Jawa Tengah tahun 2000 dan tahun 2004 (Analisis Input Output)
- [12] Putra, D. Yuli. (2011). Peran Sektor Perikanan Dalam Perekonomian Dan Penyerapan Tenaga Kerja Di Indonesia: Analisis Input-Output, Program Pascasarjana, *Thesis*. Universitas Andalas.
- [13] Ravianto, J. (1985). *Produktivitas dan Manajemen*, SIUP : Jakarta.
- [14] Sinulingga, S., 2010. Analisis dan Rekayasa Produktivitas, Medan.
- [15] Sinungan, M. (2000). *Produktivitas Apa dan Bagaimana*. Bumi Aksara, Jakarta.
- [16] Stanny, Dewinta. (2009). Analisis Peranan Sektor Industri Pengolahan terhadap Perekonomian Provinsi Jawa Barat (Analisis Input-Output). *Skripsi*. Departemen Ilmu Ekonomi. Fakultas Ekonomi dan Manajemen. Institut Pertanian Bogor
- [17] Suharno. (2009). Analisis Input Output Manufaktur di Jawa Tengah, Laporan Penelitian. Purwokerto : Fakultas Ekonomi Universitas Jenderal Sudirman.
- [18] Sumanth, D. J. (1984). *Productivity Engineering and Management, Productivity Measurement, Evaluation, Planning, and Improvement in Manufacturing and Service Organizations*, McGraw-Hill Book Company.
- [19] Sunarti. (2016). Analisis Peran Sektor Pertanian Dalam Perekonomian Provinsi Lampung (Pendekatan Analisis Input-Output), Jurusan Ekonomi Pembangunan, Universitas Lampung, Bandar Lampung
- [20] Supriyono, Rachmat. (2010). *Desain Komunikasi Visual*, Yogyakarta. Andi.
- [21] Suryani, Timtim. (2013). Analisis Peran Sektor Ekonomi Terhadap Pertumbuhan Ekonomi Kabupaten Pemalang (Analisis Tabel Input Output Kabupaten Pemalang Tahun 2010), *Jurnal Ekonomi Pembangunan*, Jurusan Ekonomi Pembangunan, Fakultas Ekonomi, Universitas Negeri Semarang, Indonesia.
- [22] Swasta Basu dan Sukotjo Ibnu. (1998). *Pengantar Bisnis Modern*, Cetakan Ketiga, Liberty, Yogyakarta.
- [23] Umar, Husein. (1998). *Riset Akuntansi*, PT. Gramedia Pustaka, Jakarta.
- [24] Wahyuni, R. (2013). Analisis identifikasi sektor unggulan di Provinsi Jawa Timur tahun 2010 (Pendekatan Input-Output), *Skripsi*, Fakultas Ekonomi dan Bisnis, Universitas Brawijaya, Malang.
- [25] Wahyuni, Rika. (2010). Analisis Identifikasi Sektor Unggulan Di Provinsi Jawa Timur Tahun 2010 (Pendekatan Input-Output).
- [26] Yulianto, Galih D., et al. (2012). Analisis Peranan Sektor Perdagangan Terhadap Perekonomian Wilayah Di Kabupaten Jember, Jurusan Ilmu Ekonomi Dan Studi Pembangunan, Fakultas Ekonomi, Universitas Jember (UNEJ).

