Key sectors and inter-sectoral linkages in economic development in East Lombok Regency, West Nusa Tenggara Province

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Abstract. Sectors developed in a regency should have strong links with other domestic economic sectors. This study examines the key sectors and their interrelationship in the East Lombok Regency registration. The data used is Input-Output Table on 2013 West Nusa Tenggara Province. The results showed there are ten economic sectors which key to economic development in East Lombok Regency. Considering the authority of the local government, the populist-based economic sectors such as the food and beverage industry, restaurants, poultry, shallots, the textile industry, and broilers are priority industries. So to accelerate the growth of economic output required government policies that can encourage key economic sector actors that have strong backward and forward linkages to increase their business activities. Besides that, an incentive policy is needed for key economic sector actors such as tax exemptions to be more motivated in carrying out their business activities. This is intended to increase output demand for other sectors.

1. Introduction

The economic structure formed in an area is determined by the role of each sector in creating added value or GDP. The economic structure illustrates the potential and dependence of a region on the production capacity of each sector, which occurs due to the interaction between two processes, namely the process of capital accumulation and changes in consumption of the community. In terms of managing, the magnitude of the added value formed is largely determined by the ability to choose key sectors and the interrelationships between sectors in the economy. Through strong linkages, the added value created will increase, which in turn will increase people's per capita income. In microeconomic theory, the choice of commodities or sectors to be developed is limited by the constraints of capital, labor, and technology [1]. East Lombok Regency, as one of the districts in West Nusa Tenggara Province, has these limitations so that it has implications for its inability to compete with other districts. Therefore, to accelerate the growth of value-added, it is necessary to make choices in developing the sector. Based on the principle of the comparative advantage of the region owned, the sector chosen should be a key sector that has strong links with other domestic economic sectors.
Through strong linkages, it is expected that output, employment, and household income in other sectors related to the food agriculture sector can grow rapidly. It is known that the papers relating to sectors in the economy have been widely discussed. Subramaniam and Vijayaratnam (2010) in his article entitled Agricultural Intersectoral Linkages and their Contribution to Economic Development in Poland, Romania, Bulgaria and Hungary concluded that the agricultural sector has a negative relationship with other sectors in the short term but does not mean there is a negative relationship in the long run [2]. A similar paper was written by Salami and Kelikume (2011), in his article entitled Empirical analysis of the linkages between the manufacturing and other sectors of the Nigerian economy, concluding that there was a link between the manufacturing sector and other sectors in the Nigerian economy [3]. The linkage of the food agriculture sector in the economy of West Nusa Tenggara concluded that most developing sectors were related to their sectors. Only a small part is related to other economic sectors.

Unfortunately, these papers are not to discuss in detail and detail based on commodities so that no specific recommendations appear. In analyzing the linkages and selecting key sectors in economic development in a region, regional experts used the Input-Output (I-O) model, which was pioneered by Wassily Leontief in the late 1930s [4]. In the I-O model, there are two types of linkages, namely backward linkage and forward linkage [5]. Referring to the opinion of Hirschman (1958) as quoted by Simatupang (1997), that the backward link is more appropriate to be used as a guide in the formulation of development strategies because increasing demand is a driver of investment while the future is more permissive [6,7].

In this study, the problem is what sectors are the key and how are the inter-sectoral links in the economy of East Lombok District so that the output of the economy grows faster? This paper tries to analyze it in the hope of contributing to the local government of East Lombok Regency in taking strategic steps.

Inter-industry linkage analysis is one type of analysis that is very suitable for analyzing input-output. This analysis sees the industrial sectors in the economy influencing each other. Increasing the output of a sector will encourage increased output in other sectors. The increase in other sector outputs can be achieved through increasing sector output, which will increase the demand for input from the sector. There are sector inputs that come from the sector itself, and some come from other sectors.

In the analysis of inter-industry linkages, there is a connection between backward and forward. Backward linkage is the linkage of a sector with its input provider, while the future linkage is the linkage of a sector with other sectors in the use of output. The two linkages have not only a direct effect but also an indirect effect besides output shown by the opposite matrix of Leontief.

In this analysis include direct and indirect impacts, indicated by the number of columns to i from the opposite matrix of Leontief. If there is an increase in one unit of output money in sector i, it will directly increase the input as indicated by column of the technology matrix A. The additional input error is the same as the total additional output, which shows direct backward linkages. Direct backward linkages formulated with:

$$B(d)_j = \sum_{i=1}^{n} a_{ij}$$

Furthermore, the backward linkages not only possess direct effects as indicated by formula (1) but also have an indirect effect of adding output as indicated by the inverse matrix of Leontief. Therefore, total backward linkages that include direct effects and indirect effects from these backward linkages are resolved by:

$$B(d + i)_j = \sum_{i=1}^{n} \alpha_{ij}$$

$$\alpha_{ij} = \text{Leontief's inverse matrix element}$$
Future linkages see an increase in output through an output bid mechanism. This forward linkage calculates the total output created by the increase in output of an industrial sector through the economic distribution mechanism. If there is an increase in sector output, the additional output will be attributed to the production sectors in the economy, including the sector itself. Direct linking is formulated directly with:

$$ F(d)_j = \sum_{j=1}^{n} a_{ij} $$

The forward linkage in this analysis includes direct and indirect impacts, indicated by the number of rows of the opposite matrix Liontief (Nazara, 2005: 125).

$$ F(d + i)_j = \sum_{j=1}^{n} \alpha_{ij} $$

$$ F(d + i)_j = \text{Total forward linkages} $$

$$ \alpha_{ij} = \text{Leontief's inverse matrix element} $$

Economic policy analysis in the input-output is known as two types of analysis, namely the spread power index and the sensitivity degree index. Power distribution analysis is used to determine key sectors that will be developed in the development of the food agriculture sector in West Nusa Tenggara. Subsectors that have a high dispersion power index mean that the sector has a high dependence on other sectors. Deployment power index can be calculated by dividing the average of the power distribution of sector j divided by the average power of the spread of all sectors as follows (BPS, 2000: 47).

$$ \alpha_j = \frac{1}{n} \left( \frac{\sum b_{ij}}{\sum_i \sum_j b_{ij}} \right) = \frac{\sum b_{ij}}{\frac{1}{n^2} \left( \sum_i \sum_j b_{ij} \right)} = \frac{\frac{1}{n} \left( \sum_i \sum_j b_{ij} \right)}{\frac{1}{n^2} \left( \sum_i \sum_j b_{ij} \right)} $$

$$ \alpha_j = \text{dispersion index power} $$

Dispersion power index> 1, means the power distribution of a sector is above the average of the overall dispersion power. Sensitivity degree index analysis is used to determine key sectors that will be developed in economic development in a region. Sectors that have a high degree of sensitivity indicate that the sector has a forward link or a strong impetus to other sectors. The sensitivity degree index is obtained by dividing the average from the sensitivity level of sector i with the average degree of sensitivity of all sectors (BPS, 2000: 48).

$$ \beta_j = \frac{1}{n} \left( \frac{\sum b_{ij}}{\sum_i \sum_j b_{ij}} \right) = \frac{\sum b_{ij}}{\frac{1}{n^2} \left( \sum_i \sum_j b_{ij} \right)} = \frac{\frac{1}{n} \left( \sum_i \sum_j b_{ij} \right)}{\frac{1}{n^2} \left( \sum_i \sum_j b_{ij} \right)} $$

$$ \beta_j = \text{Sensitivity degree index} $$

Sensitivity degree index> 1 means the degree of sensitivity of a sector is above overall average sensitivity degree.
2. Methods
The Input-Output Table on 2013 data is used to determine key sectors and analyze the inter-sectoral linkages in the economy of East Lombok Regency. In the table, the economic sector is broken down into 66 sectors, where the agricultural food sector consists of 13 sectors namely rice (1), corn (2), peanuts (3), soybeans (4), tubers (5), materials other foods (6), shallots (7), tomatoes (8), chilies (9), other vegetables (10), mangoes (11), pineapple (12), and other fruits (13).

Trade transaction data was taken from the input-output table. From this data, an analysis of the local government matrix is conducted, which begins by calculating the input coefficient of the technology matrix based on producer prices. Next, by subtracting it from the identity matrix, you will get the multiplier matrix or Liontief inverse matrix.

3. Results and Discussion

3.1. Overview of East Lombok Regency
East Lombok Regency has an astronomy location among 116°-117° East latitude dan 8°-9° South Latitude and has 2,679.88 km² area consists of land 1.605,55 km² (59.91%) and sea as 1.074,33 km² (40.09%). The total population reaches 1,130,365 inhabitants, which 526,179 men and 604,186 for women. Based on the constant prices in 2000, the Lombok District Regency's gross added value (GRDP) for five years continued to increase. In 2009 with per capita income of Rp. 2,580 million more increased to Rp 3,087 million more in 2013. This indication complements the welfare needs of the population of East Lombok Regency, which is improved with time travel. Observing the trend of per capita income growth requires more earnest efforts from the East Lombok Regency government to stimulate and mobilize sources of economic growth to increase per capita income growth. The agriculture sector is the most significant contributor, more than Rp 1,124 billion (33.83%). Most of the GDP from the agriculture sector comes from the food crops sub-sector. The rest comes from the estate, livestock, and fisheries sub-sector.

3.2. Key sectors
Efficient resource allocation is one of the keys to the economic development of a region. Therefore determining the key sectors that can provide a strong impetus to other sectors in producing economic output in a region becomes crucial. For this purpose, through the analysis of the power distribution index and sensitivity degree index, key sectors of economic development in East Lombok Regency can be determined. The results of the two index analyzes are presented in Table 1 and Table 2.

Sectors that have a high degree of sensitivity indicate that the sector has a forward linkage or a driving force that is quite strong compared to other sectors. Sectors that have high dispersal power also have a high dependence on other sectors. The dispersion power index indicates that the sector which has a dispersion power greater than 1, shows its dispersal power above the average spread capacity overall, also the same case for indexes of sensitivity degree.

| Economic Sector              | Dispersion Power Index |
|------------------------------|------------------------|
| Other pond fisheries         | 2.6296                 |
| Paddy                        | 2.3373                 |
| Building                     | 2.1558                 |
| Land Transportation          | 2.1495                 |
| Information and Communication| 2.0023                 |
| Shallots                     | 1.8554                 |
| Cattles                      | 1.7972                 |
| Electricity and Gas          | 1.6914                 |
| Banks                        | 1.6189                 |
Table 1 showed there are ten economy sectors, which has high dispersion power index, such as inland fisheries, paddy, buildings, transportation, information and communication, shallots, cattle, electricity and gas, bank, dan food, and beverage industry. These became key sectors for economic development in East Lombok Regency. Increased output of the paddy sector effect to increased of other sectors, because of higher input.

Pond fisheries have the highest dispersion power index of 2.6296. This showed the increased output of Rp 1000, - will increase another sector output too overall amounted to Rp 2,629. The second place is the paddy sector around 2,3373. The third is building sector amount of 2,1558, then transportation sectors as 2,1495, and the fifth is information and communication system amount of 2,0023.

In the food agriculture sector, shallots and cows are sectors that have a high dispersion power index. Shallots have a spreading capacity of 1.8854. It means an increase in output by Rp. 1000, - will cause an increase in output from other sectors, including its sector as a whole by Rp. 1885. The cattle sector has a spreading capacity of 1.7972. It means an increase Rp 1000 in the output cattle sector will cause an overall increase in the output of other sectors by Rp.1,797.

Key sectors can also be determined from the degree of sensitivity index. Sectors that have a high degree of sensitivity indicate that the sector has a forward linkage or a driving force that is quite strong compared to other sectors. The results of the sensitivity index analysis are presented in Table 2.

Table 2. Sensitivity degrees index of 10 largest economic sectors in East Lombok Regency.

| Economy Sector                     | Sensitivity Index Degree |
|------------------------------------|--------------------------|
| Electricity and Gas                | 2.1958                   |
| Tobacco Processing                 | 2.0328                   |
| Other Pond Fisheries               | 1.8798                   |
| Food and Beverage Industry         | 1.8500                   |
| Restaurants                        | 1.7681                   |
| Poultry                            | 1.6853                   |
| Shallots                           | 1.6753                   |
| Textile and Apparel Industry       | 1.6553                   |
| Information and Communication      | 1.5795                   |
| Broilers                           | 1.4803                   |

Table 2 shows that there are ten economic sectors that have a high degree of sensitivity index (above the average degree of sensitivity of other sectors), namely the electricity and gas, tobacco processing, other pond fisheries, the food, and beverage industry, restaurants, poultry, shallots, textile and apparel industry, information and communication, and broilers.

Electricity and gas have the highest degree of sensitivity by 2.1958. This figure means that each Rp 1000, - increase in the final demand of all sectors will have an impact on the increased output of the electricity and gas sector by Rp. 2,1958. The second rank is the tobacco processing sector with a degree of sensitivity of 2.0328, meaning that every thousand rupiahs an increase in the final demand of all sectors in the economy of East Lombok Regency will have an impact on increasing the output of the tobacco processing sector by Rp. 2,032,8. The third is the other pond fisheries sector by 1.88798, then followed by the food and beverage industry sector by 1.8500, and the last is the restaurant sector by 1.7681.

In the agriculture sector, poultry, shallots, and broilers are sectors that have a high degree of sensitivity. The poultry sector has a sensitivity level of 1.6853, meaning that every thousand rupiahs an increase in the final demand of all sectors in the economy will have an impact on increasing the
output of the poultry sector and the results of Rp. 1,685.3. The same thing with the shallot sector has a sensitivity level of 1.6753 and the broiler sector of 1.4808.

Based on the dispersion power index (DP) and sensitivity degree index (DK), as shown in Table 2 and Table 3, it is further grouped into sectors that have a high DP and DK. Sectors included in this group have a high dependency on other sectors and a strong impetus for different sectors. These sectors are a priority in the economic development of the East Lombok Regency.

Table 3. Economic sectors that have High DK and High DP in East Lombok Regency.

| Economic Sectors         | Sensitivity Degree Index (DK) | Dispersion Power Index (DP) |
|--------------------------|-------------------------------|----------------------------|
| Electricity and Gas      | 2,1959                        | 1,6914                     |
| Inland fisheries        | 1,8798                        | 2,6296                     |
| Shallot                  | 1,6753                        | 1,8554                     |
| Information and Communication | 1,5793                     | 2,0023                     |
| Food and Beverage Industry | 1,8500                     | 1,5277                     |

Source: Results of analysis of Table I-O Prov. NTB, 2013

Table 3 shows the five economic sectors being a priority in economic development in East Lombok Regency, namely the electricity and gas, fisheries, shallots, information and communication, and food and beverage industries. However, the two economic sectors which are not under the authority of the regional government are electricity and gas, as well as information and communication. These two sectors are the SOE's authority, which cannot be controlled by the regional government. Then the priority sectors in economic development are inland fisheries, shallots, and the food and beverage industry.

3.3. Key sector linkages

3.3.1. Backward linkage. The backward linkages of key sectors in the economy of East Lombok Regency are the linkages between key sectors and other sectors in the economy. Backward linkages are often referred to as dispersal power, which is the impact that occurs on economic output as a result of changes in the final demand of a sector. If there is an increase in the final order of a sector, there will be an increase in output of the sector itself and other sectors in the economy through increased input demand. In Table I-O, the magnitude of the number of backward linkages in a sector is shown by the total elements of the Lioentief inverse matrix. The backward linkage of key sectors in the economy of East Lombok Regency is presented in Table 4.

Table 4. Backward linkages of key sectors in the Economy of East Lombok Regency, 2013.

| Key Sector            | Backward Linkages Sector         |
|-----------------------|----------------------------------|
| Electricity and Gas   | Mining & Quarrying               |
| 2,19576               | Wood industry                    |
|                      | 0,05793                          |
| Tobacco Processing   | Land transportation              |
| 2,03279               | Tobacco                          |
|                      | Bank                             |
|                      | Air transportation               |
|                      | 0,3187                           |
| Pond’s Fisheries     | -                                |
|                      | 1,87983                          |
| Food and Beverage Industry | Paddy                          |
| 1,85000              | Pond’s                            |
|                      | Cashew                           |
|                      | Milkfish                         |
|                      | 0,77026                          |
|                      | Fisheries                        |
|                      | 0,06654                          |
| Restaurant           | Paddy                            |
|                      | Shallot                          |
| 1,76805              | Soy                              |
|                      | Cow                              |
|                      | 0,1528                           |
|                      | 0,15873                          |
|                      | 0,08053                          |
|                      | 0,09339                          |
Table 4 shows that the electricity and gas sector has the highest backward linkage with a spread rate of 2.19576, and the broiler sector occupies the lowest position with a spread rate of 1.48030. This figure means that every thousand rupiahs, an increase in final demand in the electricity and gas sector, will increase the output of all sectors in the East Lombok Regency economy by Rp 2,195.76 while in the broiler sector only by Rp 1,480.3. The increase in output demand for the electricity and gas sector has a significant impact on other economic sectors because it uses it as an input, especially the mining and quarrying sector, the wood industry, ore mining, and cattle.

The broiler sector increased demand for output in this sector only had an impact on increasing the output of the chemical industry, the food industry, rice, and corn. The advantage of developing this sector as a priority for economic development in East Lombok Regency is because of its strong backward linkages with economic sectors developed by the people such as the food, rice, and corn industry sectors.

The second highest sector that has backward linkage is tobacco processing, with a distribution rate of 2.03279. This sector has strong links with transportation, tobacco, and banks, where an increase in demand for the output of the tobacco processing sector will have an impact on increasing the output of the sector. The economic sector that has a strong backward linkage with the economic sector, which many people are trying to do is the food and beverage industry, restaurants, poultry, shallots, and the textile industry. The sector is related to rice, fisheries, cashew nuts, milkfish cultivation, onions, soybeans, cows, and others.

Table 4 shows that the ability of key sectors of the economy based on the populist economies such as the food and beverage industry, restaurants and restaurants, poultry, shallots, textile industry, and broilers to influence other economic sectors in increasing their output through increasing input demand high enough.

3.3.2. Forward linkage. Forward linkage is often also referred to as the degree of sensitivity. The degree of sensitivity is the magnitude that explains the changes in output that occur in a sector as a result of final demand in each economic sector. This forward linkage calculates the total output created by the increasing output of an industrial sector through the mechanism of output distribution in the economy. If there are increasing production in a sector, then that additional output will distribute to other production sectors in economic, included it sector. Future linkages of key sectors presented in Table 5.
Table 5. Future linkages of key sectors in the Economy of East Lombok Regency.

| Key Sector                        | Forward Linkages Sector |
|-----------------------------------|-------------------------|
| Electricity and Gas               | Health Services         | Paper Industry | Information & Communication |
| 1,76437                           | 0,03573                 | 0,02448       | 0,02292                      |
| Tobacco Processing                |                         |               |                            |
| 2,03279                           |                         |               |                            |
| Pond’s Fisheries                  | Tobacco Processing      | Seafood       | Restaurant                  |
| 1,87983                           | 1,00427                 | 0,01285       | 0,02176                     |
| Food and Beverage Industry        | Seafood                 | Broilers      | Fisheries                   |
| 1,85000                           | 0,19315                 | 0,03892       | 0,03587                     |
| Restaurant                        | Sea transportation      | Land Transportation | Tobacco Processing | Tomato |
| 1,76805                           | 0,05062                 | 0,02034       | 0,01632                     | 0,00142 |
| Poultry                           | Restaurant              | Real Estate   | Non-star hotel              |
| 1,68529                           | 0,03109                 | 0,00160       | 0,00441                     | -       |
| Shallots                          | Restaurant              | Chemical      | Land                        | Tobacco |
| 1,67529                           | 0,15873                 | 0,00394       | 0,00323                     | 0,00260 |
| Textile Industry                  | Wood Industry           | Government Administration | Educational Services | Health Services |
| 1,65530                           | 0,05733                 | 0,01392       | 0,00451                     | 0,00352 |
| Information and Communication     | Bank                    | River Transportation | Laying Hens | Tobacco Processing |
| 1,57952                           | 0,07040                 | 0,03159       | 0,02554                     | 0,02957 |
| Broilers                          | Restaurant              | Non-stars      | Government Administration  | Tobacco Processing |
| 1,48030                           | 0,06940                 | 0,00985       | 0,00358                     | 0,00116 |

Source: Analysis of Output Multiplier Numbers, NTB I-O Table (2013)

Table 5 shows that the tobacco processing sector has the highest forward linkage with a degree of sensitivity of 2.03279, and the broiler sector occupies the lowest position with a degree of sensitivity of 1.48030. This figure means that every thousand rupiah increase in the final demand of all sectors will have an impact on increasing the output of the tobacco processing sector by Rp. 2,032.79. Then the broiler sector is only Rp. 1,480.30. The tobacco processing sector has the highest forward linkage but does not have a forward linkage with other economic sectors. So it is not feasible to be developed.

Sectors that have strong links with other sectors in the future are fisheries, the food and beverage industry, restaurants, onions, the textile industry, and broilers. The industry was developed as a people's economic business such as poultry and its products, the food industry, seaweed, and others.

Looking at the figures for the degree of sensitivity of each sector, as shown in Table 5, it can be concluded that the future relationship is weak. This indication is reflected in almost the whole of the increase in output requested by the sector itself, only a small portion requested by other sectors in the economy of East Lombok Regency as input. This happens because the sectors of the food industry, seaweed, restaurants and restaurants, and restaurants, broilers, tobacco processing, which are expected to use the input of this sector, have not been well developed.
4. Conclusion

1. Ten sectors can become key sectors of economic development in East Lombok Regency. However, the populist economy-based sectors are prioritized development sectors such as the food and beverage industry, restaurants and restaurants, poultry and its products, shallots, the textile and apparel industry, and broilers.

2. Sectors that have strong backward links with other economic sectors are the food and beverage industry, restaurants, poultry, shallots, textile industry and broilers.

3. Strong forward linkage in the economic sectors, including pond fisheries, food and beverage industry, restaurants, onions, textiles, and broilers.

Government policies are needed that encourage key sector economic actors that have strong backward and forward linkages to increase their business activities. The priority economic sector is the populist financial sector, which is intended to increase local input demand. Such as the food and beverage industry, restaurants, poultry, shallots, the textile and apparel industry, and broilers. As well as the need for incentive policies for key sector economic actors such as tax exemptions to be more motivated in carrying out their business activities. This is intended to increase output demand for other sectors.

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