

The Potential of the Blue Economy Sector for the Development Economy in South Sulawesi

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ABSTRACT

This research aims to find out how much is the backward linkage and forward linkage of the blue economy sector to other sectors in South Sulawesi. This research was designed with the main objective of conducting further studies and producing policy recommendations regarding the linkages between factors supporting the development of the blue economy in Indonesia in the context of food security and optimizing its role as a contributor to new sources of growth in Indonesia. Based on these research problems, this type of research is descriptive and explanatory quantitative research. The type of data used is in the form of primary and secondary data. In this study, the technique used in analyzing the data is input output analysis using the Input Output (IO) table for constant prices (17 sectors) in South Sulawesi in 2016. Based on the results of an analysis of the input-output table of South Sulawesi Province in 2016, the study indicate that the two sectors in quadrant I denote blue economic sectors. This shows that these two sectors are sectors that have good linkages to the upstream sector and the downstream sector. This means that the procurement of electricity and gas sector, and the manufacturing sector is able to both encourage and attract other sectors in increasing output in South Sulawesi.

Keywords: Input-output; Blue economy; Economy Sector; Development Economy

INTRODUCTION

Indonesia's efforts to become the country with the fifth largest economic power in the world are described in the Indonesia Vision 2045 scenario. Furthermore, this vision is translated into the 2025-2045 national long-term development plan (RPJPN) by carrying out Indonesia's vision as a "Sovereign, Advanced and Sustainable Maritime Country" . The purpose of a development process is how the process is able to bring humanity beyond prioritizing material and financial aspects of everyday life. Thus development must be understood as a multidimensional process, involving the reorganization and reorientation of economic and social systems as a whole (Todaro & Smith, 2010).

Functionally, South Sulawesi is the centre of economic activity, especially in Eastern Indonesia. South Sulawesi's economic structure still characterizes the traditional sector, as seen in South Sulawesi's economic growth during 2006-2021, which was above national growth and

continues to show positive growth. The biggest contributor to this growth in 2019 came from the agricultural sector, namely 28.57 percent; the trade, hotel and restaurant sector by 16.47 percent; the industrial sector is in third place at 13.67 percent (Samsir, 2013).

As the direction of South Sulawesi's long-term development policy 2008-2028 "Making the South Sulawesi Region a single, just socio-economic unit". The expected target of this policy direction is the creation of quality and sustainable economic growth that can encourage an increase in per capita income and employment opportunities so as to reduce the poverty rate (RPJPD Sulsel 2008-2028).

Indonesia's natural resources have the potential to be developed, especially in the fisheries and marine sectors (Nurkholis et al., 2016). The large potential of resources in marine and coastal areas is considered to be the main capital in national and regional development (Firdaus & Rahardian, 2018; Statistik, 2016). The development of marine areas has a broader development dimension than land because marine resources have quite a lot of diversity and have great potential to be developed (Gani et al., 2022). In fact, almost 60 percent of Indonesia's population live in coastal areas and islands with various livelihoods including fishermen (Statistik, 2016). Although developments in the fisheries, transportation and mining sectors with utilization of marine and coastal areas have progressed, technological limitations are still an obstacle in the management of these areas (Kunarso, 2011).

Regional development is a process that needs to be adapted to certain conditions. Each region has its own uniqueness and characteristics. The keys to development include the availability of natural and human resources, level of technology, stock of capital, knowledge, institutions, and values and commitment (Šabić & Vujadinović, 2017). The government's efforts in the development of fisheries and marine affairs in Indonesia are proclaimed in the vision of the maritime sector which places the sea as the nation's future. Furthermore, this vision is translated into three pillars of development, namely sovereignty, sustainability and prosperity (Susi Pudjiastuti, 2017). Coastal and marine area development policies are very relevant to poverty alleviation programs because most of these areas are rural areas, remote and underdeveloped areas (Samsir, 2015).

South Sulawesi Province is one of the regions in Indonesia which has a wide area of coast and sea. This area includes the Makassar Strait, Flores Sea and Bone Bay as well as expanses of small islands in the Spermonde and Takabonerate Regions, with a long coastline stretching 1,979.97 km of coastline with a sea area of $\pm 48,000$ km² (Mosriula, 2018). Based on data from the Central Bureau of Statistics (BPS), it shows that the production of the capture fisheries sub-sector in South Sulawesi, especially capture fisheries at sea, is quite large, but its growth is relatively stagnant. During 2018-2020, the average production of this sub-sector was 353.94 thousand tons per year and contributed 5.22 percent to national production (Statistik, 2022).

Several studies have been conducted to analyze the role of the fisheries sub-sector as a key factor (leading sector) of economic development in various regions of Indonesia. Miar et al. (2020) analyzed the strategy of the fishing industry in Indonesia. Kusdiantoro et al. (2019) examines the economic impact of fishing development in Indonesia. Meanwhile, Yulinda et al. (2020) analyzed the economic potential of hemp in Rokan Hilir, Riau Province. Mudzakir (2003) analyzed the role of the fisheries sector in Central Java's economy. However, this research only measures the potential and determines the basic and non-basic sectors of the fisheries sub-sector in Indonesia. Different things are shown in the analysis conducted by Gani et al. (2022) which measures the development of the Makassar Strait area in Indonesia based on the maritime economic sector using the Interregional Input Output (IRIO).

The magnitude of the contribution and potential of the fisheries sub-sector to the economy, both sectoral and regional, needs to be measured comprehensively. Maritime and fisheries management policy as an institutional factor is one of the key factors in national and

regional development. In fact, in 2023 it is predicted that the world will not only face a recession but will also face the threat of a food crisis (Anisyah Al Faqir, 2022). Therefore, with clear measurements, the results of this study will provide alternative policies for managing and utilizing fisheries resources optimally and sustainably which can drive economic growth, increase people's income, especially fishing households and coastal communities, and can maintain supply chains (intermediate input) and meet national food needs (final demand).

Based on the background of the problems in this research, the purpose of this research is to find out how much is the backward linkage and forward linkage of the blue economy sector to other sectors in South Sulawesi.

METHOD

Based on the above research problems, this type of research is descriptive quantitative research. The type of data used is secondary data. Secondary data was obtained from the South Sulawesi Central Bureau of Statistics in the form of Input Output data for 2016.

In this study, the technique used in analyzing the data is input output analysis using the South Sulawesi IO table on the basis of producer prices according to 34 provinces and 52 industries in 2016. To answer the research problem, several more specific methods will be used to solve it by computerized assistance, namely the Microsoft Excel program and the I-O Analysis For Practitioners (IOAP) program.

To obtain the value of the input coefficient, we can introduce an input coefficient of the a_{ij} technique with the formula:

$$A_{ij} = \frac{Z_{ij}}{X_j}$$

To determine key sectors, this study uses two measurement methods, namely the Chenery-Watanabe method and the Rasmussen method (Samsir, 2013). In the Chenery-Watanabe method, the linkages between sectors are divided into two parts, namely backward linkages and forward linkages. The measure of backward linkages in a sector departs from Leontief's model by looking at the demand side, while forward linkages are seen from the supply side.

$$BLc_j = \sum_{i=1}^n a_{ij}$$

In the same way, but the addition is now done in rows, the forward linkage size can be calculated using the formula:

$$FLci = \sum_{j=1}^n a_{ij}$$

To measure direct and indirect linkages, the Rasmussen method is used which shows that the sum of columns (or rows) in the inverse Leontief matrix, $(I-A)^{-1}$, is used as a measure of inter-sectoral linkages. So that the backward linkage and forward linkage according to this method are each measured in a way:

$$BLR_j = \sum_{i=1}^n g_{ij}$$

and,

$$FLR_i = \sum_{j=1}^n g_{ij}$$

Where BLR_j and FLR_j respectively show a measure of backward linkage and forward linkage for the Rasmussen method, while g_{ij} is an element in the inverse matrix Leontief $G = (I - A)^{-1}$.

To measure the spreading power index and sensitivity degree index with the coefficient of variation, this study used the Rasmussen method which can be measured using the following equation:

$$\alpha_j = \frac{\sum_{i=1}^n g_{ij}}{\sum_{i=1}^n \sum_{j=1}^n g_{ij}} \quad \text{dan,} \quad \beta_i = \frac{\sum_{j=1}^n g_{ij}}{\sum_{i=1}^n \sum_{j=1}^n g_{ij}}$$

Where α_j shows the index of the spreading power of sector j in the economy, and β_i is the index of the degree of sensitivity of sector i . while g_{ij} is the Inverse Leontief matrix element, $G = (I - A)^{-1}$.

The three variables that are always the main concern in the analysis of the multiplier are the production sector output, household income, and employment. Thus the way of measurement is:

$$O_j = \sum g_{ij}$$

Where O_j shows the magnitude of the output multiplier number from sector j , while g_{ij} , the matrix element in Leontief's inverse matrix, $G = (I - A)^{-1}$.

To measure the income multiplier, two types of household income figures are used, namely type I and type II income multiplier numbers. This income multiplier figure can be found by the following formula:

$$Y_i = \frac{\sum_{j=1}^n g_{ij}}{P_i}$$

The impact of the export multiplier will be related to the output produced by a sector and the absorption of labor by that sector. This is accommodated by using two analytical tools, namely the export multiplier for output and the export multiplier for employment. The export multiplier index to output (poi) is stated in the following formulation.

$$Poi = \frac{\sum b_{ij} \cdot E_i}{\sum E_j}$$

Export multiplier index on the absorption of labor by a sector (Pl_i) stated as follows:

$$Pl_i = \frac{l_i \sum b_{ij} \cdot E_i}{\sum E_j}$$

Where l_i is the coefficient of sector i labor; pl_i is the multiplier of exports to labor

RESULT AND DISCUSSION

One of the advantages of the analysis in the I-O model is that it can be used to determine the degree of relationship or linkage between economic sectors. Linkages between economic sectors can be in the form of backward linkages; related to raw materials or raw materials while forward linkages related to the production/sale of finished goods.

a. Direct and Indirect Linkages

To see the magnitude of direct and indirect linkages of the economic sectors in South Sulawesi Province in 2009, equations were used, while to measure the magnitude of backward and forward indirect linkages, equations were used to obtain the results as described in the following table:

Table 1
Direct and indirect linkages respectively by economic sector in South Sulawesi Province 2016

No	Economy sector	KLDi	KLBj	KTLDi	KTLBj
1	Agriculture, Forestry and Fisheries	0.466991	0.859442	1.929818	1.184751
2	Mining and excavation	0.790038	0.831862	1.345230	1.211916
3	Manufacturing	0.088981	0.558898	2.155230	1.561867
4	Procurement of electricity and gas	0.483880	0.311591	1.967587	2.355678
5	Water Procurement, Waste Management, Waste and Recycling	0.993874	0.766982	1.007572	1.331844
6	Construction	0.903704	0.514930	1.108044	1.690483
7	Wholesale and Retail Trade; Car and Motorcycle Repair	0.450862	0.832352	1.771076	1.216999
8	Transportation and Warehousing	0.470009	0.751564	1.724019	1.320757
9	Provision of Accommodation and Food and Drink	0.807174	0.514996	1.216549	1.666745
10	Information and Communication	0.657770	0.780321	1.497833	1.288512
11	Financial Services and Insurance	0.593173	0.857235	1.571478	1.187945
12	Real Estate	0.867340	0.891659	1.183945	1.147128
13	Company Services	0.825366	0.741749	1.261983	1.344940
14	Government Administration, Defense and Compulsory Social Security	0.911857	0.710145	1.102592	1.432338
15	Education Services	0.979127	0.770255	1.025856	1.336123
16	Health Services and Social Activities	0.971364	0.666210	1.030892	1.470550
17	Other Services	0.811716	0.713036	1.258538	1.409667

Source: South Sulawesi input-output analysis table, 2022 (processed)

Based on Table 1, the economic sector that has the largest direct forward linkage is the Water Supply, Waste Management, Waste and Recycling sector, which is 0.993874, meaning that the output of the Water Supply, Waste Management, Waste and Recycling sector is used to fulfil all intermediate demands, namely as much as IDR 0,994. While the economic sector that has the greatest direct backward effect is the Real Estate sector, because it has the largest direct backward linkage rate of 0.891659, meaning that to produce an output of IDR 1 this sector requires an intermediate input of IDR 0.892. Different things are shown in the number of indirect forward linkages and backward indirect linkages. The magnitude of the number of indirect linkages to the front of the manufacturing sector, namely 2.155230, indicates that the total output needed to fulfil as much as IDR. buildings require a total input of IDR 2,356 to produce an output of IDR 1 from all sectors.

b. Power of Spread and Degree of Sensitivity

In addition to using the equation above, to measure forward and backward linkages, an equation is also used to measure the magnitude of the spreading power index and the degree of sensitivity of the economic sectors in South Sulawesi Province. From these equations the results are obtained as described in the following table.

Table 2
Power of Spread and Degree of Sensitivity by economic sector in South Sulawesi Province in 2016

No	Economy sector	Power of Spread	Degree of Sensitivity
1	Agriculture, Forestry and Fisheries	0.833701	1.358000
2	Mining and excavation	0.852817	0.946629
3	Manufacturing	1.099076	1.516621
4	Procurement of electricity and gas	1.657675	1.384579
5	Water Procurement, Waste Management, Waste and Recycling	0.937210	0.709022
6	Construction	1.189582	0.779723
7	Wholesale and Retail Trade; Car and Motorcycle Repair	0.856395	1.246295
8	Transportation and Warehousing	0.929408	1.213181
9	Provision of Accommodation and Food and Drink	1.172878	0.856078
10	Information and Communication	0.906718	1.054015
11	Financial Services and Insurance	0.835949	1.105839
12	Real Estate	0.807227	0.833134
13	Company Services	0.946425	0.888049
14	Government Administration, Defense and Compulsory Social Security	1.007927	0.775887
15	Education Services	0.940221	0.721889
16	Health Services and Social Activities	1.034816	0.725432
17	Other Services	0.991974	0.885625

Source: South Sulawesi input output analysis table, 2010 (processed)

Based on the classification of seventeen economic sectors, the sectors that have an index of spread power above the sector average are the Manufacturing Industry, Electricity and Gas Procurement, Construction, Accommodation and Food and Drink Provision, Government Administration, Defence and Compulsory Social Security, and Services Health and Social Activities. Meanwhile, other sectors are smaller than one, meaning that demand from these sectors has little effect on the increase in the output of other sectors in the South Sulawesi economy.

The linkages with downstream sectors show that the manufacturing sector is the sector that is most sensitive to changes in final demand for its downstream sectors, from table 4.3 it can be seen that the index of the degree of sensitivity of the manufacturing sector is 1.516621. This shows that the increase in output in the manufacturing sector can reach 1.516621 times compared to the average increase in output in other sectors if all economic sectors each experience an increase in final demand by 1 unit. Other sectors whose output formation is also relatively sensitive to shifts in final demand in other economic sectors are the agricultural sector and electricity and gas procurement, which are respectively 1.3580 and 1.3846.

The degree of sensitivity of the agricultural sector indicates that the sector is able to meet the above average final demand so that this sector can be classified as a strategic sector. However, in contrast to its distribution power which is below average, this means that this sector cannot yet be classified as a strategic sector in spurring economic growth in South Sulawesi. Therefore, the high degree of sensitivity of the agricultural sector is not followed by its spreading power so that this sector cannot be categorized as a key sector in the economy of South Sulawesi.

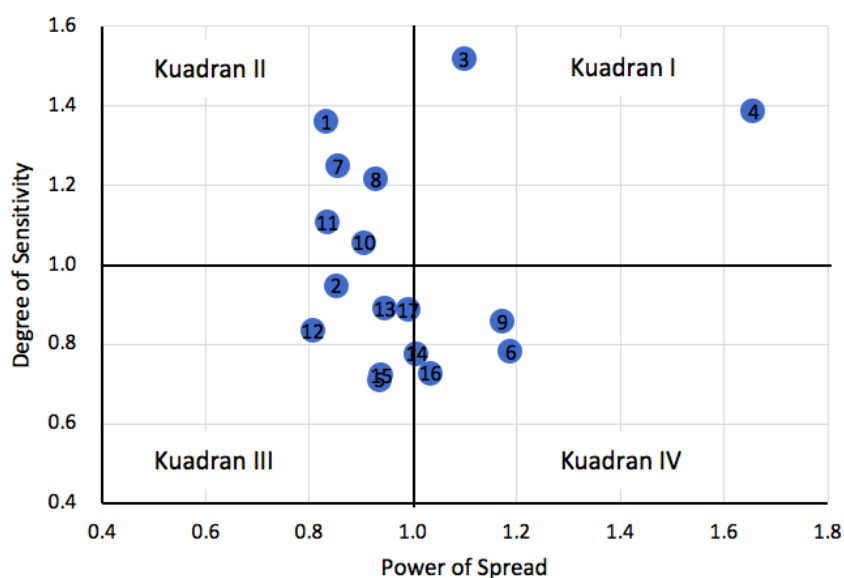


Figure 1 Degree of Sensitivity and Power Spread

In fact on the figure 1, there are two sectors that have the power of spreading and a high degree of sensitivity and four sectors that have low spreading power and high degree of sensitivity. The sectors that are in quadrant I are the procurement of electricity and gas sector, and the manufacturing sector. Meanwhile, there are five sectors in quadrant II including Agriculture, Forestry and Fisheries, Wholesale and Retail Trade; Car and Motorcycle Repair, Transportation and Warehousing, Information and Communication, and Financial Services and Insurance. Furthermore, the other ten sectors are in quadrants III and IV.

The results of this study indicate that the two sectors in quadrant I denote blue economic sectors. This shows that these two sectors are sectors that have good linkages to the upstream sector and the downstream sector. This means that the procurement of electricity and gas sector, and the manufacturing sector is able to both encourage and attract other sectors in increasing output in South Sulawesi. Meanwhile, in quadrant II there are four other blue economic sectors, namely Agriculture, Forestry and Fisheries, Wholesale and Retail Trade; Car and Motorcycle Repair, and Transportation and Warehousing. These four sectors have high spreading power and low degree of sensitivity.

On the other hand, the sectors that are in quadrant III are sectors that have low spreading power and degree of sensitivity, namely, Mining and excavation, Water Procurement, Waste Management, Waste and Recycling, Real Estate, Company Services, Education Services, and Other Services. Furthermore, the four sectors in quadrant IV are sectors that have low spreading power and a high degree of sensitivity.

By using sectoral classification, the grouping results obtained can be seen that there is one sector that has a dispersion index and a high degree of sensitivity, namely the procurement of electricity and gas sector and the manufacturing sector. This sector is often referred to as the leading sector. The development of these leading sectors will trigger growth for the development of other sectors in the economy in South Sulawesi. The other fifteen sectors are supporting sectors of the leading sectors which are in quadrant II, quadrant III and quadrant IV.

The findings of this study complement the result of previous study proposed (Nugroho & Murti (2020) Based on the results of the analysis, the policy recommendations that can be taken by the government concerning economic development is optimize the potential of the manufacturing industry sector and the procurement of electricity, gas as a national priority. While, Ciptawaty et al. (2020), Ririhena; et al. (2023) and Kharisma & Hadiyanto (2019) state that overlay analysis shows that government administration, defence, social security sectors are obliged to contribute to and the highest growth. Suarmanayasa et al. (2019), Fauzi dan Sutrisno (2022) show that contribution of the agricultural sector is dominant. Therefore, Potential economic sectors that used as leading sector are agriculture and services sectors and sub sector of entertainment services and recreation, whereas, (Fauzi & Sutrisno, 2022), *Analysis results show that the agricultural sector has score relatedness and value low index to other sectors.*

Additionally, according to Wang et al. (2022) reveals that the development of the marine economy is based on successful marine accounting. The lack of marine data globally has made marine accounting controversial. As well as, Ebarvia (2016), Mazzotta et al.(2022), and Sha (2019), as well as Xu & Gao (2022) found that new growth drivers, green finance, for the high-quality development of the marine economy.

CONCLUSION

Based on the results of an analysis of the input-output table of South Sulawesi Province in 2016, several conclusions can be drawn as follows: First, the sectors that are in quadrant I are the procurement of electricity and gas sector, and the manufacturing sector. Meanwhile, there are five sectors in quadrant II including Agriculture, Forestry and Fisheries, Wholesale and Retail Trade; Car and Motorcycle Repair, Transportation and Warehousing, Information and Communication, and Financial Services and Insurance. Furthermore, the other ten sectors are in quadrants III and IV. study indicate that the two sectors in quadrant I denote blue economic sectors. This shows that these two sectors are sectors that have good linkages to the upstream sector and the downstream sector. This means that the procurement of electricity and gas sector, and the manufacturing sector is able to both encourage and attract other sectors in increasing output in South Sulawesi.

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