Blue economy impact and fishery comparative advantage mapping in Sulampua

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Submitted: 29 September 2025 – Revised: 30 October 2025 – Accepted: 03 December 2025

Abstract

This research examines the impact of blue economy factors on economic growth in Sulampua. In this research, the blue economy variable is displayed by the fisheries sector, which is proxied by the blue economy variable, which is represented by the fisheries sector which is proxied using marine capture fisheries production. This research used annual panel data at the provincial level in the Sulampua region covering the period 2018 to 2022. The analytical tool used in this research is panel data regression analysis using the Fixed Effect Model (FEM). The analysis results show that the blue economy factor significantly contributes to economic growth when a country's blue economy is well mapped, integrated within a strong institutional framework, and underpinned by concrete policies and research. In this way, spillover effects will be created, such as infrastructure growth, job creation, and the alleviation of poverty through the social inclusion of residents of coastal areas. Based on Revealed Comparative Advantage (RCA), Maluku, South Sulawesi, and North Sulawesi have comparative advantages in fishery products compared to other provinces.

Keywords: blue economy; economic growth; Sulampua; RCA
JEL Classification: C22; I18; R11

Recommended Citation
Davani, I., Sa'dia, N. H., and Azhar, A. (2025). Blue economy impact and fishery comparative advantage mapping in Sulampua. *Jurnal Ekonomi Indonesia.* 14(3), 209-223. DOI: https://doi.org/10.52813/jei.v14i3.570

Available at: https://jurnal.isei.or.id/index.php/isei

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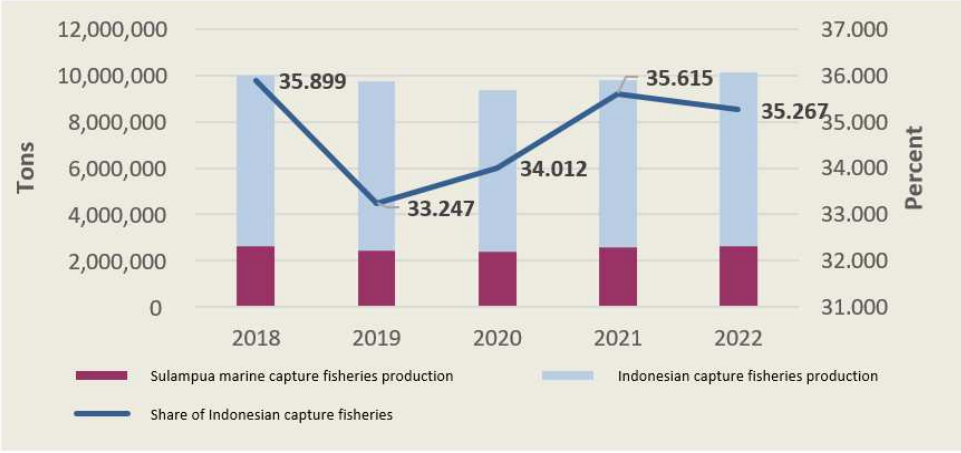
1. Introduction

With 17,374 islands spread across two oceans and two continents, and a sea area of 3,257,483 km^2, Indonesia is a large maritime country. As a maritime country, Indonesia has enormous marine resources potential, especially in the fisheries sector. Every year, marine catches from Indonesian fisheries contribute significantly to global production. In 2023, Indonesia became the second-largest fish producer in the world, with fisheries production reaching 24.74 million tons and a production value of 463.53 trillion rupiah. However, the contribution of the fisheries sector to Indonesia's Gross Domestic Product (GDP) remains minimal. In 2023, the fisheries sector only contributed 2.73 percent to Indonesia's Gross Domestic Product (GDP) (KKP, 2024).

The fisheries sector, which makes a relatively small contribution to GDP, has three strategic values that cannot be ignored (WRI-Indonesia, 2022). First, the fisheries sector is a significant provider of employment in Indonesia, especially in coastal areas and small islands that depend on marine products as their primary source of livelihood. Second, the fisheries sector also makes an essential contribution to the national food security. Fish is an important source of animal protein for the Indonesian people, especially in areas that are difficult to reach by other protein sources. Third, the fisheries sector has the potential to develop further with good management and the use of appropriate technology. An example of the development of the fisheries sector that can increase its contribution to the national economy while maintaining the sustainability of marine resources is the cultivation of fish, shrimp, and shellfish in aquaculture.

Figure 1.
Fisheries production (tons) and fisheries share (percent)



Source: Katadata Insight Centre (2023)

Production of fisheries catches in Indonesia is dominated by marine fishing, and the regions with the most significant contributions are Sulawesi, Maluku, and Papua (Sulampua). Sulampua is known for its abundant and diverse marine resources,

including various types of fish, shrimp, lobsters, and other aquatic organisms. The fisheries sector in the Sulampua region reflects the vast and diverse marine resource potential of eastern Indonesia.

Sulawesi Island, particularly its northern and eastern areas, is rich in marine resources, with Bitung City in North Sulawesi recognised as a major centre for fishing and fish processing activities in Indonesia. In this region, fishermen use a variety of methods, including nets, fishing rods, and other traditional gear.

The Maluku Islands, located between two oceans, benefit from high levels of plankton and abundant marine resources, making the region one of the most productive areas for capture fisheries. Maluku is exceptionally well known for its red snapper, which is widely exported to international markets, as well as for its substantial catches of shrimp and lobster.

Meanwhile, the waters of Papua Island, particularly in West Papua and Papua, are also rich in marine resources and renowned for their extraordinary marine biodiversity. These waters are home to economically important species, including tuna and grouper. Fishermen in Papua generally rely on traditional gear, including nets and rods, to catch fish in the surrounding waters (FAO, 2022).

Capture fisheries production in Indonesia during the period 2018 to 2022 ranged from 6,989 thousand tons to 7,489 thousand tons. The Sulampua region is the most significant contributor to Indonesia's total capture fisheries production, which is 35.27 percent in 2022 (Figure 1). However, the fisheries sector is not the primary contributor to the economy of each province in Sulampua.

There is empirical evidence on the influence of the fisheries sector on the economy, but the results are highly diverse. The fisheries sector has a positive impact on economic growth (Alharthi & Hanif, 2020; Elzaki, 2024; Garcia-de-la-Fuente et al., 2016; Madhoo, 2011; Ng'onga et al., 2019; Roberts, 2017; Surís-Regueiro et al., 2014).

On the other hand, the fisheries sector is not significant in influencing economic growth due to low domestic fisheries yields, considerable loss of foreign exchange earnings as a result of increasing fish imports to bridge the gap between demand and supply of fisheries products, fluctuations in fish and fish-related product prices in domestic and international markets, and human activities that have an impact on environmental damage (Oyakhilomen & Zibah, 2013; Dey, 2020).

The results of the above research apparently yield different parameter estimates because the data and models used differ. Thus, it remains a debate whether the fisheries sector affects economic growth. Furthermore, it is necessary to update the data to capture the current impact of the fisheries sector on the economy, especially in the Sulampua area. The initial hypothesis is that the fisheries sector can have a significant effect on the local economy. Empirical evidence on the contribution of the fisheries sector to regional economic growth, especially in Indonesia, is rarely examined in the literature.

Therefore, it is essential to measure the impact of the fisheries sector in terms of the blue economy factor on marine capture fisheries against the economy in Sulampua and map the comparative advantages of fisheries products in each province in Sulampua. The analysis in this study uses provincial-level panel data regression in the Sulampua area.

In addition, to determine the potential of fisheries products in each province in Sulampua, a mapping of the advantages of fisheries products was carried out using the Revealed Comparative Advantage (RCA) method. Blue Economy is the separation of socio-economic development from environmental degradation, which is

traditionally seen as the global status quo (United Nations Conference on Sustainable Development, 2012).

The concept of blue economy can be aligned with economic and trade activities, integration of conservation and sustainability in the management of maritime areas (Smith-Godfrey, 2016). If maintained effectively, the utilization of the blue economy can have a positive impact on the economic growth of a country (Eikeset et al., 2018). The blue economy is also defined as a form of business in marine-based regional development that includes marine ecology and environment (Saksono, 2013).

Coasts and oceans are biological systems and represent effective resources that can strengthen financial and economic development (Voyer & Van Leeuwen, 2019). One of the human activities that affects the world's oceans is fishing. The fisheries sector has economic, social and nutritional significance in various countries. Specifically, fish and fisheries make a significant contribution to the livelihoods of individuals in coastal areas.

Fisheries production, both aquaculture and capture, is a national resource that provides food, ensures livelihoods, and creates jobs (Rehman et. al., 2019). In 2020, an estimated 58.5 million people were employed as full-time, part-time, occasional or indefinite workers in fisheries and aquaculture (FAO, 2022). Further explained, by subsector, 35 percent worked in aquaculture and 65 percent in capture fisheries. This study concluded that fisheries-based households contribute significantly to the local economy and national fish production. The involvement of fisheries-based households in fisheries activities stimulates the local economy through mobilization of capital and labor (Ng'onga et al., 2019).

As an archipelagic country, Indonesia has great potential in the marine and fisheries sector. In 2020, Indonesia was included in the top ten fishing producers (seawater fishing and inland waters fishing) in the world (FAO, 2022). Capture fisheries production in Indonesia is dominated by marine fishing. The most significant contributors to capture fisheries production in Indonesia are the regions of Sulawesi, Maluku, and Papua (Sulampua) (BPS, 2023). However, the fishing industry still needs to prioritise the sustainability of the ecosystem and environment, because rapid growth in the fisheries economy will be in vain if the ecosystem is damaged and there is no guarantee that economic growth will persist in the future (Sari & Muslimah, 2020).

Restoring ecosystems to healthy, productive conditions and protecting long-term aquatic food supplies are essential. Rebuilding overfished fish stocks can increase fisheries production and the contribution of marine fisheries to food security, nutrition, economic growth and the well-being of coastal communities (FAO, 2022).

Fish is one of the sources of animal protein, vitamins and other nutrients needed for human health. The fisheries sector plays a vital role in the economies of developing countries (Rehman et al., 2019). Overall, the fisheries sector can not only guarantee food security in Indonesia, but can also be a source of income, so this sector must be independent and sustainable.

The fisheries sector plays a vital role in economic development, both nationally and regionally, by creating jobs, increasing foreign exchange through exports, and providing food supplies. The contribution of aquaculture and capture fisheries to gross domestic product (GDP) is one of the most widely used indicators of economic performance. Given the importance of the fisheries sector to the economy, many studies have examined how it affects the economy.

Several relevant studies have used input-output models to estimate the impact of fishing and other maritime activities on the local or regional economy (Surís-Regueiro et al., 2014; Garcia-de-la-Fuente et al., 2016; Roberts, 2017). The impact of these production activities extends beyond job creation to the possibility of earning income in other economic sectors.

Several studies have shown the relative contribution of fish production to GDP using various econometric techniques. In a related study, Madhoo (2011) used the feasible generalised least squares method to examine the effect of marine fish production on GDP and found a relationship between GDP per capita and fish catch in Mauritius. On the same subject, Ng'onga et al. (2019) tested the contribution of fish production to GDP by applying a causality test. They found that fisheries will definitely contribute to the local economy at the household level. A recent study conducted by Elzaki (2024), estimated the impact of marine fish on economic growth and food security using heterogeneity dynamic cointegration and FMOLS estimators and concluded that marine fish production has a positive effect on economic growth.

Rehman et al. (2019) conducted a study to examine the relationship between aquaculture, capture fisheries production, and economic growth in Pakistan from 1970 to 2015. Their study was based on annual time series data. To examine the dynamic causality among the study variables, the researchers used the autoregressive distributed lag (ARDL) model. The findings of this study indicate that aquaculture and capture fisheries production have had a positive impact on economic growth. Further, it explained that better infrastructure for the fisheries industry, increased government spending on facilities and financial support for fish farmers can contribute to economic growth in the future.

Similar findings were also reported by Alharthi & Hanif (2020), who analysed the blue economy factor and concluded that it plays a statistically significant role in the economic growth of South Asian Association for Regional Cooperation (SAARC) countries. It is explained in their findings that the blue economy contributes to the achievement of the United Nations' sustainable development, namely to conserve and sustainably utilize oceans, seas, and marine resources for sustainable development. Ilyas et al. (2022), the fisheries subsector has a positive effect on Gross Domestic Product per capita.

Eyüboğlu & Akmermer (2024) analyzed the effect of fisheries production on economic growth using the Auto Regressive Distributed Lag (ARDL) model in 1990-2019. The results of the study found a positive long-term relationship between fisheries production and economic growth. However, a survey conducted by Sugiawan et al. (2019) confirmed that economic growth initially caused damage to marine ecosystems. However, with a per capita income level of around 3,827 USD, a beneficial impact of economic growth on the sustainability of marine fisheries was found.

Not all studies related to the role of the fisheries sector in accelerating economic growth reach positive conclusions. According to Oyakhilomen & Zibah (2013), fisheries production does not significantly influence economic growth. Explained in their analysis, this is due to the low domestic fisheries yields of Nigeria and the loss of substantial foreign exchange earnings as a result of increasing fish imports to bridge the gap between demand and supply of fisheries products

The statement of Oyakhilomen & Zibah (2013) is supported by the results of the analysis of Dey's (2020) time-series analysis. The results of the hypothesis test show that fisheries production has no significant impact on GDP in Bangladesh. In its

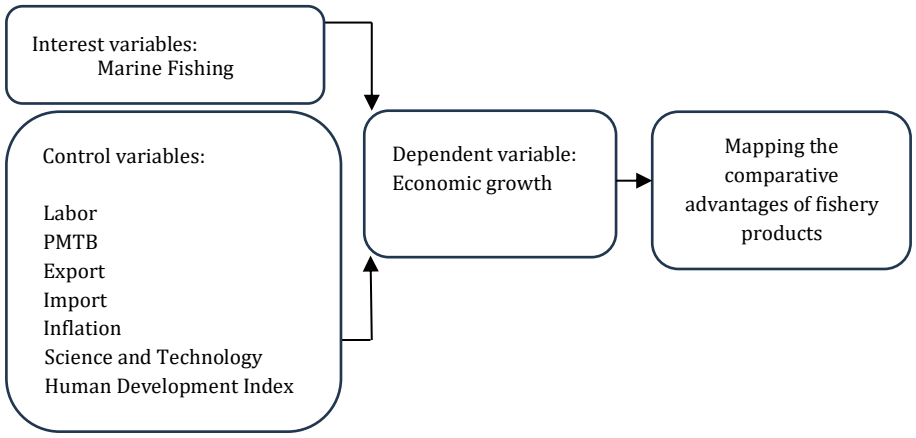
discussion, it is explained that this insignificant impact can be caused by unfavourable climatic conditions, fluctuations in the prices of fish and related products in domestic and international markets, and human activities that contribute to environmental damage.

Overall, relevant studies show mixed results regarding the contribution of the fisheries sector to economic growth. However, in general, the fisheries sector is believed to be a catalyst for economic development. Empirical evidence on the contribution of the fisheries sector to local economic growth, especially in Indonesia, is still rarely examined in the literature. Based on previous studies, the fisheries sector is a marine-based activity and a blue economy factor that can impact the local economy in the Sulampua area. The analysis in this study uses provincial-level panel data and a fixed-effects panel data regression model. In addition, a mapping of the superiority of fisheries products of each province in the Sulawesi, Maluku, and Papua (Sulampua) regions was carried out using the Revealed Comparative Advantage (RCA) method.

2. Methodology

The population in this study comprises ten provinces on the Sulawesi, Maluku, and Papua islands, namely North Sulawesi, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi, Maluku, North Maluku, West Papua, and Papua. The research design focuses on the study to be studied, namely, to determine the comparative advantages of fishery production in the Sulampua area and the magnitude of the impact of the blue economy factor on economic growth in the Sulampua area.

Figure 2.
Research Framework



Source: Processed by Author

The research data sources come from the BPS-Statistics Indonesia and the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (KKP). The data was collected on an annual panel basis at the provincial level in the Sulampua area during the period 2018 - 2022. The collected data were then processed and reviewed according to the relevant theories. Furthermore, research conclusions were

drawn and recommendations were offered that were useful for related parties. The schematic can be shown in Figure 2.

Table 1.
Variables-Variable Research that Used

Variable Types	Name	Definition	Symbol	Unit
(1)	(2)	(3)	(4)	(5)
Dependent variable	Economic growth	The development of production of goods and services in an economic region in a particular year, compared to the value of the previous year, is calculated based on GRDP at constant prices.	*Ecogrowth*	Percent
Interest variable	Sea water fishing	The business of catching fish and other aquatic organisms in marine waters	*Marinfish*	Tons
Control variables	Labor	Proportion of the number of working population aged 15 years and over to the workforce population	*TKK*	Percent
	Gross fixed capital formation	All capital additions made by the government and non-government sectors based on constant prices in a particular year are used as a basis.	*PMTB*	Million Rupiah
	Export	The value of the activity of exporting goods and services from an area, both commercial and non-commercial.	*Exports*	Million Rupiah
	Import	The value of the activity of importing goods and services purchased by residents of a region from other regions	*Imports*	Million Rupiah
	Human development index	An index that measureshuman development achievements with a basic dimension approach to quality of life (long and healthy life, knowledge, and a decent life)	*HDI*	Index value
	Inflation	Rata-average price change in a period, originating from the consumption of a collection of goods and services by residents/households during a specific period of time	*CPI*	Index value
	Information and communication technology development index	The measure of the achievement of information and communication technology development in a region is composed of 11 indicators in 3 sub-index groups (access and infrastructure, use, and skills).	*IPTIK*	Index Value (0-10)

Source: Processed by Author

The broad concept of the blue economy needs to be constrained by the approach used of measure its factors. This study uses the approach of the amount of marine fishing production as the primary variable of interest. The dependent variable uses economic growth. The control variables are the same as those used by Alharthi & Hanif (2020) and Bahrini & Qaffas (2019). The control variables consist of labour, gross fixed capital formation (PMTB), exports, imports, human development index (HDI), consumer price index (CPI) and information and communication technology

development index (IPTIK). The complete use of research variables is presented in Table 1.

In enriching the descriptive analysis, this study applies the Revealed Comparative Advantage (RCA) technique. This technique can describe the comparative advantage of fishery production in Sulampua province in terms of value. RCA is the most widely used method for assessing the comparative advantage of products in a region.

The comparative advantage of a region reflects its export value also known as the Balassa index, with the following formula (Gordeev, 2020):

$$RCA = (X\_ij/X\_j)/(X\_iw/X\_w) \quad (1)$$

The Revealed Comparative Advantage (RCA) value is calculated based on export values, where X_{ij} represents the export value of fishery commodities from a particular province, X_i is the total export value of that province, X_{iw} denotes the export value of Indonesian fishery commodities, and X_w is the total value of Indonesia's exports. A higher RCA value indicates a more substantial comparative advantage of the province.

The RCA value is classified into three categories: an RCA value greater than 1 indicates that the province's export products have competitiveness above the national average, and an RCA value less than 1 indicates that the competitiveness of the province's export products is below the national average. In contrast, an RCA value equal to 1 indicates that the province's export products have the same level of competitiveness as the Indonesian average.

Quality data assurance is crucial for achieving the best results from panel data analysis. The classical assumption-testing stage of panel data analysis is essential. The hope is that the results of the assumption testing are free from all existing violations. The following are the specifications of the model built to measure the impact of the blue economy on the economic growth in the Sulampua region:

$$Ecogrowth_{it} = \alpha_i + \beta_0 . Marinfish_{it} + \beta_1 . Z_{it} + \mu_i \quad (2)$$

The variables used in the RCA calculation are defined as follows: X_{ij} refers to the export value of fishery commodities from a particular province, X_j represents the total export value of that province, X_{iw} denotes the export value of Indonesian fishery commodities, and X_w indicates the total export value of Indonesia.

The techniques used include descriptive analysis, while accompanying Revealed Comparative Advantage (RCA) and inferential analysis. Descriptive analysis provides an overview of the focus of the study. The inferential analysis uses panel data regression to measure the impact of the blue economy on economic growth in the Sulampua region. The application of panel data analysis can provide greater variation in characteristics across observation units and over time; however, it is essential to pay attention to the assumptions made.

Unlike the Ordinary Least Squares (OLS) modelling, which has the assumption of constant individual effects, panel data regression analysis in the form of a Fixed Effects Model (FEM) or Random Effects Model (REM) applies individual provincial effects, assumed to have different values between provinces and constant slopes.

To support the research objectives and assumptions, the analysis in this study uses the Fixed Effects Model (FEM). This choice is reinforced by the explanation of

Nachrowi & Usman's (2006) explanation that the selection of a model must consider the desired analysis objectives. The FEM approach can accommodate differences across provinces, with the interception of each province fixed. However, the difficulty of maintaining the unobserved provincial factors that do not change over time remains, as they still correlate with the variables studied (Cov(X_it,i)=0). For aggregate geographic data, such as country coverage, provinces, and other areas, it is recommended to use the Fixed Effects Model (Wooldridge, 2016).

Even though the Fixed Effect Model has been selected as the preferred model for the desired analysis objectives, it is necessary to test other panel data models to determine the best model. Based on the results of the Chow test (p-value = 0.0000 <), the model chosen is the Fixed Effect Model rather than the Common Effect Model. Furthermore, the results of the Hausman test provide a p-value of 0.0021 < 0.05, so the correct model is the Fixed Effect Model rather than the Random Effect Model.

It turns out that both the Chow test and the Hausman test also provide results and decisions that support the selection of the Fixed Effect Model. Meanwhile, the results of the classical assumption tests indicate that the panel data model is free of violations of homoscedasticity and multicollinearity. The following is the panel-data regression equation using the Fixed Effects Model (FEM).

$$y_{it} = \alpha_i + X_{it}\beta + v_i + \varepsilon_{it} \quad ; i = 1,2,3,\dots,10 \; ; t = 1,2,\dots,5 \tag{3}$$

To test the robustness and reliability of the panel data regression analysis results, a robustness check was conducted using 2 (two approaches, namely, the amount of capture fisheries production (sea and PUD) (symbol: Fishcaptured) and the amount of capture fisheries production and marine cultivation (symbol: Fishcaptqua) against the variable of interest. The results of the robustness check increase the researcher's confidence in the results of the inferential analysis.

3. Results and Discussion

Descriptive statistics of all research variables are discussed in this section. Table 2 presents descriptive statistics of the variables used in the study. Based on Table 2, from 2018 to 2022, the average economic growth in Sulampua was 5.33 percent with a standard deviation of 6.02. The highest economic growth was reached 22.94 percent in North Maluku in 2022.

The average marine capture fisheries production in Sulampua for 2018-2022 was 252,059.3 tons. During the study period, the highest marine capture fisheries production was in Maluku Province, reaching 603 thousand tons in 2018. Meanwhile, the lowest marine capture fisheries production was 64.18 thousand tons in West Sulawesi in 2020.

As with marine capture fisheries, the province with the highest capture fisheries production, consisting of marine capture fisheries and inland public waters (PUD) capture fisheries, was Maluku in 2018. In contrast to overall fisheries production (capture fisheries and marine aquaculture), the province with the highest fisheries production in 2022 was South Sulawesi, at 661.95 thousand tons.

Table 2.
Descriptive Statistics

Variables	Average	Standard deviation	Minimum	Maximum
(1)	(2)	(3)	(4)	(5)
Economic growth (percent)	5.33	6.02	-15.74	22.94
Marine capture fisheries production (tons)	252,059.3	132,721.9	64,182.0	603,000.0
Capture fisheries production (tons)	257,715.8	136,278.1	64,182.0	603,000.0
Fisheries and marine aquaculture production (tons)	301,592.9	164,530.3	84,202.0	661,951.1
Labor force (percent)	95.33	1.53	92.43	97.66
PMTB (million rupiah)	36.00	36.14	7.20	138.99
Exports (Million US$)	41.00	41.28	2.79	194.75
Imports (Million)	37.90	36.31	9.48	175.18
HDI (percent)	68.46	3.59	60.06	73.81
Inflation (percent)	118.97	13.99	103.46	144.15
Science and technology (percent)	5.04	0.74	3.22	5.93

Source: Processed by Author

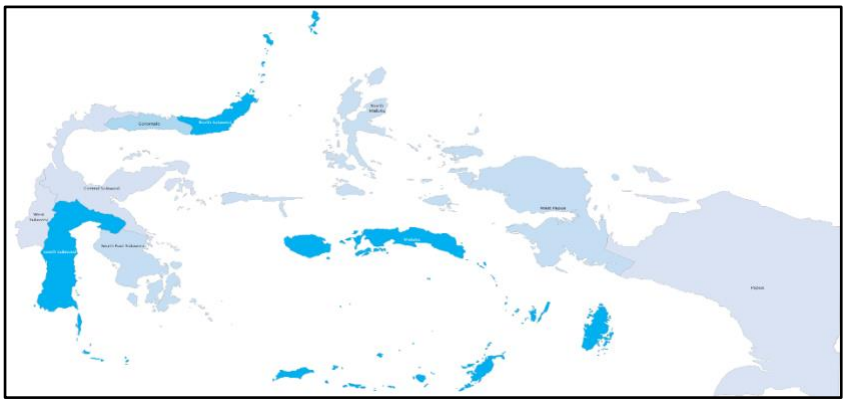
Geographically, the distribution of provinces in the Sulampua area according to the comparative advantage of fishery products, based on the results of the Revealed Comparative Advantage (RCA) calculation, is shown in Figure 3. Based on Figure 3, Maluku Province, South Sulawesi Province, and North Sulawesi Province have comparative advantages in fishery products and are marked in blue during 2018-2022. The three provinces have an RCA value > 1, indicating that their export product competitiveness exceeds the national average.

The government and related parties need to pay attention and synergise, especially for provinces that do not yet have a comparative advantage in fishery products, to grow and pursue the quality of competitiveness of fishery production to increase economic growth significantly, mainly through export activities.

The quality of export products is good, so the number of foreign buyers increases. However, the potential for fishery products in the Sulampua area is still not optimally managed or adequately addressed. The panel data regression results in Table 3 column (1) show the estimation of the marine capture fisheries production approach data as the variable of interest.

The results show that marine capture fisheries production has a positive and significant correlation at the 5% significance level. An increase in fisheries production by 1% will increase economic growth by around 0.12 percent, ceteris paribus. The estimation results indicate that fisheries production has proven beneficial for driving economic growth and is an essential sector of food production in Sulampua.

Figure 3.
Map of the Distribution of Comparative Advantages of Provinces in the Sulampua



Note: The dark blue areas indicate provinces with a Revealed Comparative Advantage (RCA) value greater than 1 meaning they have a strong comparative advantage in marine capture fisheries. The light blue areas represent provinces with RCA values below 1, indicating relatively lower competitiveness in marine capture fisheries compared to the national average.

Source: Processed by Author

Table 3, column (2), and column (3) are models for robustness check. In this case, to obtain a reliable research model, the fisheries sector is not only measured using marine capture fisheries production but involves other approaches. As expected, the fisheries sector approached using marine capture fisheries production and inland public waters (PUD) (column 2) has a positive and significant influence correlated with economic growth at a parameter coefficient of 0.13.

It means that every 1 percent increase in capture fisheries production increases economic growth by 0.13 percent ceteris paribus. In column 3, the economic sector approach using capture fisheries production and marine cultivation produces a positive and significant influence correlated with economic growth with a parameter coefficient of 0.16. It means that every 1 percent increase in fisheries production increases economic growth by 0.16 percent, ceteris paribus.

The significance of the fisheries variable remains stable throughout the specifications, as shown in columns (2) and (3). In all models, the sign of the fisheries production variable remains stable, namely, it is significantly positively correlated and in line with theoretical expectations.

Thus, the analysis provides evidence that the capture fisheries sector can increase the economic growth of the province of Sulampua. In addition, this finding is by several previous studies, namely Alharthi & Hanif (2020), Rehman et al. (2019), Eyüboğlu & Akmermer (2024) which state that the blue economy factor in this case fisheries production plays a statistically significant role in economic growth.

Table 3.
Economic Growth and the Fisheries Sector

	Economic growth		
Symbol	Marine capture	Capture fisheries	Capture fisheries and marine aquaculture

		fisheries	(sea and PUD)	
(1)	(2)	(2)	(3)	(4)
Constants	*C*	-430.7***	-441.54***	-498.40***
Marine capture fisheries production	*Marinfish*	0.12**	-	-
Capture fisheries production (Sea and PUD)	*Fishcaptured*	-	0.13**	-
Production of capture fisheries and marine aquaculture	*Fishcaptqua*	-	-	0.16***
Labor	*TKK*	3.64**	3.62**	3.34**
Gross Fixed Capital Formation	*PMTB*	0.11***	0.11***	0.11***
Export	*Export*	0.20***	0.20***	0.20***
Import	*Import*	-0.19**	-0.19**	-0.19**
Human Development Index	*HDI*	-0.03*	-3.221*	-2.48
Inflation	*CPI*	-0.06	-0.06	-0.06
Science Technology	*IPTIK*	-4.54	-4.64	-5.27**
Observation		50	50	50
Number of Provinces		10	10	10
R^2		0.66	0.66	0.72

***significant at the 1% level, **significant at the 5% level, *significant at the 10% level

Source: Processed by Author

The findings of this study emphasize that the Sulampua provinces have strong potential to leverage marine capture fisheries as a driver of economic growth. Geographically, these provinces are strategically positioned to support the development of marine capture fisheries, capture fisheries in general, and aquaculture.

To sustainably accelerate the sector's growth, several efforts are required, including enhancing the quantity and quality of fisheries production, particularly marine capture fisheries, to improve the population's standard of living, and fostering collaboration among labour union stakeholders to advance the sector. Thus, it is hoped that the fisheries sector can help accelerate economic growth optimally in the Sulampua region (Sari & Musliman, 2020). Sustainable fisheries development must be implemented of line with development principles that benefit the current generation, while still prioritizing sustainability for future generations.

Blue economy policies and programs are the right and practical approach to marine development to encourage the optimal and sustainable utilization of fisheries resources and exploitation. Towards blue economy-based fisheries management, the government must intensify policies related to the following matters, such as revising the Fisheries Law as an effort to protect local fishermen and small fishermen; law enforcement against illegal fishing, and the application of innovation and technology in fisheries management where the use of innovation and technology must reach the application stage for fishermen, including in the form of assistance and maintenance (Sari & Musliman, 2020).

4. Conclusion

The blue economy contributes significantly to economic growth when it is owned by a country, well mapped and integrated into a strong institutional framework, and supported by concrete policies and research. Thus, spillover effects will be created, including accelerated infrastructure development, employment, and poverty alleviation through the social inclusion of coastal residents.

The provinces of the Sulampua region have great potential to utilize the blue economy to grow into a force for economic growth. However, this great potential requires strong political commitment, concrete research, awareness, and positive attitudes within the community to avoid damaging the marine ecosystem. If the utilization of aquatic resources that have not been optimally developed can be managed correctly and adequately, it will not take long for the Sulampua region to progress faster.

Sustainable management of marine resources certainly requires government intervention and collaboration between regions and related institutions. This will help in understanding the concept of the blue economy and is in line with the 2020-2024 Indonesian National Medium-Term Development Plan (RPJMN), which emphasizes the importance of good marine management to achieve the Sustainable Development Agenda. In addition, the development of the blue economy also supports the 14th Sustainable Development Goals (SDGs), namely preserving and utilizing marine and ocean resources sustainably.

Marine fisheries production and marine fish farming have a greater impact than relying solely on marine fisheries. The contribution of marine fisheries to agriculture has great potential to boost the economy of the Sulampua region, along with the marine fisheries sector. The relevant government can facilitate infrastructure to increase the production of capture fisheries and aquaculture, such as cages or ponds for marine fish farming, so that it becomes competitive and a leading sector in the Sulampua region.

In addition, easy financial access also needs to be considered, such as providing more soft credit opportunities so that fishermen and/or marine fish farmers can run their businesses more optimally, even to the stage of exporting their fishery products.

The government is expected to provide socialization and training to improve the skills of fishermen and farmers, especially regarding the latest technology that is effective and efficient to run to increase the production of fishermen and farmers' fisheries businesses. For further research, it can be recommended to use the latest provincial and/or district/city disaggregation (results of expansion) while increasing the number of research sample units.

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