Neo Journal of Economy and Social Humanities (NEJESH) **ISSN: 2828-6480**
Volume 4, Issue 2, 2025.
pp. 259-269 http://dx.doi.org/10.56403/nejesh.v4i2.269

Challenges and Potential of Blue Economy in Supporting Sustainable Development in Luwu Raya

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Article Information

Article History
Received, 30 April, 2025
Revised, 13 June, 2025
Accepted, 28 June, 2025
Published, 30 June, 2025

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ABSTRACT

The Blue Economy and Sustainable Development are two interrelated concepts that mutually reinforce one another. Both hold great potential, especially in regions like Luwu Raya, which has rich marine and coastal resources. However, the practical implementation of the blue economy faces a number of significant challenges. This research aims to explore the potentials and barriers to realizing sustainable development through the blue economy in Luwu Raya. The study employs field research using a descriptive qualitative approach. Data were collected through purposive sampling, selecting participants based on criteria most relevant to the research objectives. The analysis technique utilized is content analysis, which allows for in-depth and systematic examination of various data sources. Data triangulation was also conducted to ensure the validity of the findings. The results indicate that while Luwu Raya has promising marine and fishery resources, several key challenges hinder progress. These include limited innovation in processing marine products into high value-added commodities, low public awareness and literacy regarding environmental sustainability, and minimal adoption of eco-friendly technologies. Although the use of simple fishing gear is environmentally sustainable, it does not contribute significantly to economic growth, thus falling short of blue economy principles. Among all challenges, waste management and environmental pollution emerge as the most pressing issues, as they impact the economic, social, and ecological dimensions of sustainable development. Addressing this through circular economy strategies and targeted government policies could generate employment, boost local incomes, and reduce pollution— ultimately supporting the realization of sustainable development in Luwu Raya.

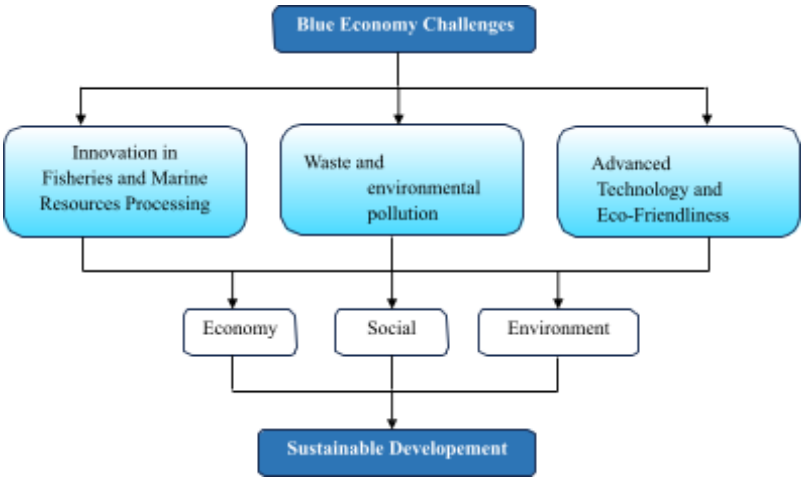
Keywords: Blue economy, Marine resource, Sustainable development.

1. INTRODUCTION

Indonesia has marine and fisheries resources that have great potential in supporting holistic economic aspects. The blue economy concept is one of the strategies in maintaining the sustainability of marine ecosystems so that the production of marine products can encourage production activities and job creation in a region (Lee et al., 2020). The idea of a "blue economy" was conceptualized at the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012 in response to the growing importance of marine and fisheries industries to national economies (Garland et al., 2019). Since then, the concept has been widely discussed around the world. A sustainable ocean economy emerges when economic activity is in balance with the long-term capacity of marine ecosystems (Youssef, 2023). Sustainable development highlights development that focuses on preserving the environment, and one of the strategic focuses in realizing the implementation of sustainable development is through the application of the blue economy (Croft et al., 2024)

Luwu raya is one of the regions in South Sulawesi that has very potential marine and fisheries resources. Luwu raya consists of several city districts including palopo city, luwu district, north luwu district and east luwu district. Geographically, Luwu Raya is located on the banks of the Gulf of Bone. Fisheries resources in the Gulf of Bone area of South Sulawesi Province are a strategic asset to be developed. Potential fish resources in Bone Bay include skipjack, anchovy, baronang, tuna and small pelagics. But the most potential is skipjack (Arham Rumpa et al., 2021). However, behind the abundance of marine and fisheries resources in the Luwu Raya region, there are several problems that occur, including the low level of utilization of fisheries resources (Arfika, 2022) and aquatic waste that has an impact on water quality and marine products (Amru & Makkau, 2023)

This is a challenge for Luwu Raya in implementing the blue economy to support sustainable development. In addition, most coastal communities in Luwu Raya have not used simple modern technology in processing the capture fishery products they obtain. Most of them are only processed into salted fish by drying using the hot sun. Likewise, the use of simple capture technology used by fishermen in catching fish such as trawls, bagangs and simple fishing gear. Management of marine tourism objects is also not yet optimal in East Luwu district (Nurul Hartati, n.d.) (Midlen, 2021). In fact, these challenges can be minimized to optimize the potential of the blue economy from economic, social and environmental aspects so that it has a strong relevance to sustainable development.



Figur 1. Systematic path from blue economy to sustainable development

This research focuses on 3 (three) main challenges in implementing the blue economy, namely innovation, waste and technology. Then, from these 3 challenges can be identified the potential of 3 (three) aspects including economic, social and environmental which are the focus in sustainable development. This illustration can be seen in Figure 1 above

So far there is no specific research that examines the potential and challenges of the blue economy in supporting sustainable development. many studies have only been limited to looking for the relevance between the blue economy and sustainable development (Biru et al., 2024; Darajati, 2023; Lee et al., 2020; Surya Bakti & Lukman Nuzul Hakim, 2024)

2. LITERATUR REVIEW

Blue Economy

Blue economy is a model of sustainable ocean development that promotes the development of ocean spaces in ways that address ecological crises and benefit 'the common good'. However, the dis courses surrounding the blue economy show competing and conflicting notions of what constitutes a blue economy and what makes it sustain able (Voyer et al., 2022). In addition, there is limited evidence of widespread or equitable social and environmental benefits flowing from blue economy developments.

The blue economy has been critiqued as entrenching existing ocean challenges by accelerating economic and industrial development (Stuchtey et al., 2023)for the benefit of powerful actors, at the expense of poor or marginalised communities who continue to bear the brunt of widescale ecological disasters (Lubchenco & Haugan, n.d.) and a changing climate (Croft et al., 2024)

Sustainable Development

The Sustainable Development is represent a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. Within this framework, cybersecurity emerges as a pivotal element, not explicitly mentioned but inherently critical to the achievement of several sustainable development (Adebimpe Bolatito Ige et al., 2024; Lubchenco & Haugan, n.d.)

The Sustainable Development has of 17 guiding targets adopted by United Nation, each focusing on an aspect of human development and sustainability of ecosystems. The constitution and adoption of these goals signifies a universal call to action to address the urgent environmental, social and economic. Sustainable development has been defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It calls for concerted efforts towards building an inclusive, sustainable and resilient future for the people and the planet (Singh et al., 2024)

3. RESEARCH METHOD

This research is designed to examine more deeply what are the potentials and challenges faced by Luwu Raya in implementing the blue economy as a supporting aspect in achieving sustainable development. So that researchers conducted field research with a descriptive qualitative approach in this study. The type of data used is primary data obtained from interviews in the field with several fishermen or coastal communities, fishery and marine product managers, and local governments as research samples. The sampling technique used in determining the sample is purposive sampling, where the researcher determines certain criteria specifically with the aim that the data obtained can be used in exploring this research. Qualitative data analysis techniques used are data reduction, data presentation and conclusion drawing with data validity testing, namely data triangulation.

4. RESULTS AND ANALYSIS

a. Results

Luwu raya is an area located in South Sulawesi province and consists of 4 (four) districts/cities. Luwu raya has enormous maritime potential because it is directly adjacent to the bay of bone. The bay of bone has potential marine resources but there are also many challenges in achieving sustainable development. the following is presented data and or information from field interviews with several informants including fishermen and fishermen's wives, restaurant business owners, seaweed business owners and processed fish entrepreneurs. This data has been reduced by sorting the answers that are considered most relevant and supportive of this research.

Table 1. Results of Data Reduction

Interview Topic	Interview Questions	Informan	Respondent's Answer
Innovation in Fisheries and Marine Product Management	fish and seaweed obtained from fishing are processed into anything	Tuti (Wife of a Fisherman) in Luwu District	*Processed into dried fish because it does not require a lot of money, only using salt and sunlight*
		Rahman (seaweed business owner) in Palopo City	*So far we have not processed, as we focus on collecting and drying. Even then, we have used some labor, but the results and wages depend on the results of the collection and the weather.*
		Daeng Aso (Fisherman) in North Luwu Regency	*If we land and someone wants to buy in large quantities, we sell them immediately. But if not, we usually sell it, but if there are still leftovers, we just dry it in the sun so that it is durable and can be eaten tomorrow*
		Dewi (Fisherman's wife and salted fish crackers maker)	*I had plans to make shredded fish but the process is quite long and takes a lot of time and energy, so I just made salted fish chips. I also packaged and sold them to stalls or online, but the results were not much because they were only sold according to orders, if someone ordered and there were ingredients, then I made more.*

Waste and environmental pollution	**Describe your opinion regarding garbage or waste in the sea**	Herman (Fisherman in Palopo City)	*Every time I go out to sea, I see a lot of trash such as water bottles, food wrappers or plastic, cans, and many more that cause the water to smell and dirty.*
		Taufik (fish seller at the fish auction)	*If it's water waste from fish, we usually throw it in the sea because it's just water and fish blood, but if it's solid waste such as fish that are not good enough, we give it to the cat but there are also some people who I've seen throwing it into the sea.*
		Andi (Fisherman in East Luwu)	*Waste boats that are no longer in use are usually left in the middle of the sea which certainly spoils the sea view.*
		Pipink (Fisherman in Luwu Regency)	*There are still many people who are not aware and always throw garbage in the river and the sea. If you throw it in the river, the river water will flow into the sea and the garbage will accumulate in the sea. There are even animal carcasses that I have gotten, such as cats.*
Use of modern and environmentally friendly technology	What kind of technology is used in processing fishery and fishing products	Daeng Aso (Fisherman and boat owner) in North Luwu Regency	*Only processed into dried fish because it does not require much cost, only using salt and sunlight*
		Rahman (seaweed business owner) in Palopo City	*After we release the seaweed from the nets, we immediately sort it and then dry it under the hot sun for a few days. I don't use any machinery except the boat engine used to search for seaweed.*

Waste and environmental pollution	**Describe your opinion regarding garbage or waste in the sea**	Herman (Fisherman in Palopo City)	*Every time I go out to sea, I see a lot of trash such as water bottles, food wrappers or plastic, cans, and many more that cause the water to smell and dirty.*
		Taufik (fish seller at the fish auction)	*If it's water waste from fish, we usually throw it in the sea because it's just water and fish blood, but if it's solid waste such as fish that are not good enough, we give it to the cat but there are also some people who I've seen throwing it into the sea.*
		Andi (Fisherman in East Luwu)	*Waste boats that are no longer in use are usually left in the middle of the sea which certainly spoils the sea view.*
		Pipink (Fisherman in Luwu Regency)	*There are still many people who are not aware and always throw garbage in the river and the sea. If you throw it in the river, the river water will flow into the sea and the garbage will accumulate in the sea. There are even animal carcasses that I have gotten, such as cats.*
		Ridwan (restaurant business owner in East Luwu district)	*As for modern technology in the cooking process, I don't think there is any because we still use gas stoves. Maybe it's just the marketing process that uses technology digital because I made Instagram but rarely update the news. Unless there is free time and opportunity*

	Dian (shredded fish seller in palopo city)	*In making shredded fish, I only use a gas stove in the cooking process. The process of separating the fish meat and the spines is also done by hand, but I am usually assisted by neighbors who are used to helping me. For sales, I leave it at stores or stalls. For packaging, I pack it in plastic mica.*

Source : data processed (2025)

From table 1 above, a matrix can be created between the challenges and the economic, social and environmental potential of each challenge, which is presented in table 2 below:

Table 2. Challenges and Potency of Economic, Social and Environment

Potency / Challenges	**Economy**	**social**	**Environment**
Innovation in Fisheries and Marine Product Management.	√	√	
Waste and environmental pollution	√	√	√
Use of modern and environmentally friendly technology	√		√

Source : data processed (2025)

From table 2 above, it can be seen that of the 3 challenges, only 1 can touch the potential of the economic, social and environmental aspects. While in innovation and only touches 2 aspects, namely economic and social. Then technology touches 2 aspects of potential, namely economic and environmental aspects. Of all the potential, only the economic aspect can be touched by all existing challenges. This means that the economic potential is very large if these challenges can be dispelled by the government and society.

b. Analysis

The blue economy is present as one of the supporters of achieving sustainable development in addition to the green economy. As the pillars of sustainable development focus on economic, social and environmental aspects, the challenges in the blue economy are very relevant to the focus of sustainable development. Sustainable development has 17 goals or objectives that refer to these three aspects or pillars. Sustainable development was born because of a development system that increasingly has a negative impact on social life and the environment. so that the achievement of sustainable development

indicates a balance between development that is oriented towards economic and social aspects by prioritizing environmental sustainability as a resource that can be felt in a sustainable manner.

Table 2 above shows that amidst the challenges of innovation in the management of marine and fisheries products, there are favorable economic and social potentials. This means that, if the community in luwu raya is able to increase their innovation and creativity in processing marine and fishery products into products that have high added value, it can increase their income, and if their income increases, then the flow of capital will also increase so that business expansion increases, and employment from the social aspect also increases so as to overcome the problem of unemployment which is a problem in the social economy (Midlen, 2021). The people of Luwu Raya currently only process their marine resources in traditional ways, namely by drying so as to produce dried fish and dried seaweed products. No one is serious about developing businesses such as canned products, shredded fish, fish crackers, amplang, or local specialties modified with marine products. This is due to the characteristics of the community who still always rely on easy and cheap processes, only by relying on solar energy and the use of salt which is affordable for the community. Compared to having to be processed, for example by making shredded fish. The processing process is long and requires more capital to buy spices and cooking utensils as well as packaging equipment. This is why the people of Luwu Raya are more likely to process their marine and fishery products by drying them (Susanto et al., 2024). This result is in line with research (Raihansyah et al., n.d.) Which explains that the main strategy in implementing the blue economy is to increase innovation in processing fishery and marine products into economic products that are in demand by the community.

In addition, another challenge of the blue economy is waste and environmental pollution. one of the development problems that is identical to developing countries like Indonesia is environmental issues (Martínez-Vázquez et al., 2021). Low literacy and education lead to low environmental awareness in the community so that environmental pollution is considered normal (Lubchenco & Haugan, n.d.). In addition, the dynamics of culture and lifestyle in the community that tend to be instantaneous lead to high levels of plastic solid waste that is difficult to decompose (Verawati, 2022). This has led to the accumulation of solid waste in the community. Luwu raya also has many rivers that drain into the sea or the bay of bone. The rivers flow from the mountains, passing through residential areas and emptying into the sea. So that many residents still dispose of their waste into the river, both solid waste and liquid waste. These wastes flow and pollute along the river until they reach the sea. Sea water is polluted, fish that live in the sea are polluted by waste and have an impact on the catch of fishermen. In fact, if these wastes are processed by the community into products needed in the community, for example processing plastic waste into wall hangings or tablecloths. Plastic bottle waste is processed into flower pots or various other processed products based on the green industry. This can absorb labor from the social sector, can increase community income through empowerment and of course reduce the impact of pollution on the environment. This result is in line with research (Gómez & Maynou, 2021) which explains that polluted seawater threatens marine ecosystems and biodiversity so that it can have an impact on the health and social economic conditions of the community.

Then the last is the challenge of the latest technology and environmentally friendly. specifically for luwu raya, so far the process of fishing and searching for seaweed is still using simple equipment so it is still environmentally friendly. however, besides the positive impact on the environment. However, in addition to its positive impact on the environment, it has a negative impact that is also quite serious. Especially

in the processing of marine and fishery products that should be able to improve the welfare of the community through the provision of employment, but so far it has not because the sales of processed products are still low. There are several respondents who have opened seafood-based restaurants, but they are still low in employment in the social aspect. This result is in line with research (Hutajulu et al., 2021; Susanto et al., 2024) which explains that the use of technology has a positive impact on production results but is always unfriendly to environmental aspects.

2. CONCLUSION

The challenges of innovation in processing fishery and marine products, waste and environmental pollution, and the use of the latest and environmentally friendly technology in Luwu Raya are still serious problems in the community. Whereas these challenges have potential from economic, social and environmental aspects if these challenges can be faced by the community and local government. Innovation in processing fishery and marine products including processing the potential of marine tourism can increase the economic income of the community through employment that touches social aspects. Waste and environmental pollution if minimized through managed waste utilization and increased public environmental awareness can create new jobs based on green business. This can certainly increase the economic income of the community while supporting environmental sustainability. Meanwhile, the challenge of using the latest and environmentally friendly technology has greater economic and social potential because for environmental aspects, fishing gear is simple, so it is still friendly to the environment. However, this aspect has its own challenges because the catch is limited, economic income is also limited, limited capital has an impact on the absorption of labor which is also limited. So that the challenges and potential for the application of the blue economy in luwu raya have not been able to provide full support in realizing sustainable development in luwu raya. The government and society still need to focus on the optimal application of the blue economy in Luwu Raya.

The community is expected to cooperate with the government to carry out innovative activities in the management of fishery and marine products such as making canned fish or canned food, shredded fish, amplang, fish crackers, multipurpose side dishes and even cosmetics. The government needs to stimulate the community to improve the capital aspect so that the management can involve the latest technology that is friendly to the environment. In addition, the government is expected to increase socialization related to public environmental awareness with the aim that people no longer throw garbage in the sea or river. the government also needs to invite and empower the community through economic value waste processing. This can expand employment, increase community economic income and create environmental sustainability.

ACKNOWLEDGEMENTS

Thank you and my highest appreciation goes to the informants who have been open and given their time. Thank you to the institution in this case, the Palopo State Islamic Institute which gave full support to the author to complete this research.

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