

Strategy for Improving the Economy of Seaweed Farmers Through Strengthening Infrastructure and Technology in Tekolabbua Urban Village

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Info Artikel	ABSTRAK
<i>Article history:</i> Received Jun, 2026 Revised Jun, 2026 Accepted Jun, 2026 <i>Kata Kunci:</i> Pembangunan Berkelanjutan; Pendapatan Masyarakat; Perencanaan Pembangunan; Produk Lokal; Rumput Laut; Teknologi dan Infrastruktur Pendukung <i>Keywords:</i> Community Income; Development Planning; Local Products; Seaweed; Supporting Technology and Infrastructure; Sustainable Development	Penelitian ini bertujuan menganalisis strategi perencanaan pembangunan berkelanjutan berbasis potensi produk lokal jenis rumput laut guna meningkatkan pendapatan masyarakat tempatan di Kelurahan Tekolabbua, Kecamatan Pangkajene, Kabupaten Pangkep. Penelitian menggunakan pendekatan deskriptif kualitatif dengan teknik pengumpulan data melalui Focus Group Discussion, wawancara, observasi lapangan, dan dokumentasi. Informan penelitian meliputi kelompok pembudidaya rumput laut, kelompok perempuan, tokoh masyarakat, ketua kelompok, dan pemangku kepentingan terkait. Hasil penelitian menunjukkan bahwa Tekolabbua memiliki potensi ekologis dan sosial yang kuat untuk pengembangan rumput laut, terutama karena ketersediaan tambak, pengalaman budidaya masyarakat, dan keberadaan kelompok lokal. Namun, strategi pembangunan belum optimal karena budidaya masih tradisional, pengolahan pascapanen terbatas, kelembagaan ekonomi lemah, akses pasar bergantung pada tengkulak, dan pendapatan masyarakat fluktuatif akibat harga serta kondisi lingkungan. Temuan penelitian menegaskan perlunya strategi terpadu yang mencakup peningkatan kapasitas sumber daya manusia, penguatan koperasi atau lembaga ekonomi lokal, diversifikasi produk, kemitraan pasar, penyediaan infrastruktur pascapanen, dan mitigasi risiko lingkungan. Kebaruan penelitian ini terletak pada pengintegrasian dimensi hulu-hilir, kelembagaan, nilai tambah, pemberdayaan perempuan, dan keberlanjutan lingkungan dalam satu kerangka perencanaan pembangunan lokal berbasis rumput laut. Secara praktis, hasil penelitian ini memberikan dasar bagi pemerintah daerah dan masyarakat dalam merancang program pengembangan rumput laut yang partisipatif, adaptif, dan berkelanjutan di wilayah pesisir lokal. ABSTRACT This study aims to analyze sustainable development planning strategies based on the potential of local seaweed products to increase the income of the local community in Tekolabbua Urban Village, Pangkajene District, Pangkep Regency. This study uses a descriptive qualitative approach with data collection techniques through Focus Group Discussions, interviews, field observations, and documentation. The research informants included seaweed farmer groups, women's groups, community leaders, group leaders, and relevant stakeholders. The results show that Tekolabbua has strong ecological and social potential for seaweed development, particularly because of the availability of ponds, the community's cultivation experience, and the existence of local groups. However, the development strategy has not



been optimal because cultivation is still traditional, post-harvest processing is limited, economic institutions are weak, market access depends on middlemen, and community income fluctuates due to prices and environmental conditions. The findings emphasize the need for an integrated strategy that includes improving human resource capacity, strengthening cooperatives or local economic institutions, product diversification, market partnerships, the provision of post-harvest infrastructure, and environmental risk mitigation. The novelty of this study lies in the integration of upstream-downstream dimensions, institutions, added value, women's empowerment, and environmental sustainability within a single framework of seaweed-based local development planning. Practically, the results provide a basis for local governments and communities in designing participatory, adaptive, and sustainable seaweed development programs in local coastal areas.

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1. INTRODUCTION

Sustainable development in coastal areas has an important position because these areas are not only living spaces for communities but also local economic bases that depend on marine and fisheries resources (Daaris & Marwah, 2024). In the context of Pangkep Regency, particularly Tekolabbua Urban Village, seaweed potential is one of the local commodities that is relevant to be developed as a driver of the local community's economy. Sustainable development planning requires a balance between economic growth, social strengthening, and environmental protection (Handini et al., 2025). Therefore, local-potential-based development cannot be directed only toward increasing production, but must also include community capacity building, economic institutions, post-harvest processing, infrastructure support, market access, and environmental sustainability. This view is in line with development planning ideas that place basic strategies, sectoral policies, financing, and institutional strengthening as important elements in regional development (Januari et al., 2024; Wibowo, 2008).

In recent literature, seaweed is viewed as a commodity with economic and ecological value. Munaeni et al. (2023) explain that seaweed has potential as a food source, a source of bioactive compounds, renewable energy, and a commodity that supports the economy of coastal communities. Seaweed cultivation is also relatively simple, has a short maintenance period, and can contribute to sustainable development because of its role in coastal ecosystems (Tunardjo et al., 2024). Fatmala et al. (2023) emphasize that seaweed cultivation can become a source of income for coastal communities, especially when it is managed through local economic development. Meanwhile, Rahmadi et al. (2025) show that seaweed development in Indonesia still faces both challenges and opportunities, particularly in cultivation, technology, product quality, and strategic recommendations. Thus, seaweed development in Tekolabbua needs to be understood as a local development agenda that requires an integrated strategy, not merely as raw-material production activity.



The main problem in this study is the suboptimal strategy of sustainable development planning based on local seaweed potential in increasing local community income, particularly in optimizing cultivation and post-harvest processes related to infrastructure support for optimizing production results in Tekolabbua Urban Village. The ecological and social potential of the community is quite large, but it has not fully generated stable income growth because cultivation remains traditional, post-harvest processing is limited, economic institutions are not yet strong, market access still depends on middlemen, and environmental risks have not been managed systematically. The general solution needed is the formulation of a sustainable development strategy that integrates production, processing, institutions, marketing, infrastructure, and environmental risk mitigation. With this approach, seaweed is not only a cultivated commodity but can also develop into a local economic base that provides added value and strengthens the welfare of coastal communities.

The literature on development planning shows that development strategies must be prepared in a directed, participatory, and change-oriented manner toward the economic structure of the community. Wibowo (2008) explains that development planning includes efforts to increase income, expand employment opportunities, promote equitable development, develop community economic institutions, and maintain economic stability. In this study, this idea is relevant because the Tekolabbua community needs a strategy that not only increases seaweed cultivation output but also strengthens the local economic structure through cooperatives, business groups, training, and market access. Januari et al. (2024) also position strategic planning as an instrument to ensure that development proceeds sustainably without sacrificing the needs of future generations. Therefore, seaweed development strategies in Tekolabbua need to be designed within a long-term framework that connects the community's economic needs with the sustainability of coastal resources.

In terms of commodity development, Tahang et al. (2019) emphasize the importance of increasing seaweed production through cultivation expansion, technological innovation, extension services, development of processing industries, provision of quality seedlings, capital assistance, institutional strengthening, and improvement of seaweed quality. Busthanul et al. (2021) also show that cooperatives play an important role in strengthening seaweed farmers' economic institutions, especially through increasing production quantity and quality, partnership development, capital accumulation, innovation adoption, and priority setting. Meanwhile, Sukrin et al. (2025) position seaweed cultivation as a source of income for coastal communities. These three references strengthen the view that increasing community income cannot be achieved through production alone, but must also be accompanied by economic institutions, quality improvement, processing, and strengthening farmers' bargaining position in the marketing chain.

Studies on seaweed generally show that this commodity has strong economic potential for coastal communities. Munaeni et al. (2023) state that seaweed can be developed into various useful products, including those for food, health, energy, and industrial needs. In the local context, Fatmala et al. (2023) affirm that seaweed cultivation can support local economic development as a source of community income. However, the literature has more often emphasized the potential and economic contribution of seaweed in general. Discussion of how this potential is translated into an integrated local development planning strategy still needs to be strengthened. This is important because the condition of coastal communities is determined not only by production capacity but also by human resource capacity, institutional support, access to capital, technology, markets, and the ability to respond to environmental change.

The research gap is also evident in the limited discussion that connects seaweed development with local value chains, the role of women's groups, and environmental risk mitigation within one planning framework. Hayashi et al. (2024) show that sustainable aquaculture needs to consider production sustainability and the environmental context. Rahmadi et al. (2025) also emphasize the challenges and opportunities in seaweed cultivation in Indonesia that require strategic recommendations. However, in the Tekolabbua context, the problems that arise are more



specific, namely farmers' dependence on middlemen, weak economic institutions, limited product diversification, low post-harvest processing capacity, and the absence of an established environmental adaptation strategy. Therefore, this study fills the gap by offering a location-based, participatory, and income-oriented sustainable development planning approach for the local community.

This study aims to analyze sustainable development planning strategies based on the potential of local seaweed products to increase the income of the local community in Tekolabbua Urban Village, Pangkajene District, Pangkep Regency. The novelty of this study lies in the development of an integrative approach that positions seaweed as the axis of coastal economic development, not merely as a cultivation commodity. This study connects farmer capacity building, local economic institutions, product diversification, women's group involvement, direct market access, the provision of supporting infrastructure, and environmental risk mitigation as one framework of sustainable development strategy. The scope of this study is limited to social, economic, institutional, planning, and environmental dimensions in seaweed development in Tekolabbua Urban Village. This study does not discuss laboratory analysis of seaweed quality, technical aquaculture experiments, or macroeconomic analysis of the national seaweed industry. The main focus is directed toward understanding the actual condition of the community, seaweed management problems, opportunities for increasing added value, and development strategies that match the needs and characteristics of the local community.

2. LITERATURE REVIEW

2.1 *Theoretical Framework*

This study is based on the theoretical framework of sustainable development planning, local potential development, and income improvement among coastal communities. Sustainable development planning theory views development as a process directed toward meeting the needs of the present generation without reducing the ability of future generations to meet their own needs (Hariram et al., 2023). In this study, the theory is used to explain how development strategies in coastal areas must integrate economic, social, and environmental aspects. Januari et al. (2024) emphasize that strategic planning for sustainable development is needed so that the development process is directed and able to respond to long-term problems. Meanwhile, Wibowo (2008) explains that development planning includes efforts to increase socio-economic growth, increase income, diversify the economy, expand employment opportunities, promote equitable development, strengthen community economic institutions, and maintain economic stability. This framework is relevant because seaweed development strategies in Tekolabbua cannot be understood merely as production programs, but as a process of strengthening the local economy that requires institutions, markets, infrastructure, and environmental sustainability.

The second theoretical framework relates to the development of local potential based on seaweed commodities. In this study, seaweed is positioned as a local resource that has economic, social, and ecological value. Munaeni et al. (2023) explain that seaweed has potential as a source of protein, bioactive compounds, food ingredients, renewable energy, and a commodity that contributes to the development of coastal communities. Fatmala et al. (2023) also place seaweed cultivation as part of local economic development that can become a source of community income. In previous studies, seaweed potential has often been used to explain economic opportunities for coastal communities, especially through cultivation, processing, and marketing Msuya et al. (2022). However, in this study, local potential development theory is used more broadly to examine how seaweed potential can be transformed into a development strategy that includes farmer capacity building, product diversification, institutional strengthening, market access, and environmental risk mitigation.

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The third theoretical framework is community income theory, which explains the relationship between economic activity, production costs, revenue, and household welfare. Seaweed farmers' income is understood as the difference between production revenue and all costs incurred in one production period (Bakarbessy, 2023). Community income is also influenced by production volume, selling price, market access, operational costs, weather conditions, and bargaining position in the marketing chain (Kuijpers et al., 2024). Sukrin et al. (2025) emphasize that seaweed cultivation can become a source of income for coastal communities. However, such income is not always stable if the community still depends on middlemen, has no direct access to markets, and has not developed processed products (Hidayat et al., 2024). Therefore, income theory is used in this study to explain that increasing the income of the Tekolabbua community is not determined only by harvest output, but also by planning strategies that can increase added value, strengthen economic institutions, and expand market access.

2.2 Sustainable Development Planning Strategy

A sustainable development planning strategy is the process of formulating development directions, policies, and programs aimed at creating a balance between economic growth, social welfare, and environmental sustainability. In the context of coastal communities, this strategy is important because the community's economic resources are highly dependent on natural conditions and ecosystem stability. Wibowo (2008) explains that development planning must include basic policies, development frameworks, financing, sectoral policies, and investment programs. This view shows that development cannot run partially, but needs to be designed as one system that connects community needs, resource capacity, and the direction of regional development. In this study, sustainable development planning strategies are used to understand how seaweed can become the basis of local development in Tekolabbua through strengthening production, post-harvest processing, marketing, institutions, and environmental protection.

Previous studies show that seaweed development strategies need to be implemented in an integrated manner. Tahang et al. (2019) emphasize that seaweed development can be carried out through cultivation expansion, technological innovation, farmer extension services, development of processing industries, provision of quality seedlings, capital assistance, institutional strengthening, and improvement of product quality. Busthanul et al. (2021) also show that cooperatives can serve as an important instrument in strengthening seaweed farmers' economic institutions through increased production, partnership development, capital accumulation, innovation adoption, and priority setting. Based on these two studies, development planning strategies in this study are directed toward strengthening a local system that not only encourages increased cultivation output but also improves the community's bargaining position in the seaweed economic chain.

2.3 Potential of Local Seaweed Products

Seaweed is a coastal commodity with great potential to be developed as a source of local community income. Munaeni et al. (2023) explain that seaweed consists of various types, such as green, brown, and red seaweed, which are distributed in intertidal, tidal, and subtidal areas. Several widely known types of seaweed include *Gracilaria*, *Eucheuma*, *Gelidiella*, *Sargassum*, *Turbinaria*, *Ulva*, and *Caulerpa*. In the Tekolabbua context, seaweed is an important commodity because aquatic and pond conditions support cultivation activities. The attached article shows that the characteristics of the Tekolabbua area allow the community to develop seaweed cultivation, particularly *Gracilaria*, as a main source of livelihood. This potential indicates that seaweed is not only a fisheries commodity but can also become a basis for local economic development among coastal communities.



Seaweed potential lies not only in raw material production but also in opportunities for processing it into value-added products. In the attached article, several derivative products that have the potential to be developed include seaweed crackers, seaweed flour, gelatin or agar, soap, facial masks, lotion, bioplastics, and liquid organic fertilizer. This potential is in line with Munaeni et al. (2023), who argue that seaweed has broad utility for food, industrial, health, and energy needs. Fatmala et al. (2023) also show that seaweed cultivation can support local economic development when it is managed as a source of community income. However, this potential has not been fully utilized in Tekolabbua because of limited capital, low processing skills, the absence of intensive assistance, and limited market access. Therefore, the discussion of seaweed potential in this study is directed toward understanding how local commodities can be developed into more sustainable sources of added value.

2.4 Improving Local Community Income

Local community income in this study is understood as the economic return obtained by the community from seaweed cultivation and management activities after production costs are deducted. In the attached article, seaweed farmers' income is explained as the difference between revenue and all expenses in one production period. The income of the Tekolabbua community mainly comes from seaweed harvests sold to collectors or middlemen. This income pattern is fluctuating because it is influenced by market prices, seasons, weather, harvest quality, and dependence on intermediaries. Sukrin et al. (2025) position seaweed cultivation as a source of income for coastal communities, but in the Tekolabbua context, this income source has not been able to significantly improve living standards because the community still sells harvests in raw or semi-dried form.

Increasing community income cannot be achieved only by increasing production volume. More sustainable income requires strategies that can improve the value chain, strengthen economic institutions, improve product quality, and open broader market access. Busthanul et al. (2021) show that cooperatives can strengthen the economic institutions of seaweed farmers, while Tahang et al. (2019) emphasize the need for processing industry development, extension services, quality improvement, and institutional strengthening. In this study, increasing the income of the local community is understood as the result of integrating several strategies, namely human resource capacity building, product diversification, strengthening cooperatives or local economic institutions, market partnerships, provision of supporting infrastructure, and environmental risk mitigation. Thus, community income is positioned as an outcome variable influenced by the quality of development planning based on local potential.

2.5 Local Economic Institutions and Market Access

Local economic institutions are an important component in seaweed development because they are directly related to the community's ability to manage production, access capital, determine prices, and strengthen bargaining power. The attached article shows that seaweed farmer groups have been formed in Tekolabbua, but cooperation among groups is still weak and there is no special cooperative that handles seaweed marketing. This condition causes the community to remain dependent on middlemen and to lack sufficient strength in determining prices. In the local development framework, economic institutions do not only function as organizational forums, but also as instruments for coordinating farmers' interests, expanding market access, and building a more stable business system.

Busthanul et al. (2021) show that strengthening seaweed farmers' economic institutions through cooperatives has great potential to improve production quality, develop partnerships, collect capital, and encourage innovation. These findings are relevant to the needs of the Tekolabbua community, which still faces limitations in marketing, storage, transportation, and access to price information. Strong institutions can help farmers move

away from marketing patterns that are too dependent on intermediaries. In addition, economic institutions can also serve as a means for training, joint business management, processed product development, and partnership negotiations with factories or broader markets. Therefore, local economic institutions and market access are important variables in this study because both function as bridges between production potential and increased community income.

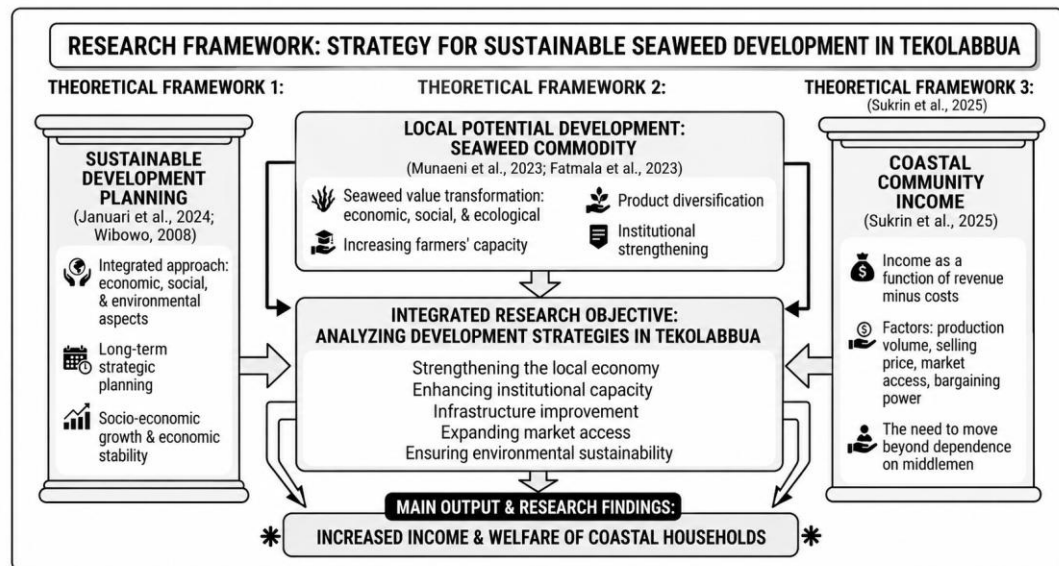


Figure 1. Research Framework for Sustainable Seaweed Development in Tekolabbua

3. RESEARCH METHOD

This study uses a descriptive qualitative approach. This approach was chosen because the aim of the study is not to test relationships among variables statistically, but to describe in depth the conditions, potential, problems, and sustainable development planning strategies based on local seaweed products in Tekolabbua Urban Village, Pangkajene District, Pangkep Regency. Through this approach, the study is directed toward obtaining a contextual understanding of seaweed cultivation practices, the socio-economic condition of the community, marketing patterns, limitations in post-harvest processing, local economic institutions, and development strategy needs that are relevant to the characteristics of the local community.

The research location was set in Tekolabbua Urban Village, Pangkajene District, Pangkep Regency, particularly in the coastal and community pond areas of Kampung Pandanglau. This location was selected because the local community has a fairly high economic dependence on seaweed cultivation, especially *Gracilaria* cultivated in pond areas. In addition, the area has ecological potential that supports seaweed cultivation activities, but it still faces various problems in cultivation technology, post-harvest processing, market access, institutions, and community income stability.

The research subjects included seaweed farmer groups, women's groups involved in post-harvest activities, community leaders, group leaders, and relevant stakeholders. The involvement of these various elements was intended to obtain more complete information about the actual condition of seaweed management and the development needs of the community. The attached article states that the Focus Group Discussion involved seaweed farmer groups and women's groups with approximately 50 participants. The involvement of women's groups is important because they have a potential role in the development of post-harvest processing and seaweed-based product diversification.



The main data collection technique in this study was Focus Group Discussion. This technique was used to explore the views, experiences, and needs of the community regarding the development of seaweed as a leading local product. Through Focus Group Discussions, the researcher obtained information on cultivation conditions, production constraints, marketing patterns, dependence on middlemen, product diversification opportunities, and strategies considered appropriate by the community. In addition to Focus Group Discussions, this study also used interviews, field observations, and documentation. Interviews were conducted with community leaders and group leaders to deepen the information obtained from group discussions. Field observations were used to directly examine pond conditions, cultivation facilities, harvesting processes, drying, and the seaweed supply chain. Documentation was used to support the completeness of data on cultivation activities, regional conditions, and community seaweed management practices.

The data collected in this study consisted of primary data and supporting data. Primary data were obtained from Focus Group Discussions, interviews, and field observations. These data included information on the socio-economic characteristics of the community, seaweed cultivation systems, income patterns, marketing problems, group institutions, opportunities for product processing, and the need for supporting infrastructure. Supporting data were obtained through documentation related to regional conditions, community activities, and seaweed management practices in Tekolabbua Urban Village. All data were used to build a comprehensive understanding of the relationship between local seaweed potential and strategies for increasing the income of the local community.

Data analysis was carried out qualitatively through the process of organizing, grouping, interpreting, and drawing conclusions from field data. Data from Focus Group Discussions, interviews, observations, and documentation were first classified based on the main research themes, namely development planning strategies, local seaweed product potential, and local community income. Afterward, the data were analyzed to identify problem patterns, supporting factors, inhibiting factors, and development opportunities. The analysis was directed toward formulating a sustainable development strategy that includes human resource capacity building, strengthening local economic institutions, product diversification, expanding market access and partnerships, providing supporting infrastructure, and mitigating environmental risks.

Data validity was maintained by checking the consistency of information from various sources and data collection techniques. Information obtained through Focus Group Discussions was compared with the results of interviews, field observations, and documentation. This checking was carried out so that the research findings would not rely on a single source of information but would have a stronger empirical basis. In this way, the results are expected to describe the factual condition of the Tekolabbua community more accurately and serve as a basis for preparing sustainable development planning strategies based on local seaweed potential.

Methodologically, this study is limited to social, economic, institutional, planning, and environmental studies in seaweed development in Tekolabbua Urban Village. This study does not conduct laboratory tests on seaweed quality, technical cultivation experiments, or macro-national analysis of the seaweed industry. The research focus is directed toward understanding the actual condition of the community, identifying seaweed management problems, opportunities for increasing added value, and formulating development strategies that fit local community needs. With these limitations, the research method is designed to produce an empirical description that is relevant for preparing policies and development programs based on local potential in coastal areas.

4. RESULT AND DISCUSSION

4.1 Results

The results show that Tekolabbua Urban Village, particularly Kampung Pandanglau, has strong local potential for pond-based seaweed cultivation. Based on the



results of Focus Group Discussions, interviews, observations, and documentation, this area has coastal characteristics that support seaweed cultivation activities, especially *Gracilaria* sp. Relatively stable pond conditions, water clarity, and the availability of pond land are ecological factors that support production sustainability. The local community has also made seaweed its main commodity for generations, so social capital and local experience can become a basis for coastal economic development.

From the socio-economic aspect, the results show that most people in Kampung Pandanglau work as fishermen and pond-based seaweed farmers. The community's educational level is generally at the elementary to junior high school level. This condition affects the community's capacity to access cultivation technology, price information, business management, and post-harvest processing innovation. Most people depend on seaweed cultivation for income, making this commodity strategically important in the household economic structure. However, high dependence on one commodity also creates economic vulnerability when prices decline, weather disturbances occur, or marketing barriers arise.

The findings show that the seaweed cultivation system in Tekolabbua is still carried out traditionally, with very limited infrastructure and technological support from cultivation to post-harvest processes. Farmers use independently available cultivation facilities, such as nets, small boats, harvesting tools, and simple drying areas. Seaweed productivity is reported to reach around 1,000 to 2,000 kg of dry product per harvest cycle within 25 to 30 days. Although these production figures indicate considerable economic potential, the results cannot yet be considered optimal because the infrastructure and technology used by farmers are still insufficient. In addition, seed quality is not consistent, cultivation technology has not developed, and the drying process still depends on sunlight. This condition shows that increasing productivity requires not only the expansion of cultivation activities but also improvements in input quality, production techniques, and post-harvest facilities.

In terms of post-harvest processing, the study found that most harvests are still sold in wet or semi-dried form. Post-harvest processing facilities are not yet adequately available, so the community has not been able to develop derivative products sustainably.

Farmers are positioned at the beginning of the value chain and receive a relatively small profit margin of around 10% to 15%. This margin is lower than that of large collectors, who can earn profits of around 30% to 40%. This imbalance occurs because farmers do not yet have storage facilities.

Community income from seaweed cultivation is fluctuating. Under good harvest conditions, farmers' income can reach around IDR 10,000,000 to IDR 15,000,000 per month, assuming a selling price of around IDR 5,000 per kilogram and a harvest of around 2 tons every 25 days. However, this income is not always stable because it is strongly influenced by price changes, weather, harvest quality, and dependence on middlemen. This result shows that seaweed is indeed the main source of community income, but it has not been able to guarantee sustainable welfare improvement if processing is not supported by adequate infrastructure to improve the quality and quantity of production.

The results also show that the sustainable development planning strategy based on local seaweed potential in Tekolabbua Urban Village has not been implemented optimally. The urban village government, together with related agencies and stakeholders, has carried out several forms of assistance, such as cultivation training, group organization, and post-harvest training. However, these activities are still limited in terms of number, intensity, and sustainability. This finding indicates that development interventions have not been fully integrated with community needs, especially in human resource capacity building,



strengthening economic institutions, product diversification, direct market access, supporting infrastructure, and environmental risk mitigation.

From the institutional perspective, seaweed farmer groups have been formed, but cooperation among groups remains weak. The absence of a cooperative or special economic institution that handles seaweed marketing means the community does not have a strong bargaining position in the marketing chain. This condition directly affects the limited ability of farmers to determine prices, store harvests, access industrial buyers, and develop joint businesses. Therefore, strengthening local economic institutions is an urgent need so that the community does not remain in the weakest position in the structure of the seaweed value chain.

The involvement of women's groups is one of the important findings of this study. Women's groups have participated in post-harvest activities and have the potential to be developed as actors in processing derivative seaweed products. However, this role has not been supported by continuous training, technology, infrastructure, and assistance. The implication is that women's empowerment can become an important strategy for creating additional household income, strengthening local product diversification, and developing seaweed-based microenterprises at the community level.

Overall, the results show that seaweed is the main local potential that can be developed as a basis for sustainable development in Tekolabbua Urban Village. However, this potential has not had an optimal impact on increasing community income because obstacles remain in infrastructure, cultivation technology, and post-harvest processing. The implication of these findings is the need for more integrated and needs-based development planning. Relevant strategies include improving knowledge on the use of supporting technology and infrastructure in cultivation and post-harvest processes and providing post-harvest facilities. Through the integration of these strategies, seaweed can develop from a raw-material commodity into a source of added value that can sustainably increase the income and welfare of the local community.

4.2 Discussion

The results answer the research question that the sustainable development planning strategy based on the potential of local seaweed products in Tekolabbua Urban Village has not been implemented optimally, but it has strong opportunities to be developed as an instrument for increasing local community income. The prominent new finding of this study is that the main problem faced by the community is not merely low production potential, but the lack of integration between the ecological potential of seaweed and human resource strengthening, especially knowledge of technology use and supporting facilities from the cultivation process to post-harvest management and supporting infrastructure. Thus, the research objective has been achieved because this study has identified the actual condition of seaweed cultivation, socio-economic barriers, product diversification opportunities, and the need for development strategies that fit the local context of Tekolabbua. This finding strengthens Wibowo (2008) view that development planning must be directed toward increasing income, economic diversification, expanding employment opportunities, equitable development, and strengthening community economic institutions. It is also in line with Januari et al. (2024), who position strategic planning as an important instrument for ensuring sustainable development. However, this study offers an advantage over those studies because it not only discusses development planning at the conceptual level but also directly connects it with the seaweed commodity value chain, community income structure, and local institutional needs.

Compared with previous studies on seaweed, the results of this study show both consistency and an expansion of findings. Munaeni et al. (2023) explain that seaweed has economic, ecological, and industrial potential because it can be used as food material,



bioactive compounds, renewable energy, and a commodity that supports the development of coastal communities. Fatmala et al. (2023) also show that seaweed cultivation can become a source of community income in local economic development. The findings in Tekolabbua support both views because seaweed has proven to be the main source of livelihood for the community, has a relatively short harvest cycle, and has the potential to be developed into processed products. However, this study found that this potential does not automatically improve welfare when the community still sells harvests in wet or semi-dried form due to limited technology and infrastructure. This is consistent with Tahang et al. (2019), who emphasize the need for technological innovation, extension services, institutional strengthening, quality improvement, and development of seaweed processing industries. These findings also support Busthanul et al. (2021). The difference is that this study emphasizes that institutional strengthening in Tekolabbua needs to be linked to the role of technology and infrastructure strengthening so that development strategies do not stop at increasing production alone.

The scientific contribution of this study lies in expanding sustainable development studies based on local commodities through an upstream-downstream integrative approach. This study shows that increasing the income of coastal communities cannot be explained only by the amount of seaweed production, but must be understood through the relationship among farmer capacity, economic institutions, product added value, market access, technology, infrastructure, and environmental sustainability. Practically, the findings imply that local governments, urban village governments, farmer groups, women's groups, and relevant stakeholders need to design more integrated development programs. These programs may include modern cultivation training integrated with technology and infrastructure, construction of standard drying facilities, training in derivative product processing, packaging, digital marketing, and partnerships with factories. Nevertheless, several findings still require further explanation, especially the margin gap between farmers and collectors, the lack of consistency in training sustainability, and the low success of processed seaweed businesses even though product diversification opportunities have been recognized by the community. This indicates that development strategies in Tekolabbua need to be supported by more operational policies, continuous assistance, and stronger economic institutions so that seaweed potential can become a more stable, fair, and sustainable source of income for the local community.

5. CONCLUSION

Based on the results, it can be concluded that the sustainable development planning strategy based on the potential of local seaweed products in Tekolabbua Urban Village, Pangkajene District, Pangkep Regency, has not yet been implemented optimally, although this area has strong ecological, social, and economic potential to be developed as a basis for increasing local community income. Seaweed has become the main source of livelihood for the community, especially because of supportive pond conditions, cultivation experience passed down through generations, and the involvement of farmer groups and women's groups in production and post-harvest activities. However, this potential has not been able to provide maximum economic impact because the cultivation system remains traditional, post-harvest processing is limited, and the use of technology and infrastructure from cultivation to post-harvest management remains minimal.

The findings show that increasing community income cannot be achieved merely by increasing seaweed production, but requires an integrated development strategy from upstream to downstream. This strategy includes human resource capacity building, strengthening technology, infrastructure, and partnerships, as well as providing supporting infrastructure for cultivation and post-harvest activities. Thus, seaweed needs to be positioned not only as a cultivation commodity but also as an instrument of local economic development that can encourage income diversification,



strengthen farmers' bargaining position, open household business opportunities, and improve the economic sustainability of coastal communities.

Scientifically, this study contributes to the development of sustainable development planning studies based on local potential by offering an integrative approach that connects social, economic, institutional, technological, infrastructure, and environmental dimensions within one framework of seaweed development strategy. The novelty of this study lies in emphasizing that increasing local community income needs to be built through the transformation of the seaweed value chain, not merely through increased harvest output. This study also demonstrates the importance of involving women's groups as potential actors in post-harvest processing and product diversification, so that seaweed-based development can create broader economic space at the household and local community levels.

Practically, the results imply the need for local governments, urban village governments, farmer groups, women's groups, community economic institutions, and relevant stakeholders to design more directed and sustainable development programs. These programs can be directed toward modern cultivation training, provision of technology and infrastructure, construction of standard drying facilities, strengthening access to price information, training in derivative product processing, packaging, and technology-based digital marketing. Consistent implementation of these strategies will strengthen the community's position in the seaweed value chain and reduce traditional management or cultivation practices that do not benefit farmers.

This study has limitations because the scope of the analysis is focused on social, economic, institutional, planning, and environmental dimensions at the local level. This study does not conduct laboratory analysis of seaweed quality, does not experimentally test specific cultivation technologies, and does not discuss the seaweed industry at the national macro scale. Therefore, future studies can develop this research by integrating product quality analysis, economic feasibility of processed seaweed businesses, value-chain-based cooperative models, digital marketing strategies, and more measurable environmental sustainability analysis. Future research may also compare Tekolabbua with other coastal areas to obtain a broader, more adaptive, and replicable seaweed development model for coastal communities with similar characteristics.

Thus, this study affirms that seaweed potential in Tekolabbua Urban Village can become a foundation for sustainable development if it is managed through participatory, integrated, and added-value-oriented planning. The success of this strategy depends greatly on the ability of the community and stakeholders to strengthen local capacity, build economic institutions, expand market access, develop processed products, and maintain coastal environmental sustainability as the main basis of community livelihoods.

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