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## Local Wisdom-Based Capture Fisheries Development Strategy through a SWOT Approach in Pasié Nan Tigo Village

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### ABSTRACT

*This study aims to formulate a strategy for developing capture fisheries based on the local wisdom of coastal communities in Pasié Nan Tigo Village, Padang City, using the Strengths, Weaknesses, Opportunities, and Threats (SWOT) approach. Capture fisheries in this area are dominated by traditional fishermen with simple fishing gear and social practices based on mutual cooperation and maritime customary values, but face environmental pressures, limited facilities, and business capital that have an impact on declining productivity. The study used a qualitative descriptive approach supported by simple quantitative analysis. Primary data were collected through interviews, observations, and questionnaires with 25 fishermen, traditional leaders, and government officials, and supported by secondary data from related agencies. The results of the SWOT analysis show that the main strengths of Pasié Nan Tigo fishermen include social solidarity, traditional knowledge of seasons and ocean currents, and local wisdom in preserving resources. The main weaknesses are limited technology, capital, and market access. Opportunities come from policy support, marine tourism potential, and increasing demand for local fish, while threats include climate change, coastal erosion, and competition with modern fishermen. Priority strategies include strengthening local wisdom-based fishing institutions, innovation in environmentally friendly fishing gear, and triple helix collaboration to support the development of the coastal blue economy.*

**Keywords:** *blue economy, capture fisheries, local wisdom, Pasié Nan Tigo, SWOT*



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## INTRODUCTION

Coastal areas are among the most productive ecosystems, playing a crucial role in supporting community livelihoods, particularly through capture fisheries activities (Wajyudin et al., 2017). In Indonesia, the capture fisheries sector is the backbone of the coastal economy, serving as both a primary source of income and a source of protein for the wider community (Siregar et al., 2024). However, traditional capture fisheries currently face various challenges, such as climate change, coastal habitat degradation, limited capital and technology, and competitive pressures from large-scale modern fishers.

Pasié Nan Tigo Village is one of the villages located in the coastal area of Padang City, most of its residents have a livelihood as fishermen, both permanent fishermen and part-time fishermen, the types of fishing gear operated by fishermen in this Village are bagan, payang, trawl, fishing rod (Simanullang & Eriyanti, 2019). Capture fishing activities in this area are not only the main source of income for the community, but also reflect the values of local wisdom that have been passed down from generation to generation, such as the pattern of mutual cooperation in fishing, fair distribution of catches, and the use of environmentally friendly traditional fishing gear.

This local wisdom serves not only as a social guide for interactions between fishermen but also as a form of resource management based on ecological balance and spirituality (Marlianungrum et al., 2025). Traditional knowledge regarding fishing seasons, wind direction, ocean currents, and natural signs is crucial for fishermen in maintaining the sustainability of fish resources (Mariliza & Gunawan, 2023). However, amidst the modernization of fishing gear and changes in the coastal environment due to abrasion and coastal infrastructure development, this local wisdom practice is beginning to erode and could potentially disappear if not strengthened through adaptive local policies and innovations.

Besides environmental factors, economic challenges are also a major issue facing Pasie Nan Tigo fishermen. Limited capital, lack of catch diversification, and poor access to modern markets have led to stagnant fisherman welfare (Santoso et al., 2025). Yet, this area holds significant potential for development, both through sustainable catch increases and through integrating the fisheries sector with the growing marine tourism activities along Pasie Nan Tigo Beach.

In the context of sustainable development and the blue economy, local wisdom-based capture fisheries management is a solution that can maintain a balance between economic, social, and ecological dimensions (Nurqailbi, 2024). This approach is in line with the Sustainable Development Goals (SDGs), especially SDG 8 (Decent Work and Economic Growth), SDG 13 (Addressing Climate Change), and SDG 14 (Marine Ecosystems). Purnomo & Tahir (2023) explain (through the application of local wisdom strengthened by technological innovation and regional policies, fishing communities can improve their welfare without damaging the coastal ecosystems that are their source of life.

To support this, a development strategy is needed that can systematically identify the potential and main problems of the capture fisheries sector in this region. SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was chosen because it can objectively map the strengths, weaknesses, opportunities, and threats faced by fishermen, so that a realistic and implementable strategy can be formulated for the development of the capture fisheries sector in Pasie Nan Tigo. The purpose of this study is to analyze internal and external factors that influence the development of capture fisheries in Pasie Nan Tigo Village, Padang City and formulate a capture fisheries development strategy based on local wisdom through a SWOT approach to support sustainable coastal resource management.

## **THEORETICAL FRAMEWORK**

### **Local Wisdom-Based Capture Fisheries**

Local wisdom-based capture fisheries refers to a system of fishery resource utilization based on customary values, traditional knowledge, and social norms of coastal communities. Local wisdom serves as a regulatory mechanism for resource utilization that maintains a balance between economic, social, and ecological interests. Traditional knowledge regarding fishing seasons, ocean currents, wind direction, and the practice of mutual cooperation among fishermen has been shown to contribute to the sustainability of small-scale fisheries (Ostrom, 2015; Marlianingrum et al., 2025). In this study, local wisdom is positioned as the main component of internal factors, which strengthens the social resilience and adaptation of fishermen to the uncertainty of the coastal environment.

### **SWOT Analysis as a Strategy Formulation Tool**

Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis is a strategic approach used to identify the internal and external conditions of a business system. SWOT is widely applied in the fisheries sector because it can map the relationships between local resources, actor capacity, and environmental and policy dynamics (David & David, 2017).

Within the framework of this research:

1. Strengths and Weaknesses act as internal variables, which include fishermen's social solidarity, traditional knowledge, fishing technology, capital, and market access.
2. Opportunities and Threats function as external variables, including government policy support, marine tourism potential, climate change, coastal abrasion, and competition among modern fishermen.

The use of the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrices allows for quantitative measurement of the influence of each factor in determining the strategic position of capture fisheries in Pasie Nan Tigo.

### **Competitiveness and Sustainability of Small-Scale Fisheries**

The competitiveness of small-scale capture fisheries is determined not only by catch volume, but also by the fishermen's ability to adapt to environmental changes, the efficiency of fishing gear, and the strengthening of economic institutions. Traditional fisheries supported by social capital and local institutions tend to be more resilient to external pressures than systems that rely solely on resource exploitation (Siregar et al., 2024). In this study, the capture fisheries development strategy is positioned as a dependent variable, which is influenced by the interaction of internal factors (local wisdom, technology, capital) and external factors (policy, environment, market).

### **Blue Economy as a Sustainability Framework**

The blue economy concept emphasizes the sustainable use of marine resources to improve the well-being of coastal communities without damaging ecosystems. Blue economy principles encourage environmentally friendly capture fisheries, efficient fishing gear, and the integration of the fisheries sector with other economic activities such as marine tourism (Pauli, 2010; Nurqalbi, 2024). In this study, the blue economy acts as a normative framework, which emphasizes that capture fisheries development strategies must avoid overexploitation and prioritize the conservation of the Pasie Nan Tigo coastal ecosystem.

### **Triple Helix Approach in Capture Fisheries Development**

The triple helix approach emphasizes synergy between government, academics, and fishing communities in supporting innovation and development in the fisheries sector. The government plays a role in policy and facilitation, academics in research and environmentally friendly technology transfer, and fishermen are the primary actors in implementation on the ground (Etzkowitz & Leydesdorff, 2000).

In the framework of this research, the triple helix functions as a strategic reinforcing variable, which bridges the limitations of technology, capital, and market access for traditional fishermen.

## **RESEARCH METHODS**

This research uses a qualitative descriptive approach supported by simple quantitative analysis. This approach was chosen because it provides a comprehensive overview of the current state of capture fisheries in Pasie Nan Tigo Village, encompassing social, economic, and cultural aspects that underlie the local wisdom of coastal communities. Through this method, researchers attempted to analyze the strengths, weaknesses, opportunities, and threats (SWOT) faced by fishing communities in developing sustainable capture fisheries activities.

The research was conducted in Pasie Nan Tigo Village, Koto Tengah District, Padang City, a coastal area where the majority of the population works as fishermen. This location was chosen purposively because fishing activities in the area still utilize traditional systems based on local wisdom, such as determining fishing times based on natural signs and the practice of mutual cooperation among fishermen. The research was conducted from May to August 2025, encompassing field observations, primary and secondary data collection, data analysis, and development strategy development.

The data used in this study comprises primary and secondary data. Primary data were obtained through direct observation, in-depth interviews, and questionnaires distributed to fishermen, community leaders, village officials, and the Padang City Maritime Affairs and Fisheries Service. Interviews were conducted using semi-structured guidelines to enable respondents to provide relevant, in-depth yet focused information. Secondary data were obtained from government documents, reports from relevant agencies, statistical data (BPS), and previous research supporting this study.

Data analysis was conducted through the stages of identifying internal and external factors that influence capture fisheries development. Internal factors include strengths and weaknesses (Strengths and Weaknesses), while external factors include opportunities and threats (Opportunities

and Threats). Next, each factor was weighted and assessed using the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrices. Weights were assigned based on the importance of each factor, with a scale of 0.0–1.0, and a score of 1–4 indicating its level of influence. The total score was obtained by multiplying the weights and scores, then summed to determine the business's position in the SWOT quadrant diagram.

The final stage of the analysis is the formulation of a local wisdom-based capture fisheries development strategy based on a combination of SWOT factors. This combination produces four alternative strategies: Strength–Opportunity (SO), Weakness–Opportunity (WO), Strength–Threat (ST), and Weakness–Threat (WT). Each strategy is analyzed to determine the most appropriate policy direction to support sustainable capture fisheries development rooted in local potential, coastal community cultural values, and blue economy principles.

## RESULTS AND DISCUSSION

### General Description of the Pasie Nan Tigo Fishermen's Community

Pasie Nan Tigo Village is a coastal area in Koto Tengah District, Padang City, where the majority of the population earns their living as traditional fishermen. Fishing activities are carried out simply using gill nets, handlines, and small, non-motorized boats. Fishermen in this area still uphold the values of mutual cooperation and local wisdom in their social lives. A cooperative system known as manyabek reflects the culture of togetherness at sea—where several fishermen join together in small groups, sharing equipment, labor, and the catch.

Furthermore, unwritten rules still exist regarding prohibited fishing days, specific times for repairing fishing gear, and the tradition of baralek lauik (sea feast) as a form of gratitude for the catch. These values demonstrate that the Pasie Nan Tigo community possesses strong social capital, which can serve as an important foundation for sustainable capture fisheries development strategies. However, the pressures of modernization, limited fishing equipment, and declining fish yields due to climate change are beginning to impact the economic resilience of fishermen.

### Results of Internal and External Factor Analysis

Based on the results of interviews, questionnaires, and FGDs, the identification of internal and external factors was obtained as shown in the following table:

**Table 1. Internal and External Factors of Capture Fisheries in Pasie Nan Tigo**

Factor	Description
<b>Strengths</b>	High social solidarity, traditional knowledge about fishing seasons, mutual cooperation culture, strong maritime customary values
<b>Weaknesses</b>	Simple fishing technology, limited capital, low innovation in fishing results, minimal digital promotion
<b>Opportunities</b>	Support for local government programs, marine tourism potential, increasing demand for local fish
<b>Threats</b>	Coastal erosion, climate change, modern fishing competition, catch fluctuations

The calculated IFE values of 2.10 and EFE of 2.55 indicate that the Pasie Nan Tigo capture fisheries business is in Quadrant I (aggressive strategy) of the SWOT matrix. This condition indicates a significant opportunity for developing the fisheries sector by leveraging the social and cultural strengths of the community.

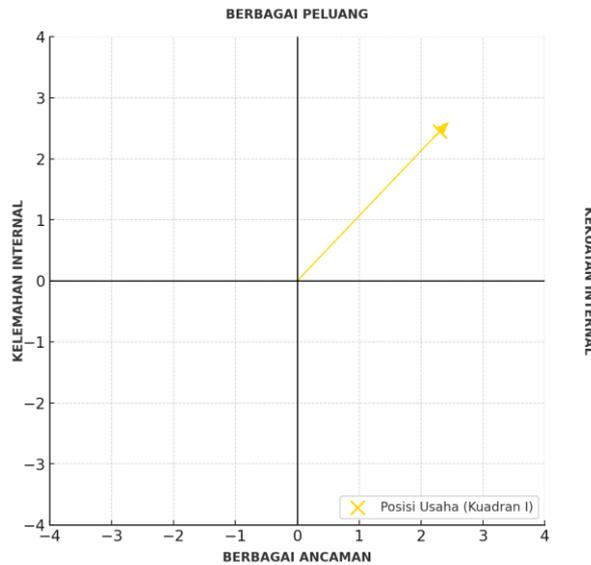


Figure 1. SWOT Quadrant Diagram for Formulating a Local Wisdom-Based Capture Fisheries Development Strategy

**Development Strategy Based on SWOT Matrix**

Based on the identification results, four main strategy combinations were obtained that can be applied in Pasie Nan Tigo:

**Table 2. Main Strategy Combinations**

Types of Strategy	Strategy Formulation	Field Implementation
<b>SO Strategy (Strength–Opportunity)</b>	Developing educational tourism based on traditional fisheries by emphasizing the values of mutual cooperation and maritime customs.	Forming a group of fishermen as educational tour guides (edutourism) and introducing <i>manyabek activities</i> to tourists
<b>WO Strategy (Weakness–Opportunity)</b>	Increasing the capacity of fishermen through training in environmentally friendly fishing gear and diversification of catch products.	<i>Eco-fishing</i> training , processing fresh fish into ready-to-sell products (salted fish, shredded fish, fish crackers)
<b>ST Strategy (Strength–Threat)</b>	Preserving local wisdom in regulating fishing seasons and protecting fishing zones to address climate change.	Revitalization of marine customary rules and documentation of traditional knowledge to be incorporated into village policies.
<b>WT Strategy (Weakness–Threat)</b>	Establishment of digital-based fishermen's cooperatives to strengthen access to capital and distribution of catches	Development of a <i>digital fishermen's cooperative</i> that sells its catch through an online platform (local marketplace)

**Discussion**

The analysis shows that the socio-cultural strength of the Pasie Nan Tigo community plays a crucial role in maintaining the sustainability of capture fisheries. Solidarity and cooperation among fishermen are not only part of tradition but also serve as adaptive mechanisms to maritime uncertainties such as extreme weather and fluctuating catches. This finding aligns with Ostrom's (2015) view that local communities are capable of managing shared resources through strong social norms and values.

However, in the context of modernization, structural weaknesses such as limited access to capital, low levels of fishing technology, and minimal digital promotion are key challenges that must be addressed. Local governments have a strategic role in providing training, support for environmentally friendly fishing gear, and access to microfinance. This aligns with research by Siregar et al. (2024), which shows that increasing catch yields and economic access for coastal communities significantly accelerates local economic growth.

Furthermore, the results of this study emphasize the importance of implementing blue economy principles in managing capture fisheries in coastal areas. This approach emphasizes the

sustainable and efficient use of marine resources, as explained by Nurqalbi (2024), who argues that the blue economy is a crucial pillar of socio-economic development in coastal areas. The implementation of a community-based blue economy positions fishers as key actors in maintaining ecosystems while simultaneously generating economic benefits.

Integrating local wisdom with technological innovation is also crucial for creating an adaptive capture fisheries management system. Marlianingrum et al. (2025) state that local values and fishermen's social organizations play a crucial role in determining the socio-economic sustainability of the traditional fisheries sector. Meanwhile, Purnomo & Tahir (2023) emphasize that empowering fishing communities through local wisdom can improve welfare without sacrificing coastal ecosystems. To strengthen this strategy, cross-sector collaboration through a triple helix approach is needed:

- a. Local governments are responsible for policies, training, and facilitation of sustainable fishing infrastructure.
- b. Academics support through research and transfer of environmentally friendly technologies.
- c. Fishing communities maintain customary practices, preserve local wisdom, and develop diversification of fishery products.

Through this synergy, the capture fisheries sector in Pasié Nan Tigo has the potential to develop into a community-based blue economy model that not only improves the welfare of fishermen but also maintains the balance of the marine ecosystem and maritime culture of Padang City.

## **CONCLUSION**

The research results indicate that the development of capture fisheries in Pasié Nan Tigo Village has great potential for sustainable development if the socio-cultural strengths of fishermen are combined with policy support and technological innovation. The SWOT analysis yielded an IFE value of 2.10 and an EFE of 2.55, placing the capture fisheries sector in Quadrant I (aggressive strategy), indicating ample development opportunities through the utilization of internal strengths. The fishermen's main strengths lie in social solidarity, the mutual cooperation system of manyabek, and traditional knowledge regarding ocean currents and fishing seasons. Key weaknesses include limited capital, simple fishing technology, and suboptimal market access. Opportunities stem from local government support, the potential for marine tourism, and increasing demand for local fish, while threats include coastal erosion, climate change, and competition with modern fishermen. Based on these conditions, priority strategies include the development of educational tourism based on traditional fisheries, increasing the capacity of fishermen through environmentally friendly technology training, integrating maritime customary values into the regulation of fishing zones and seasons, and establishing a digital fishermen's cooperative institution to strengthen access to capital and markets.

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