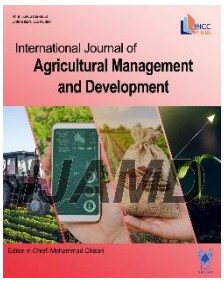

Volume 15, Issue 3, 152515 (132-143)

International Journal of Agricultural Management and Development (IJAMAD)

https://doi.org/10.57647/ijamad.2025.1503.15

Empowerment Strategies for Small-Scale Fishers in Improving the Household Economy of Coastal Areas

Abd Rahim [1,*], Diah Retno Dwi Hastuti [1], Wardihan Sabar [2], Agung Widhi Kurniawan [1]

[1] *Department of Economics, Faculty of Economics and Business, Universitas Negeri Makassar, Indonesia*
[2] *Department of Economics, Faculty of Economics and Business of Islam, Universitas Islam Negeri Alauddin Makassar, Indonesia*

***Corresponding author:** abd.rahim@unm.ac.id

Original Research

Received:
11 July 2025
Revised:
23 August 2025
Accepted:
04 September 2025
Published in Issue:
30 September 2025

Abstract

The government assistance program policy has been implemented; however, it is insufficient to meet the economic needs of small-scale fisher households, indicating the need for a fisher empowerment strategy. This research aims to identify internal and external environmental factors and to formulate fisher empowerment strategies based on the grand strategy matrix. The research employed a quantitative method with a descriptive analysis approach. The study was conducted in the coastal area of Makassar City from July to October 2022. Respondents were selected purposively, consisting of 46 coastal fisher households. The results show that, in the Internal Factors Analysis Summary, the highest-rated strength was experience at sea, while the main weakness was the use of simple fishing technology. In the External Factors Analysis Summary, opportunities included the potential for abundant marine fish resources, while threats were natural conditions. The grand strategy focuses on improving the quality of fishers' human resources, increasing catches, and optimizing catch utilization. This strategy can be realized through assistance in the form of interest-free loans or grants.

Keywords: Empowerment strategy; Small-scale fishers; Coastal area

Cite this article: Rahim, A. , Hastuti, D.R.D., Sabar, W., Kurniawan A.W., Empowerment Strategies for Small-Scale Fishers in Improving the Household Economy of Coastal Areas. *International Journal of Agricultural Management and Development*, 15(3), 132-143.

INTRODUCTION

Small-scale fisheries comprise the largest share of the world's fisheries, both in terms of catch and participation (Pameroy & Andrew, 2011). They contribute significantly to national economies, household incomes, and food security, making them an important focus of public policy (Weeratunge et al., 2014). In addition, small-scale fisheries support the livelihoods of more than 500 million people worldwide (Pameroy & Andrew, 2011). Their catch production represents one of the primary sources of income for coastal communities in developing countries (Barnes-Mauthe et al., 2013). In Makassar City, small-scale fishers play a crucial role in supporting the development of the regional marine and fisheries sector. Their contribution presents both opportunities and challenges for strengthening small-scale capture fisheries to become more advanced, independent, and sustainable. Small-scale fishers in the coastal areas of Makassar City generally use outboard

motors with limited horsepower (PK) to reach fishing grounds. Their catches are strongly influenced by seasonality (peak and lean seasons) and climate change, particularly extreme weather events, which in turn affect their household economy.

The Makassar City Government has implemented a policy through the Facilities and Infrastructure Assistance Program (Sapras), providing fishing gear to small-scale fishers in the coastal areas of Makassar City. The provision of fishing gear aims to increase catches; however, income from fishing activities has not yet been sufficient to meet household economic needs. The use of fishing gear represents technological advancement and innovation intended to increase catches (Torres et al., 2022). In addition, the central government implemented the Cash Assistance Program for Street Vendors, Warungs, and Fishers (BT-PKLWN) in 2022 in the form of Direct Cash Assistance (BLT) amounting to IDR 600,000 per fisher household. This program aims to reduce extreme poverty in Indonesia. Nevertheless, it has not been sufficient to fully meet household needs. Persistent poverty weakens the bargaining position of fishers in improving their welfare. Therefore, to enhance household economic conditions, it is necessary to formulate an empowerment strategy for small-scale capture fishers.

The urgency of empowerment in improving household economic conditions is critical, given that most coastal communities rely permanently on fishing as their primary livelihood. Empowerment strategies can strengthen household economic resilience and help secure the future of fishers (Lomboy et al., 2019). Improving the household economy of fishers (Buda et al., 2021) requires appropriate approaches, particularly empowerment strategies (Purwiyono et al., 2022; Murdayanti et al., 2021) that promote independence and balance within coastal communities (Wiber et al., 2009; Kabir et al., 2011). Such strategies aim to enhance participation and decision-making processes, enabling diversification, innovation, and long-term sustainability (Freeman & Svels, 2022). The implementation of empowerment increases the capacity of individuals and groups (Alsop, 2015). In addition, fishers, as producers of captured fish commodities that support global food security (Torres et al., 2022), require special attention, as they may sill struggle to meet their own food needs.

Previous studies have examined fisher empowerment in various countries. These include efforts to improve coastal community empowerment through participatory fisheries research in the Scotia–Fundy Region of Atlantic Canada (Wiber et al., 2009); analyses of fisher empowerment in the context of development accounting in rural Sri Lanka (Jayasinghe & Wickramasinghe, 2011); and community-based fisheries management (CBFM)–based empowerment initiatives in Bangladesh (Kabir et al., 2011) and Sri Lanka (Gammanpila et al., 2019). Other studies have focused on household economic resilience strategies through empowerment to enhance assets and secure the future of fishers in the Philippines (Lomboy et al., 2019). In Canada, community-based small-scale fisheries have been strengthened through a food systems approach (Lowitt et al., 2020). Fisher empowerment has also been explored through the management of fishing communities in Pearl Lagoon, Nicaragua (González, 2021), and through participation in conservation research in Brazil (Giareta et al., 2021). In Indonesia, empowerment strategies have included initiatives to enable fishers to produce milkfish bone thread in Segoro Tambak Sedati, Sidoarjo Regency (Hertati et al., 2017), as well as the empowerment of fishing communities based on local wisdom in the Thousand Islands of Jakarta City (Purnomo et al., 2021).

However, to the author's knowledge, research focusing on improving household economic conditions through empowerment strategies, particularly among small-scale fishers, remains limited. Empowerment strategies for small-scale fishers in coastal areas emphasize improving human resources to increase catches, process fishery products, and market fishery commodities, thereby enhancing household economic welfare. Sustainable improvements in fisher welfare can also contribute to poverty reduction, supporting the achievement of the first Sustainable Development Goal (SDG 1: no poverty) (Yonvitner et al., 2021), which is a global economic development policy issue (Mbaye et al., 2023), especially in coastal areas. Accordingly, this research aims to identify internal and external environmental factors and to formulate empowerment strategies for small-scale capture fishers based on the grand strategy matrix.

METHODOLOGY

This study employed a quantitative research method with a descriptive approach. The research was conducted in the coastal area of Makassar City. Coastal areas are ecosystems that are highly susceptible to human activities because they represent transitional zones between terrestrial and marine ecosystems, influenced by changes on both land and sea. According to Lemée et al. (2019), coastal areas are limited spaces associated with human, economic, and environmental interests and are characterized by various significant vulnerabilities. Research respondents were selected purposively. A total of 46 fishers were sampled from a population of 83 fishers using the Slovin formula with a 10% error rate (Cochran, 1977). The study used cross-sectional data

based on the time dimension, sourced from primary data. Primary data were collected directly from fishers, while secondary data were obtained from the Marine and Fisheries Service and the Central Bureau of Statistics of South Sulawesi Province.

$$n = \frac{N}{1+Ne^2} = \frac{83}{1+83\,(10\%)^2} = 46$$

Data were collected through observation, interviews, and note-taking. Observations involved directly examining the daily lives of small-scale fisher households in the research area. Interviews were conducted face-to-face with fishers using structured questionnaires. Note-taking was used to record important information obtained through both observations and interviews. To address research objectives 1 and 2, the data were analyzed using SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats). SWOT analysis is a tool for examining an organization's internal resources and external environment (Cheng et al., 2021) and serves as a strategic technique for evaluating internal and external factors (Longsheng et al., 2021).

The first research objective was analyzed using SWOT analysis by identifying factors within the internal environment of small-scale fishers. Internal factors were examined through the Internal Factors Analysis Summary (IFAS), which consists of strengths (S) and weaknesses (W). External factors were assessed through the External Factors Analysis Summary (EFAS), encompassing opportunities (O) and threats (T). The second research objective was also addressed using SWOT analysis by formulating empowerment strategies through the development of a SWOT matrix. Strategy formulation included strength–opportunity (SO), strength–threat (ST), weakness–opportunity (WO), and weakness–threat (WT) strategies.

RESULT AND DISCUSSION

The socioeconomic conditions of small-scale fishers in coastal areas were used as parameters and indicators for the internal and external factor components in the SWOT analysis framework of this study. The assessment of internal factors (strengths and weaknesses) and external factors (opportunities and threats) for the empowerment strategy of small-scale fishers was primarily based on their socioeconomic conditions. The SWOT framework can focus on social, technological, economic, environmental, and regulatory aspects (Glass et al., 2015). Fishing communities possess distinct socioeconomic characteristics that influence coastal community life. These socioeconomic factors, also referred to as fisher characteristics, affect changes in household income (Rahim et al., 2022) and play a crucial role in alleviating poverty. Persistent poverty can weaken the bargaining position of fishers, and socioeconomic factors provide essential information for decision-making under risk. In the coastal areas of Makassar City, the socioeconomic conditions of small-scale fishers include social factors—such as age, formal education, and fishing experience—and economic factors, particularly household income (Table 1).

The social and economic factors of small-scale fishers in the coastal area of Makassar City include social factors—such as age, formal education, and fishing experience—and economic factors, primarily household income (Table 1). These social and economic factors serve as parameters and indicators for assessing the Internal Factor Analysis Summary (IFAS, Table 2), the External Factor Analysis Summary (EFAS, Table 3), and for formulating strategies using the SWOT matrix (Table 4), which outlines strategies for empowering small-scale fishers. Internal factors are those that directly influence strategic activities aimed at improving household economic conditions through the empowerment of small-scale fishers in the western coastal area of Makassar City, consisting of strengths and weaknesses. External factors originate from the surrounding environment and also affect fisher empowerment, comprising opportunities and threats.

Improving the household economy of small-scale fishers on the west coast of Makassar City requires more than evaluating the impacts of government assistance programs, such as fishing gear from the local government and the IDR 600,000 BLT from the central government; it also necessitates consideration of sustainability in the capture fisheries business. Empowerment strategies for small-scale fishers aim to enhance their welfare by systematically identifying internal and external factors across multiple aspects. SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) is used as the primary tool for this strategy development.

Environmental factors of fishers empowerment strategy

The Internal Factor Analysis Summary (IFAS) results indicate that internal environmental factors are key strengths in enhancing the economic welfare of small-scale fisher households through empowerment. Among these factors, the productive age of fishermen received the highest score (1.00) compared to other human resource aspects such as coastal fishers' skills (0.75), strong family ties (0.72), and resilience in facing life's challenges (0.72) (Table 2).

Table 1. Socioeconomic Conditions of Small-scale Fishers in the Coastal Area

Variable	Description	Frequency	Percentage
Fishers age	≤ 14	-	-
(Year)	15 – 55	45	97.83
	≥ 55	1	2.17
Total		46	100.00
Fishers education	Did not finish elementary school	16	34.79
(year)	Finished elementary school	14	30.43
	Finished junior high school	10	21.74
	Finished high school	6	13.04
Total		46	100.00
Experience at sea	5 – 10	12	26.09
(Year)	11 – 15	21	45.65
	16 – 20	13	28.26
Total		46	100.00
Number of family dependents	1 – 2	15	32.61
(Year)	3 – 4	24	52.17
	5 – 6	7	15.22
Total		46	100.00
Household Income	≤ IDR 1,000,000	-	-
(IDR)	DR 1,000,000 – IDR 2,999,999	32	78.26
	≥ IDR 3,000,000	14	11.74
Total		46	100.00

Note : (1 US Dollar = IDR 16,000)

In the coastal area of Makassar City, fishermen range in age from 15 to 55 years, with 45 fishers (97.83%) being of productive age (Table 1). Similar findings in Taiwan show that fishermen around 40 years old are considered to be at a productive age for fishing activities (Lu et al., 2020). However, advancing age can lead to a decline in physical work capacity (Adnan et al., 2021), affect overall health, and reduce physical strength (Abu Samah et al., 2019).

Among small-scale fishers in Makassar City, 34 individuals (73.91%) have more than 10 years of fishing experience, ranging between 11 and 20 years (Table 1). Extensive fishing experience combined with productive age enables fishers to have a thorough understanding of fishing grounds. Strong family ties are another key social characteristic of the coastal fishing community in Makassar City. These bonds foster unity among small-scale fishers, encouraging mutual assistance. Reciprocal relationships within coastal communities also influence decision-making and can affect fisheries policy (Pollnac, 2009). Resilience in facing life's hardships is another internal strength. Uncertain catch production motivates fishers to persist in their work to sustain household economies. Many coastal community members choose capture fishing due to limited employment opportunities on land. As the main breadwinners, fishers must ensure food availability for their families (Hoque et al., 2021). Their ability to sustain livelihoods through fishing reflects the resilience of the social-ecological system to change (Blythe, 2015).

Other internal environmental factors identified in the IFAS as weaknesses include fishing technology, which received the highest score, while limited capital, lack of Fish Aggregating Devices (FADs), and low education levels scored the lowest (Table 2). The most significant weakness, simple fishing technology (score 0.27), involves the use of basic gillnet gear. The type of fishing gear directly affects catch size, with the average catch consisting of mackerel and snapper. The gillnets used are passive, targeting primarily active fish species, with a mesh size of 2.5 inches for each type of fish caught. This contrasts with small-scale fishers in China, who employ sustainable fishing technologies designed to protect marine resources (Zheng et al., 2021). Low productivity is also driven by the limited quality of human resources, particularly reflected in the low level of formal education. Poverty restricts the ability of fishing households to provide proper education for their children, and community attitudes toward education further influence educational attainment. Among the surveyed fishers, formal education levels are low (score 0.25), with most having only completed elementary school or not completing it at all. Twenty fishers (65.22%) completed junior high school, and 16 fishers (34.78%) completed high school (Table 1). Despite low formal education levels, fishers rely heavily on their fishing experience. These findings differ from contexts such as Western Kenya, where education serves as a key decision-making tool for fishers (Olale & Henson, 2012).

Capital limitation (score 0.24) represents a key weakness related to operational fishing costs. Fishers typically travel 10–20 miles to reach fishing grounds using outboard motor boats, which consume large amounts of fuel, such as pertalite, at high cost. The average outboard engine power ranges from 10 to 15 PK. Fishing capital is often obtained through loans, with fishers required to sell their catch to traders as part of the loan agreement. This situation reflects the low financial capital of small-scale fishers in Bangladesh, which similarly affects fishing as a permanent livelihood (Tikadar et al., 2022).

Another weakness is the limited availability of Fish Aggregating Devices (FADs, score 0.24). Socioeconomic conditions, particularly fishers' income (Table 1), influence the number of FADs owned in the study area, consistent with findings in Kenya where socioeconomic factors affect FAD fisheries (Onyango et al., 2021). FADs are fishing aids with tree-like constructions deliberately installed in marine waters (Saifullah & Susilawati, 2018).

They serve to aggregate fish, reduce fuel consumption, and maintain the marine ecosystem, offering a more sustainable alternative than destructive methods such as explosives or potassium. The FADs used in the study area are sedentary. According to Fréon & Dagorn (2000), FADs can be either free-drifting or anchored. Implementing FADs requires both financial investment and technical expertise, but using environmentally friendly FADs can advance fishing technology and increase the income of coastal fishers.

External factor analysis summary (EFAS)

The EFAS results indicate that external environmental factors present significant opportunities for small-scale fishers (Table 3). The abundant potential of marine fisheries resources (score 0.90) has not yet been fully utilized, largely due to traditional fishing technology, such as gillnets and low-powered outboard motors, which limit income. Both engine power and fishing gear influence household income and consumption expenditure (Rahim et al., 2018). Low income often motivates fishers to seek supplementary earnings from non-capture activities (Tikadar et al., 2022).

In the study area, the average household income is IDR 2.7 million per month, with IDR 2.5 million from capture activities and IDR 205 thousand from non-capture contributions, such as income from fishers' wives (Table 1). The proximity to TPI Paotere (score 0.72) facilitates catch distribution, as it serves as a marketplace for both wholesale and retail sales (Asmal et al., 2016).

Table 2. Assessment of Internal Factor Analysis Summary (IFAS) Strategy for Empowering Small-Scale Coastal Fishers of Makassar City

Internal factors	Parameter	Indicator	Weight	Rating	Score
Strength	Fisherman age	Based on the survey, 97.83% of fishermen are under <50 and are of productive age to run a business	0.27	4	1.00
	Sea experience	Have fishing experience > 15 years.	0.25	3	0.75
	High family ties	The fishing community has a high sense of kinship and helps each other	0.24	3	0.72
	Sturdy through life's difficulties	It's not easy to give up even though the catch production is erratic)	0.24	3	0.72
Total Strength					3.19
Weakness	Low education level	Based on the survey, 34.78% of the fishing community did not finish elementary school	0.25	1	0.25
	Capture technology	Some fishermen still use traditional technology	0.27	1	0.27
	Limited capital	Limited capital is one indicator of weakness in fishing operational costs	0.24	1	0.24
	Rumpon is still lacking	The limitations of tools such as *rumpon* that function to collect fish are one of the weaknesses because the effectiveness of operations and efficiency are not maximized	0.24	1	0.24
Total Weakness					1.00
Total Overall Score (Strength + Weakness)					4.19

Table 3. Assessment of External Factor Analysis Summary (EFAS) Strategy for Empowering Small-Scale Coastal Fishers of Makassar City

External factors		Parameter	Indicator	Weight	Rating	Score
Opportunities	*Opportunities*	The potential of marine fish resources is abundant	The potential of fish resources has not been used optimally	0.30	3	0.90
		Close to Fish Landing Center (PPI)	The location of the fisher's residence near the Paotere' Fish Auction Place (TPI) so that it is easy to distribute their catch	0.24	3	0.72
		High demand for fresh sea fish	The demand for consumers and fish processing factories from Makassar City is very high	0.27	3	0.81
		Fishing ground range	The location of the fisher's residence is close to the fishing ground area)	0.25	2	0.50
Total Opportunity						2.93
Threats	*Threats*	Natural conditions	The existence of global climate change causes marine conditions that are difficult to predict. This threatens the livelihood of fishers	0.30	1	0.30
		Erratic catch	Capture fisheries business has 3 seasons (catching season, west season, and east season	0.28	1	0.28
		The price of fresh sea fish is decreasing	In the famine season, the number of fishers catches is abundant, but the market cannot absorb it. This causes the price of fish to decrease	0.26	1	0.26
		The number of fishermen from outside	The number of fishers from outside the city of Makassar makes the production of local fishers decrease	0.24	1	0.24
Total Threat						1.08
Overall Score (Opportunities + Threats)						4.01

High demand for fresh marine fish (score 0.81) from consumers and processing plants, such as PT KIMA in Makassar City, supports fishers' economic opportunities. Processing and marketing for international markets (Japan, the United States, and the European Union) contribute to producing high-quality, safe-to-consume fishery products (Asnawi et al., 2021). Increasing global population, rising purchasing power in developing countries, and changing dietary patterns have heightened the demand for protein-rich foods like fish (Masi et al., 2022), which provide higher protein content compared to other animal products (Fathoni et al., 2019). Indonesian fisheries production is also a reliable export commodity that boosts national foreign exchange (Asnawi et al., 2021).

Fishing grounds (score 0.50) are generally close to the fishers' residences, but operational costs, particularly fuel, strongly influence income. The average fishing trip lasts 7–10 hours, and the number of trips is closely linked to fishing operations and time at sea (Muallil et al., 2013). Conversely, global climate change represents a threat (score 0.30), causing unpredictable sea conditions that endanger fishers whose livelihoods depend on catches. Climate change poses a serious global threat to the capture fisheries subsector (Mcowen et al., 2015).

Erratic catch (score 0.28) is a significant threat in the study area, where capture fisheries experience three main seasons: the fishing season, the west season, and the east season. In addition to global climate change, an annual lean season occurs due to high winds and heavy rainfall, resulting in large waves that prevent fishers from going to sea. Such climate variability can substantially reduce catch production and household income. Extreme weather events have been observed not only in Makassar City but also globally, including in marine waters off Ghana (Mabe & Asase, 2020).

Another threat is the fluctuation in the price of fresh fish (score 0.26). Fish prices can change due to shifts in demand, purchasing power, consumer preferences, and taste factors. Fish quality strongly influences market prices (Alapan et al., 2016). Rapid development in the

fishing industry also affects price movements along the value chain, as market information travels from wholesale markets to final consumers, impacting price transmission and market integration (Deb et al., 2022). Additionally, changes in fish consumption are driven by consumer preferences for protein as a primary nutritional source.

Fishers who come from outside the city are very numerous (0.24). The number of fishermen from outside Makassar City has decreased the catch production of local fishermen such as Takalar Regency fishermen. The reason fishermen from outside Makassar City land their fish at Paotere's TPI is due to the freshness of the fish, which is quickly damaged. According to Prabhakar et al. (2020), fish, as a highly nutritious commodity, contains a good amount of protein and fatty acids, so it is necessary to maintain its freshness as one of the most critical parameters in the fish market.

Table 2 (IFAS) calculation results obtained an X-axis value of 2.19 from a total Strength of 3.19 minus a total Weakness of 2.19. In Table 3 (EFAS), the Y-axis value is 1.88 from a total Opportunity of 2.93 minus a real Threat of 1.08. Based on these calculations, the fishermen's empowerment strategy in improving the household economy (Figure 1) can be developed by utilizing Strength (S) and Opportunities (O), which have more significant values. Compared to the small value, namely Threats (T) which hinders from outside the existing weakness (W).

Empowerment strategy for small-scale capture fishers

The empowerment of coastal communities, particularly small-scale fishers, involves optimizing their skills and utilizing the resources available in their coastal environment. Effective empowerment considers local culture, technical implementation, and sources of development financing. Empowerment strategies can be implemented through the sustainable development of marine and fisheries businesses. Such initiatives aim to help coastal communities meet the needs of individuals, groups, and the broader community. As a result, fishers gain the ability to make choices and shape their environment, including access to employment, social activities, and other resources. Empowerment emphasizes community autonomy by promoting democratic processes and place-based participation, enabling coastal communities to improve their overall welfare.

The empowerment strategy for small-scale capture fishers can be formulated using the IFAS (Table 2) and EFAS (Table 3) results, with alternative strategies developed through the SWOT matrix (Table 4). The key alternatives include: Improving the quality of human resources (fishers) to optimize the potential of marine resources, optimizing varied and high-quality fisheries production and increasing catches to meet high market demand (Figure 1).

First alternative; enhancing human resource quality; This involves training and coaching to improve the skills of small-scale fishers. Training focuses on increasing catch production by understanding fishing grounds, including timing and location, supported by counseling from capture fisheries experts from the Ministry of Marine Affairs and Fisheries (MMA) and the Food and Agriculture Organization (FAO).

Fishers are also guided in the use of environmentally friendly fishing gear, such as gillnets and long lines. Gillnets are considered environmentally sustainable because mesh size regulates the size of fish caught, allowing smaller fish to escape and support population sustainability (Hutubessy, 2020). Long lines consist of extensive fishing units stretching thousands of meters (Franjaya et al., 2018). In addition to fishing gear, assistance includes outboard engines (10–15 PK) and motorboats (30–50 GT), enabling fishers to reach fishing grounds more efficiently (Rahim et al., 2020). These three aids—fishing gear, engines, and boats—support the SO strategies by strengthening human and material resources, underpinned by effective leadership (Herrera-Racionero et al., 2022).

The empowerment strategy with the application of training and coaching is undoubtedly different from previous research, which is an empowerment strategy based on Community Based Fisheries Management (Kabir et al., 2011; Okeke-Ogbuafor & Gray, 2021) for the governance of small-scale fishers specifically related to their geographical areas such as coastal areas. Participatory approach strategies in small-scale fisheries management have been widely practiced in various continents and countries around the world (Kar, 2021), such as traditional ecological knowledge (TEK) in Sri Lanka to optimize harvest from catches (Gammanpila et al., 2019). In line with the case in the research area, the potential for abundant fish resources during the fishing season has not been optimally utilized. Participatory coastal fishermen have significant implications for developing community-based resource management (Wiber et al., 2009). Thus, fishermen's human resources can participate as leaders of coastal communities.

Second alternative: optimizing varied and quality catches; to maximize income, small-scale fishers must ensure that varied and high-quality catches are properly processed. Fish is highly perishable, and once spoilage begins, quality cannot be fully restored. Therefore, it is essential to slow deterioration from the point of capture

through handling, storage, unloading, and transport to processing units or consumers (Handoko & Yuniarti, 2023).

Participatory handling activities on board, even using traditional knowledge, can serve as an effective empowerment strategy (Giareta et al., 2021). Proper fish handling is critical to maintaining quality, as delays accelerate deterioration, reduce income, and lower market prices. Modern technological processing can create high-quality products, preserving fish as a valuable protein source. In tropical regions, high temperatures exacerbate quality loss through bacterial activity, enzymatic reactions, and fat oxidation (Aditi & Varsha, 2020).

Table 4. SWOT Matrix Strategy for Empowerment of Small-Scale Fishermen Coastal Makassar City

Internal Factor / External Factor	Strength	Weakness
	1. Potential age of coastal fishermen 2. Human Resources of coastal fishermen 3. High kinship ties 4. To endure life's difficulties	1. Low level of education 2. Capture technology 3. Limited capital 4. Rumpon are still lacking
Opportunities 1. The potential of marine fish resources is abundant 2. Close to Fish Landing Center (PPI) 3. High demand for fresh marine fish 4. Reach fishing ground	SO Strategy 1. Improving the quality of human resources (fishermen), in order to be able to utilize the potential of marine natural resources. 2. Optimizing the variety and quality of fishery production. 3. Increased catch due to high demand	WO Strategy 1. Improve the quality of capture technology 2. Cooperating with fish processing companies to obtain capital or technology assistance. 3. Increase the number of Rumpon to increase catch production
Threats 1. Natural conditions 2. Uncertain catch production 3. The price of fresh sea fish is decreasing 4. The number of fishermen from outside	ST Strategy 1. Alternative work is fishermen when not at sea (bad weather). 2. Optimizing Fish Auction Places (TPI) and fish processing to increase prices 3. Maximizing the performance of human resources (fishermen) in the marine area so as not to be snatched by competitors (fishermen from outside)	WT Strategy 1. Make improvements to the use of fishing technology with little capital 2. Conduct counseling on the impact of climate change on natural conditions in the sea 3. Improving the surveillance system in marine waters.

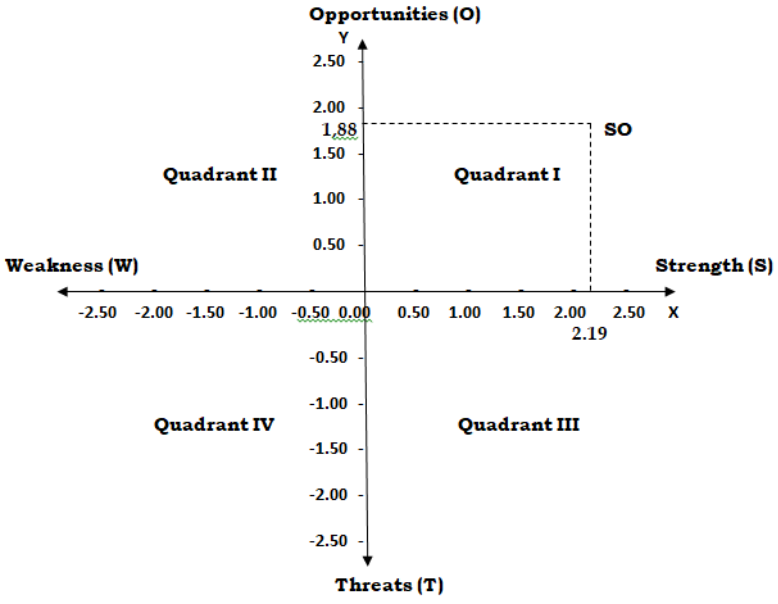

Figure 1. Matrix of Grand Strategy

Product development technologies offer solutions to increase household income, including shredded fish (Fahriana et al., 2022), fish crackers, Kadoru processed fish products (Tega et al., 2021), and fish flour (Utomo & Setiawati, 2013).

Third alternative: Increasing catches to meet high demand; catch production should be increased to meet market demand and consumer preferences. Marine aquaculture is a viable alternative to relieve pressure on wild fish stocks while providing additional sources of animal protein (Masi et al., 2022). Aquaculture has become the primary food-producing sector and the fastest-growing source of fish supply worldwide (Atalah & Sanchez-Jerez, 2020). Optimally utilizing marine resources can positively impact livelihoods and human well-being.

CONCLUSIONS AND RECOMMENDATIONS

Identification of empowerment strategies from the Internal Factors Analysis Summary with the highest score Strength is fishing experience, and Weakness is simple fishing technology. External Factors Analysis Summary in the form of Opportunities is the potential for abundant marine fish resources, and Threats are natural conditions. The grand strategy was carried out to improve fishers households' economy with 3 (three) alternatives. The first alternative is to improve the quality of human resources (fishers) through training and coaching. They were second, optimizing various quality fishery products by extending shelf life through modern fish processing. Third, increasing catches align with the high consumer demand for fish farming.

The strategy of empowering small-scale fishers can be realized by assisting with interest-free loans and grants. Such support can be obtained from stockholders of both local government (Marine and Fisheries Service and Industry Service) and Private (Non-Governmental Organizations/NGOs), both from within and outside the country, evenly and fairly to all fishermen in the region.

ACKNOWLEDGMENTS

The authors would like to express their gratitude to the Faculty of Economics and Business, Universitas Negeri Makassar, for their financial support. We also express our gratitude to the Institute for Research and Community Service at Universitas Negeri Makassar for their permission to conduct this research. We also thank the Makassar City Maritime Affairs and Fisheries Service for providing secondary data. We extend our deepest gratitude to the fishermen respondents in the coastal areas of Makassar City for their invaluable support in providing primary data.

Authors Contribution
The authors' roles in this article are as follows: Abd. Rahim (researcher and author). Diah Retno Dwi Hastuti (researcher and translator). Wardihan Sabar (data analysis and interpretation). Agung Widhi Kurniawan (reviewer and editing).

Availability of data and materials
The data that support the findings of this study are available from the corresponding author, upon reasonable request.

REFERENCES

Abu Samah, A., Shaffril, H. A. M., Hamzah, A., & Abu Samah, B. (2019). Factors affecting small-scale fishermen's adaptation toward the impacts of climate change: Reflections from Malaysian fishers. *SAGE Open*, *9*(3), 1–11. DOI: https://doi.org/10.1177/2158244019864204

Aditi, M., & Varsha, L. (2020). Fish processing: Product and by-product, processing and marketing. *International Journal of Fisheries and Aquatic Studies*, *8*(1B), 74–77. https://www.fisheriesjournal.com/archives/?year=2020&vol=8&issue=1&part=B

Adnan, N., Bashir, A., & Harunurrasyid, H. (2021). The economies of scale and efficiency of small-scale capture fisheries in Kurau Village, Central Bangka District. *Marine Fisheries: Journal of Marine Fisheries Technology and Management*, *11*(2), 121–133. DOI: https://doi.org/10.29244/jmf.v11i2.32463

Alapan, M. P., Arpilleda, E. L. I., Altizo, K. J. R., Frias, G. K. R., & Ravelo, J. D. (2016). Factors affecting the market price of fish in the northern part of Surigao del Sur, Philippines. *Journal of Environment and Ecology*, *7*(2), 34. DOI: https://doi.org/10.5296/jee.v7i2.10469

Alsop, R. (2015). On the concept and measurement of empowerment. In *The many dimensions of poverty* (pp. 120–139). DOI: https://doi.org/10.1057/9780230592407_7

Asmal, I., Amin, S., & Ali, M. (2016). Environmental sanitation conditions in the Beba fish auction place (TPI). *Procedia - Social and Behavioral Sciences*, *227*, 778–784. DOI: https://doi.org/10.1016/j.sbspro.2016.06.145

Asnawi, A., Luhur, E. S., & Suryawati, S. H. (2021). Model permintaan ekspor udang olahan Indonesia oleh pasar Jepang, Amerika Serikat dan Uni Eropa dengan pendekatan error correction model (ECM). *Jurnal Sosial Ekonomi Perikanan Dan Kelautan*, *16*(2), 179–191. DOI: https://doi.org/10.15578/jsekp.v16i2.9768

Atalah, J., & Sanchez-Jerez, P. (2020). Global assessment of ecological risks associated with farmed fish escapes. *Global Ecology and Conservation*. DOI: https://doi.org/10.1016/j.gecco.2019.e00842

Barnes-Mauthe, M., Oleson, K. L. L., & Zafindrasilivonona, B. (2013). The total economic value of small-scale fisheries with a characterization of post-landing trends: An application in Madagascar with global relevance. *Fisheries Research, 147*, 175–185. DOI: https://doi.org/10.1016/j.fishres.2013.05.011

Blythe, J. L. (2015). Resilience and social thresholds in small-scale fishing communities. *Sustainability Science, 10*, 157–165. DOI: https://doi.org/10.1007/s11625-014-0253-9

Buda, P. W. U., Susrusa, K. B., & Djelantik, A. A. A. W. (2021). Household income structure and strategy among farmers in Subak Jatiluwih. *SOCA: Jurnal Sosial Ekonomi Pertanian, 15*(2), 379–389. DOI: https://doi.org/10.24843/SOCA.2021.v15.i02.p13

Cheng, L., Chen, K., Lee, M., & Li, K. (2021). User-defined SWOT analysis – A change mining perspective on user-generated content. *Information Processing & Management, 58*(5). DOI: https://doi.org/10.1016/j.ipm.2021.102613

Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). Wiley. https://archive.org/details/Cochran1977SamplingTechniques_201703/page/n25/mode/2up

Deb, P., Dey, M. M., & Surathkal, P. (2022). Price transmission and market integration of Bangladesh fish markets. *Aquaculture, 560*. DOI: https://doi.org/10.1016/j.aquaculture.2022.738592

Fahriana, N., Nadya, Y., & Handayan, N. (2022). Inovasi pengolahan ikan tuna menjadi abon. *Abdi: Jurnal Pengabdian dan Pemberdayaan Masyarakat, 4*(1), 106–109. http://abdi.ppj.unp.ac.id/index.php/abdi/article/view/193

Fathoni, S., Rachman, M. A., & Arasy, A. K. (2019). Analysis determinant supply & demand fisheries. *IOP Conference Series: Earth and Environmental Science*, 1–8. https://iopscience.iop.org/article/10.1088/1755-1315/241/1/012030

Franjaya, W. L., Zamdial, Z., & Muqsit, A. (2018). Analisis produktivitas dan teknis penangkapan rawai dasar di Desa Kota Bani Kecamatan Putri Hijau Kabupaten Bengkulu Utara. *Jurnal Enggano, 3*(2), 262–274. DOI: https://doi.org/10.31186/jenggano.3.2.261-274

Freeman, R., & Svels, K. (2022). Women's empowerment in small-scale fisheries: The impact of fisheries local action groups. *Marine Policy, 136*, 104907. DOI: https://doi.org/10.1016/j.marpol.2021.104907

Fréon, P., & Dagorn, L. (2000). Review of fish associative behavior: Toward a generalization of the meeting point hypothesis. *Reviews in Fish Biology and Fisheries, 10*, 183–207. DOI: https://doi.org/10.1023/A:1016666108540

Gammanpila, M., Wijeyaratne, M. J. S., & Amarasinghe, U. S. (2019). The dwindling community-based management strategies in the Brush Park fishery of a tropical estuary: Need for co-management. *Ocean & Coastal Management, 167*, 145–157. DOI: https://doi.org/10.1016/j.ocecoaman.2018.10.008

Giareta, E. P., Prado, A. C., Leite, R. D., Padilha, E., dos Santos, I. H., Wosiak, C. D. D., & Wosnick, N. (2021). Fishermen's participation in research and conservation of coastal elasmobranchs. *Ocean & Coastal Management, 199*. DOI: https://doi.org/10.1016/j.ocecoaman.2020.105421

Glass, J. R., Kruse, G. H., & Miller, S. A. (2015). Socioeconomic considerations of the commercial weathervane scallop fishery off Alaska using SWOT analysis. *Ocean & Coastal Management, 105*, 154–165. DOI: https://doi.org/10.1016/j.ocecoaman.2015.01.005

González, M. (2021). To make a fishing life: Community empowerment in small-scale fisheries in the Pearl Lagoon, Nicaragua. In *Poverty mosaics: Realities and prospects in small-scale fisheries* (pp. 275–308). Springer. DOI: https://doi.org/10.1007/978-94-007-1582-0_13

Handoko, Y. P., & Yuniarti, T. (2023). Penanganan ikan hasil tangkapan di atas kapal dan di pendaratan: Penerapan, dampak, dan upaya perbaikannya. *Jurnal Kelautan dan Perikanan Terapan, 1*, 123–128. DOI: https://doi.org/10.15578/jkpt.v1i0.12155

Herrera-Racionero, P., Miret-Pastor, L., Cervelló-Royo, R., & Rodilla-Alama, M. (2022). The role of the Spanish Mediterranean Fisher's Guilds in Maritime Sustainability. Marine Policy, 140, 105058. DOI: https://doi.org/10.1016/j.marpol.2022.105058

Hertati, D., Nurhadi, & Kusuma, A. (2017). Strategy of fisherman empowerment in the production of milkfish spine floss in Segoro Tambak Sedati Sidoarjo Regency. *Nusantara Science and Technology Proceedings*, 213–217. DOI: https://doi.org/10.11594/nstp.2018.0131

Hoque, M. S., Bygvraa, A. D., Pike, K., Hasan, M. M., Rahman, M. A., Mitchell, D., & Holliday, E. (2021). Knowledge, practice, and economic impacts of COVID-19 on small-scale coastal fishing communities in Bangladesh: Policy recommendations for improved livelihoods. *Marine Policy, 131*, 104647. DOI: https://doi.org/10.1016/j.marpol.2021.104647

Hutubessy, G. (2020). Evaluasi selektivitas jaring insang di Teluk Kotania, Seram Bagian Barat. *Jurnal Enggano, 5*(1), 91–100. DOI: https://doi.org/10.31186/jenggano.5.1.91-100

Jayasinghe, K., & Wickramasinghe, D. (2011). Power over empowerment: Encountering development accounting in a Sri Lankan fishing village. *Critical Perspectives on Accounting, 22*(4), 396–414. DOI: https://doi.org/10.1016/j.cpa.2010.12.008

Kabir, G. M. S., Yew, T. S., K.M., N., & Hook, L. S. (2011). Assessing fishers' empowerment in inland openwater fisheries in Bangladesh. *Ecological Economics, 70*(11), 2114–2123. DOI: https://doi.org/10.1016/j.ecolecon.2011.06.009

Kar, D. (2021). Chapter 5 - Community-based fisheries management in different continents and countries across the world. In *Community-based fisheries management (A global perspective)* (pp. 121–505). DOI: https://doi.org/10.1016/B978-0-12-821723-8.00005-1

Lemée, C., Guillard, M., Fleury-Bahi, G., Krien, N., Chadenas, C., Chauveau, E., Desse, M., Coquet, M., Lamarre, M., & Navarro, O. (2019). What meaning do individuals give to coastal risks? Contribution of the social representation theory. *Marine Policy, 108*, 108:103629. DOI: https://doi.org/10.1016/j.marpol.2019.103629

Lomboy, C. G., Belinario, F., Pomeroy, R., Pedrajas, J., Tirona, R. S., Box, S., Domondon, P. R., & Balbido-Ramirez, K. (2019). Building household economic resilience to secure a future for near shore fishers in the Philippines. *Marine Policy, 99*, 334–342.
DOI: https://doi.org/10.1016/j.marpol.2018.11.013

Longsheng, C., Shah, S. A. A., Solangi, Y. A., Ahmad, M., & Ali, S. (2021). An integrated SWOT-multi-criteria analysis of implementing sustainable waste-to-energy in Pakistan. *Renewable Energy, 195*, 1438–1453.
DOI: https://doi.org/10.1016/j.renene.2022.06.112

Lowitt, K., C.Z., L., Spring, A., Turlo, C., Williams, P. L., Bird, S., Sayers, C. D., & Simba, M. (2020). Empowering small-scale, community-based fisheries through a food systems approach. *Marine Policy, 120*.
DOI: https://doi.org/10.1016/j.marpol.2020.104150

Lu, Y., Sajiki, T., & Yagi, N. (2020). Factors affecting fisherman satisfaction with fishermen's self-governance organizations: A case study of the Taiwan Donggang Sakuraebi (Sergia lucens) production and management group. *Marine Policy, 115*, 103819.
DOI: https://doi.org/10.1016/j.marpol.2020.103819

Mabe, F. N., & Asase, A. (2020). Climate change adaptation strategies and fish catchability: The case of inland artisanal fishers along the Volta Basin in Ghana. *Fisheries Research, 230*, 105675.
DOI: https://doi.org/10.1016/j.fishres.2020.105675

Masi, M., Pasquale, J., Vecchio, Y., Pauselli, G., Tribilustova, E., & Adinolfi, F. (2022). A cross-sectional study in Mediterranean European countries to support stakeholders in addressing future market demands: Consumption of farmed fish products. *Aquaculture Reports, 24*.
DOI: https://doi.org/10.1016/j.aqrep.2022.101133

Mbaye, A., Schmidt, J., & Cormier-Salem, M. (2023). Social construction of climate change and adaptation strategies among Senegalese artisanal fishers: Between empirical knowledge, magico-religious practices and sciences. *Social Sciences & Humanities Open, 7*(1).
DOI: https://doi.org/10.1016/j.ssaho.2022.100360

Mcowen, C. J., Cheung, W. W. L., Rykaczewski, R. R., Watson, R. A., & Wood, L. J. (2015). Is fisheries production within Large Marine Ecosystems determined by bottom-up or top-down forcing? *Fish and Fisheries, 16*, 623–632.
DOI: https://doi.org/10.1111/faf.12082

Muallil, R. N., Cleland, D., & Aliño, P. M. (2013). Socioeconomic factors associated with fishing pressure in small-scale fisheries along the West Philippine Sea Biogeographic Region. *Ocean & Coastal Management, 82*, 27–33.
DOI: https://doi.org/10.1016/j.ocecoaman.2013.04.013

Murdayanti, M., Ibrahim, J. T., & Baroh, I. (2021). Farmer empowerment strategies through organic vegetables development. *SOCA: Jurnal Sosial Ekonomi Pertanian, 15*(1), 108–119.
DOI: https://doi.org/10.24843/SOCA.2021.v15.i01.p10

Okeke-Ogbuafor, N., & Gray, T. (2021). Is community-based management of small-scale fisheries in Sierra Leone the answer to their problems? *World Development Perspectives, 21*.
DOI: https://doi.org/10.1016/j.wdp.2021.100292

Olale, E., & Henson, S. (2012). Determinants of income diversification among fishing communities in Western Kenya. *Fisheries Research, 1*, 235–242.
DOI: https://doi.org/10.1016/j.fishres.2012.02.029

Onyango, H. O., Ochiewo, J. O., & Karani, N. J. (2021). Socio-economic prospects and problems in under-exploited offshore marine fisheries: The case of fish aggregating devices (FADs) in Kenya coastal fisheries. *Regional Studies in Marine Science, 44*.
DOI: https://doi.org/10.1016/j.rsma.2021.101706

Pameroy, R. S., & Andrew, N. L. (2011). *Small-scale fisheries management: Frameworks and approaches for the developing world.* CPI Antony Rome.
DOI: https://doi.org/10.1079/9781845936075.0000

Pollnac, R. B. (2009). Social and cultural characteristics of fishing peoples. *Marine Behaviour and Physiology, 14*(1), 23–39. https://www.tandfonline.com/doi/abs/10.1080/10236248809378691

Prabhakar, K., Vatsa, S., Srivastav, P. P., & Pathak, S. S. (2020). Comprehensive review on freshness of fish and assessment: Analytical methods and recent innovations. *Food Research International, 133*.
DOI: https://doi.org/10.1016/j.foodres.2020.109157

Purnomo, D., Daraba, D., Achmad, M., & Tahir, I. (2021). Empowerment of the fisherman community based on local wisdom in the administration district of a Kepulauan Seribu DKI Jakarta Province. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal): Humanities, 4*(4), 9085–9094.
DOI: https://doi.org/10.33258/birci.v4i4.2904

Purwiyono, B., Prihatminingtyas, B., & Pujiastuti, A. Q. (2022). Empowerment of farmer's salt smallholder and their welfare. *SOCA: Jurnal Sosial Ekonomi Pertanian, 16*(2), 201–212.
DOI: https://doi.org/10.24843/SOCA.2022.v16.i02.p0

Rahim, A., Hastuti, D. R. D., & Astuty, S., & Bado, B. (2022). Are social conditions important to increase household income? The case of coastal fishers in Makassar City, Indonesia. *Journal of Socioeconomics and Development, 5*(2), 179–189.
DOI: https://doi.org/10.31328/jsed.v5i2.3832

Rahim, A., Hastuti, D. R. D., & Bustanul, N. (2018). Estimation of household consumption expenditure of small-scale fishermen in Indonesia. *Russian Journal of Agricultural and Socio-Economic Sciences, 83*(11), 375–383.
DOI: https://doi.org/10.18551/rjoas.2018-11.45

Rahim, A., Hastuti, D. R. D., & Syam, U. (2020). Estimation comparison of small-scale fisherman decision on choice fishing gear and outboard engine power. *ARPN Journal of Engineering and Applied Sciences, 15*(2), 574–580.
DOI: https://doi.org/10.36478/jeasci.2020.574.580

Saifullah, & Susilawati. (2018). Teknologi rumpon untuk nelayan tradisional di Kecamatan Pemangkat Kabupaten Sambas. *J-DINAMIKA: Jurnal Pengabdian Kepada Masyarakat, 3*(1), 51–60.
DOI: https://doi.org/10.25047/j-dinamika.v3i1.573

Tega, Y. R., Pesulima, W., Ningsih, O., Dawa, U. P. L., & Henggu, K. U. (2021). Pengembangan produk olahan ikan Kadoru di Kecamatan Katikutana Kabupaten Sumba Tengah, Nusa

Tenggara Timur. *Jurnal Teknologi Perikanan Dan Kelautan*, *12*(1), 11–18.
DOI: https://doi.org/10.24319/jtpk.12.11-18

Tikadar, K. K., Islam, J. M., Saha, S. M., Alam, M., Barman, S. K., & A., R. (2022). Livelihood status of small-scale fishermen and determinants of their income: Insights from north-eastern floodplains of Bangladesh. *Geography and Sustainability*, *3*(3), 204–213.
DOI: https://doi.org/10.1016/j.geosus.2022.06.002

Torres, F., Oyandel, R., & Gelcich, S. (2022). Adoption and impacts of fishing gear innovations: Insights from a small-scale fishery in Chile. *Fisheries Research*, *248*.
DOI: https://doi.org/10.1016/j.fishres.2021.106200

Utomo, N. B. P., & Setiawati, S. M. (2013). Role of various fishmeal ingredients on Sangkuriang catfish *Clarias* sp. growth. *Jurnal Akuakultur Indonesia*, *12*(2), 158–168.
DOI: https://doi.org/10.19027/jai.12.158-168

Weeratunge, N., Béné, C., Siriwardane, R., Charles, A., Johnson, D., Allison, E. H., Nayak, P. K., & Badjeck, M. (2014). Small-scale fisheries through the wellbeing lens. *Fish and Fisheries*, *15*(2), 255–279.
DOI: https://doi.org/10.1111/faf.12016

Wiber, M., Charles, A., Kearney, J., & Berkes, F. (2009). Enhancing community empowerment through participatory fisheries research. *Marine Policy*, *33*, 172–179.
DOI: https://doi.org/10.1016/j.marpol.2008.05.009

Yonvitner, Y., Wafi, H., Yulianto, G., Boer, M., & Kurnia, R. (2021). Small-scale fishermen: Poverty as a challenge to achieve Sustainable Development Goals (SDGs) in Sunda Strait. *Masyarakat, Kebudayaan Dan Politik*, *34*(1), 81–92.
DOI: https://doi.org/10.20473/mkp.V34I12021.81-92

Zheng, S., Wang, S., Xu, W., & Liu, Q. (2021). Research on the job transfer pathway of Chinese marine fishermen and its driving factors. *Marine Policy*, *129*, 104572.
DOI: https://doi.org/10.1016/j.marpol.2021.104572