



## The Performance of Livelihood-Enterprise Sustainability of Fish Processing Micro-Small Scale in Kendari, Indonesia

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### ARTICLE INFO

#### Article History:

Received: Oct. 16, 2023

Accepted: Dec. 23, 2023

Online: Dec. 30, 2023

#### Keywords:

MSE,

Livelihood-enterprise,

Vulnerable,

COVID-19,

Sustainability

### ABSTRACT

The sustainability of MSEs can be achieved by enhancing self-reliance, capacity, and empowerment. Efforts to ensure the sustainability of the MSEs fisheries sector are crucial in preserving the continuity of fisheries resources and livelihoods of coastal communities. This study analyzed the sustainability performance of micro-small-scale fish processing enterprises and how it is related to assets and access to different types of capital, including natural, human, social, financial, and technology in Kendari, Southeast Sulawesi. The research method was a survey and in-depth interviews with micro-small-scale fish processing businesses. This research used the livelihood sustainability approach method on the pentagon of assets. The descriptive approach systematically presented the access to livelihood assets of fisheries processing business actors. A pentagonal approach was used to describe the relationship between the five livelihood assets by scoring the indicators of each accessibility indicator asset. The scoring is based on a Likert scale. Scoring was carried out using various measurement scales (nominal, ordinal, interval, ratio, and size scales). Linkages between asset and access variables were identified in the form of a spidergram. The results showed that fish processing MSEs in Kendari have the highest asset characteristics of social, nature, human, technology, and financial capital. The ability to survive in a small micro-scale fish processing business was very vulnerable to external environmental factors (access to markets, the COVID-19 pandemic, and seasonal changes). The sustainability performance of fish processing MSEs refers to their ability to keep operating and growing long-term while maintaining a balance between Pentagon assets.

### INTRODUCTION

Sustainable development in fisheries has three main pillars covering ecology, economy, and social (Theuri *et al.*, 2014; Charles, 2023). It is regarded as an essential foundation in responding to the demands of development that continue to grow along

with population growth (**Roscher *et al.*, 2022**). To achieve national food independence and security, it is necessary to guarantee the availability, affordability, and sustainability of fish consumption and the fish processing industry. The amount of diversity and balance between assets determines the strength of a community. The livelihood strategy approach of a family unit or community consists of two categories, namely natural resource-based livelihood activities and non-natural resource activities, such as trade, services, industry, and manufacturing (**Saragih *et al.*, 2007**). Fisheries processing is a non-agricultural activity that is a major component of livelihood options for developing countries (**Igwe *et al.*, 2019**).

The traditional small-scale fish processing industry faces various challenges, including capital, technology, management, marketing and product quality. These challenges have contributed to a decline in the competitiveness of processed products. In addition, limited access to information on the quality and safety of fishery products, coupled with complex demands for quality standards, packaging, labeling, certification, and distribution permits, are major barriers to effective product marketing (**Howara, 2013**). The prevalence of a gap between supply and demand remains a persistent problem (**Man & Strandhagen, 2017**). Fish processors often struggle with the limited availability of raw materials (**Poernomo & Heruwati, 2011**). In Indonesia, fish processing largely relies on traditional methods and is still household-scale due to the challenges associated with modern processing requirements, which require the supply of high-quality raw materials, standardized types and sizes, and sufficient quantities to match the capacity of the processing industry (**Heruwati, 2002**). This gap is underscored by the fact that few countries, if any, can rival Canada in developing a mechanized processing sector that caters to large volumes of a single fish species (**Alden, 2011**). Therefore, developing small and medium-scale fisheries industries is an important focus in Indonesia, especially in the context of the economic crisis (**Purwaningsih *et al.*, 2012**).

The Sustainable Livelihood Approach (SLA) developed by DFID in 1998 (**Ashley & Carney, 1999**) has been one of the strategies to address this challenge. This approach proposes strengthening five main assets, namely natural, human, social, financial, and physical assets (**Krantz, 2001; Nguyen *et al.*, 2006; Saragih *et al.*, 2007; May *et al.*, 2009; Ferrol-Schulte *et al.*, 2013; Chandra *et al.*, 2015; Parmawati *et al.*, 2016; Triyanti & Firdaus, 2016; Quandt, 2018; Apine *et al.*, 2019**). Additionally, there are two more assets that need also strengthening, namely political policy and market (**Muhammad *et al.*, 2014**). Sustainable productive activities must be developed based on human resources, physical resources, natural resources, and markets (**Purwanti *et al.*, 2018**). Sustainable fisheries processing enterprise development must consider these various aspects, as well as how these assets interact and impact the enterprise's long-term viability.

The SLA approach has been used in livelihood sustainability studies, sustainability of Bunaken fishermen (**Walker *et al.*, 2001**), tropical coastal and marine social-ecological systems (**Ferrol-Schulte *et al.*, 2013**), geotourism development (**Chandra *et al.*, 2015**), welfare of small-scale fishers in Indramayu (**Triyanti & Firdaus, 2016**), HLRA (**Quandt, 2018**), and small-scale *Scylla serrata* fishery in India (**Apine *et al.*,**

2019). The SLA approach to the development of capture fisheries and aquaculture businesses (on-fishing) has been widely studied, but there has not been much focus on the study of fisheries processing and marketing business clusters (off-fishing). A comprehensive and multidimensional study is vital in facing external changes affecting business continuity. Therefore, there is a need for in-depth research on the performance and capacity of livelihood assets when facing business vulnerabilities that can arise due to external changes in the fisheries processing industry. Efforts to ensure the sustainability of the micro-small scale fisheries sector are crucial in preserving the continuity of fisheries resources and livelihoods of coastal communities. Factors influencing choices and income within the micro-small scale fisheries sector are essential and must be carefully considered. This study aimed to analyze the sustainability status of micro-small-scale fish processing enterprises and how it is related to assets and access to natural, human, social, financial, and technology capital in Kendari, Southeast Sulawesi.

## MATERIALS AND METHODS

### 1. Materials

The research was conducted throughout the year 2022, from January to December. The focus of the research was on small and medium-scale fisheries processing businesses in Kendari City, Southeast Sulawesi Province. Fish processing business actors are spread across 9 sub-districts from 11 sub-districts in Kendari City. The materials needed in research using the survey method and in-depth interviews are:

1. Survey questionnaire: Structured questions were developed covering aspects such as production processes, assets or resources accessed, challenges faced, and business development aspirations.
2. In-depth interview guide: A guideline used by researchers when conducting in-depth interviews, containing a list of open-ended questions and directions to obtain detailed information about the experiences, views, and problems faced by business owners,
5. Observation notes: Observation notes from the researcher when conducting surveys or interviews. Observations related to the environment, business practices, or situations that can provide deeper context related to the responses of businesses,
6. Technology support tools: Technology that supports the survey or interview process, such as data processing software, audio/video recording equipment.
7. Contact details and identification of respondents: Relevant information about the identity and contacts of respondents obtained from various sources, namely fish processing business profile data from the Office of Fisheries and Marine Affairs and the Office of Industry and MSMEs.
8. Map of the research area: A small-scale map showing the general area or a more detailed map showing the specific location of the fisheries processing businesses that are the focus of the research.

### 2. Methods

The research method used in this study is the survey method conducted in Kendari involving micro-small-scale fish processing businesses. This research aimed to conduct an in-depth study of the background of the problem and existing situation and also collect information on the five assets considered in the sustainable livelihood approach enterprise

(SLEA). This research analyzed the sustainability status of micro-small-scale fish processing enterprises and how it is related to assets and access to natural, human, social, financial, and technology capital.

The descriptive approach systematically presents the access to livelihood assets of fisheries processing business actors. A pentagonal approach is used to describe the relationship between the five livelihood assets by scoring the indicators of each accessibility indicator asset. The scoring is based on a Likert scale classified into very low, low, medium, high and very high access. Scoring is carried out using various measurement scales, such as nominal, ordinal, interval, ratio, and size scales, as outlined by **Ngatno (2019)** and **Santosa and Rahardjo (2021)**.

Linkages between asset and access variables were identified in the form of a spidergram. Data were tabulated using Microsoft Excel to determine the sustainability status of fish processing businesses that have the potential to be developed. The development of this method involves modifying the previously applied SLA approach asset pentagon model (**Ashley & Carney, 1999**) with a specialized approach from the enterprise community. The sustainable livelihood-enterprise approach (SLEA) model is designed to facilitate growth and development from sustainable livelihoods to larger-scale businesses. Furthermore, a spidergram was created to provide a clearer picture of each asset's sustainability level and status. This spidergram helps to explain the balance between variables in the context of sustainability. The indicators for each asset and access variable were identified based on the real conditions of fisheries processing businesses in the research area (Table 1). The development of these variables and indicators adopted a modified approach from the SLA previously implemented by DFID (**Ashley & Carney, 1999**) on the SFLP Sustainable Fisheries Livelihoods Program and FAO in various West African countries since 1999.

**Table 1.** Variable and attribute of the livelihood capital of SMEs fish production

<b>Human</b>	<b>Social</b>	<b>Nature</b>	<b>Technology</b>	<b>Financial</b>
- Education	- Organization	- Raw material diversity	- Production facilities	- Assets
- Health	- Participation	- Availability of raw materials	- Production room	- Investment
- Work experience	- Cooperation	- Waste handling	- Value product proposition	- Operating costs
- Number of workers	- Kinship ties	- Source of clean water	- Technology market	- Expenditure on labor
- Skill development	- Social network			- Income
- Access to capital assistance and mentoring				- Savings
				- Loans
				- Government assistance

Source: Modified from **Quandt (2018)** and **Ashley and Carney (1999)**.

The next step is to assess and score the asset variable indicators, such as:

- (1) The scores selected by respondents (very low, low, medium, high, and very high criteria) are summed up into a total score and then divided by the number.
- (2) The scores per indicator on one variable are all summed up and then divided by the total number of respondents. Then, the average score per indicator will be obtained from:

$$\text{sub variable } i = \frac{\sum \text{criteria assessment score } i}{\sum \text{total criteria score } i}$$

- (3) The average score per indicator obtained is then summed up on each asset to get the sub-total score value, then divided by the number of indicators. Then, the average score of each asset will be obtained, as follows:

$$\text{variable } i = \frac{\sum \text{sub variable score } i}{\sum \text{total sub variable score } i}$$

- (4) The average score of each asset variable was analyzed using a pentagonal diagram to determine the relationship between asset variables, access and availability. In addition, the scores of the five assets for each respondent were summed up and divided by the number of assets to obtain the overall average livelihood asset score. This is to identify whether each respondent's livelihood assets are categorized as high, medium, or low. A comparative analysis of asset values was made based on the type of fish processing business.

The sustainable livelihood approach is a useful analytical tool for small-scale fisheries to identify what assets communities have, what shocks and trends affect their daily lives and livelihoods, key influencing structures and processes, and their livelihood strategies in a dynamic sector such as small-scale fisheries. This approach is mainly used as a practical tool for poverty reduction programs (Apine *et al.*, 2019). This study used the SLEA analysis to generate a picture of the asset components owned by the fishery product processing community in Kendari in the face of business vulnerabilities arising from external changes.

## RESULTS

The practical application of the sustainable livelihood-enterprise approach is relatively new in Indonesia's fisheries development efforts. The livelihood approach provides a way for communities and their external supporters to come together to understand and develop approaches that address poverty and seek to create beneficial change, both in the present and for future generations. The performance of sustainability in micro-small-scale fish processing refers to the ability of the business to continue operating and growing in the long term while maintaining a balance between natural, human, social, technological, and financial capital. The results of the analysis in this study, which used the sustainable livelihood-enterprise approach (SLEA) modified from the sustainable livelihood approach, were analyzed according to the method of Saragih *et al.* (2007) and Ayalu *et al.* (2022). The findings revealed that sustainability in traditional fish processing businesses, such as drying, salting, and smoking can be analyzed using

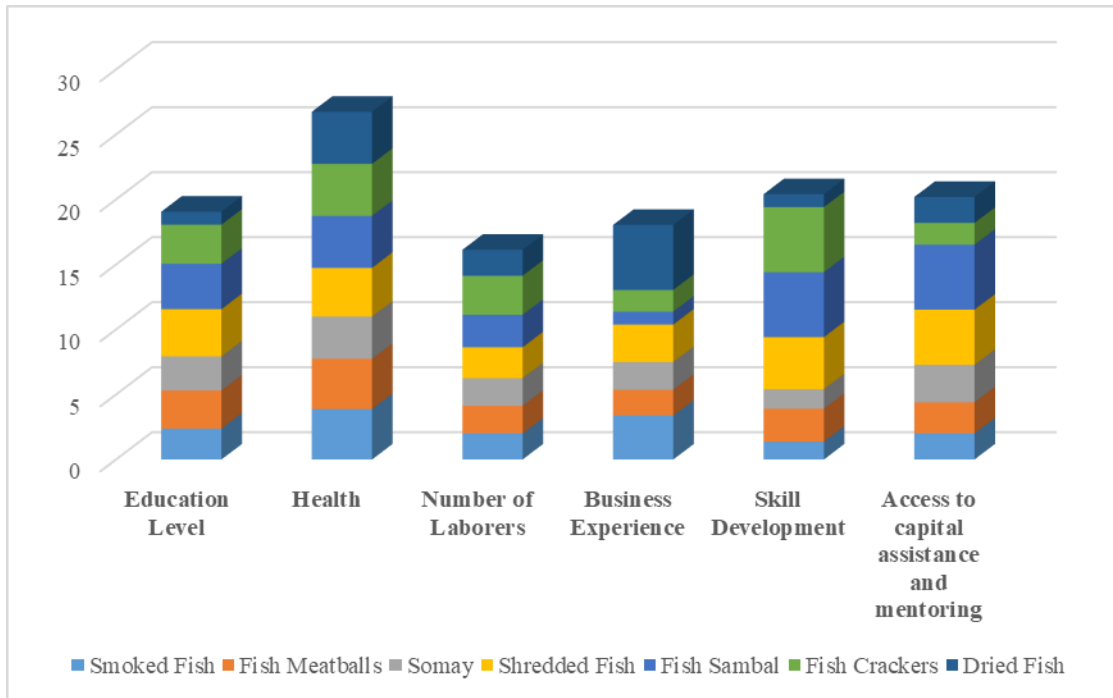
the sustainable livelihood approach (SLA), as developed in previous studies by **Hall (2011)**.

### **1. Vulnerability**

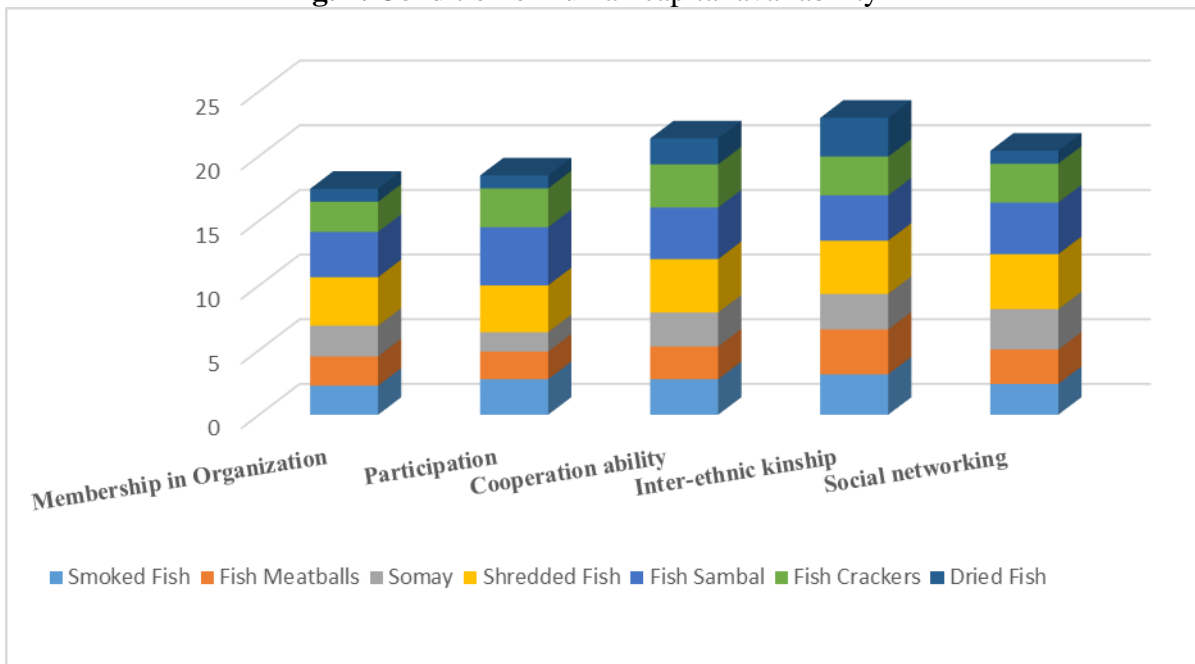
Vulnerability relates to people's livelihoods and assets that are affected environmentally, positively or negatively by trends, shocks and seasonality. Increased resilience reduces vulnerability and adaptation to shocks (**Amadu *et al.*, 2021**). In Kendari, micro-small fish processing enterprises are vulnerable to climate change and health crises. Climate change affects seasonality and extreme weather, disrupting fishing activities and limiting raw material supply and market access. The health crisis due to the Covid-19 pandemic in 2020 until the end of 2021 has both positive and negative impacts on fish processing businesses, namely affecting the decline in public health, decreased production, decreased demand for processed products due to changes in consumer buying interest due to the precautionary principle of uncertainty and supply of raw materials, transportation, and distribution. However, opportunities arise for those who can adapt through online marketing technology transfer to get a higher turnover than before with conventional marketing. Some concrete steps to maintain business continuity and sustainability are market diversification, storage of raw materials and processed products, collaboration with supporting facilities, creative technology adaptation for processing, storage and marketing, product innovation and quality improvement, responsiveness to market changes, flexibility in changing business plans, and compliance with regulations.

### **2. Livelihood asset attributes**

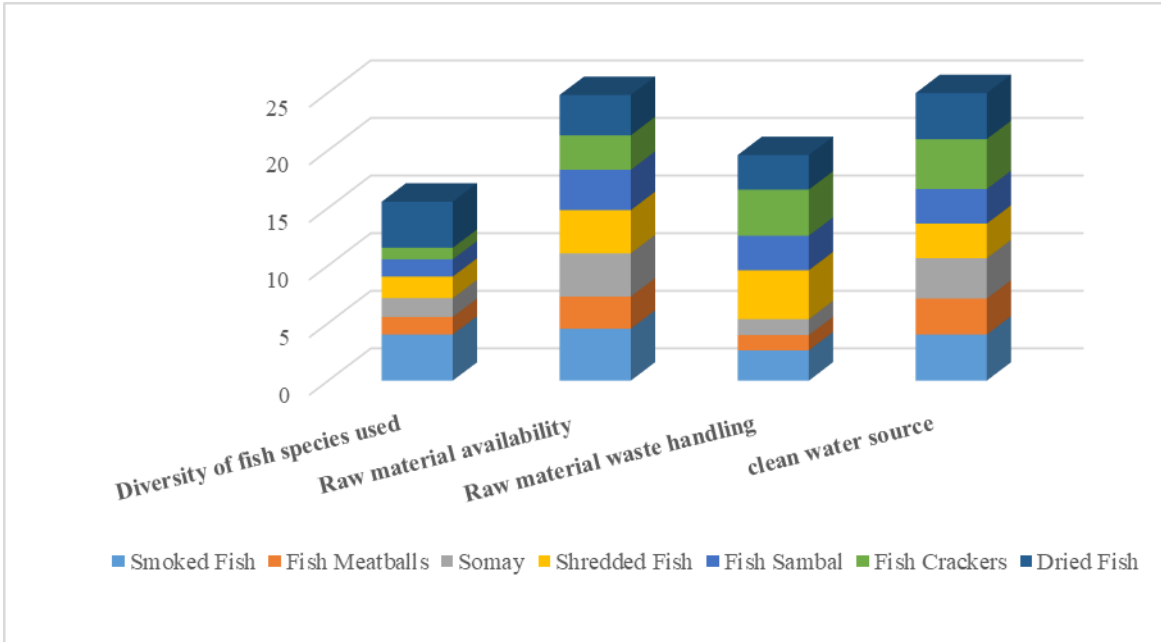
In this study, the indicators of each livelihood asset include human capital, namely education level, health, work experience, number of workers, and skill development (Fig. 1). The condition of social capital availability includes organization, participation, cooperation, institutional ties and social networks (Fig. 2). Nature capital is the availability of raw materials, waste management, and clean water sources (Fig. 3). Technology capital includes production equipment, production house facilities, product propositions, and market technology (Fig. 4). Financial capital, encompasses the amount of assets, investment value, operating costs, business income, expenses, loans, assistance and savings (Fig. 5).



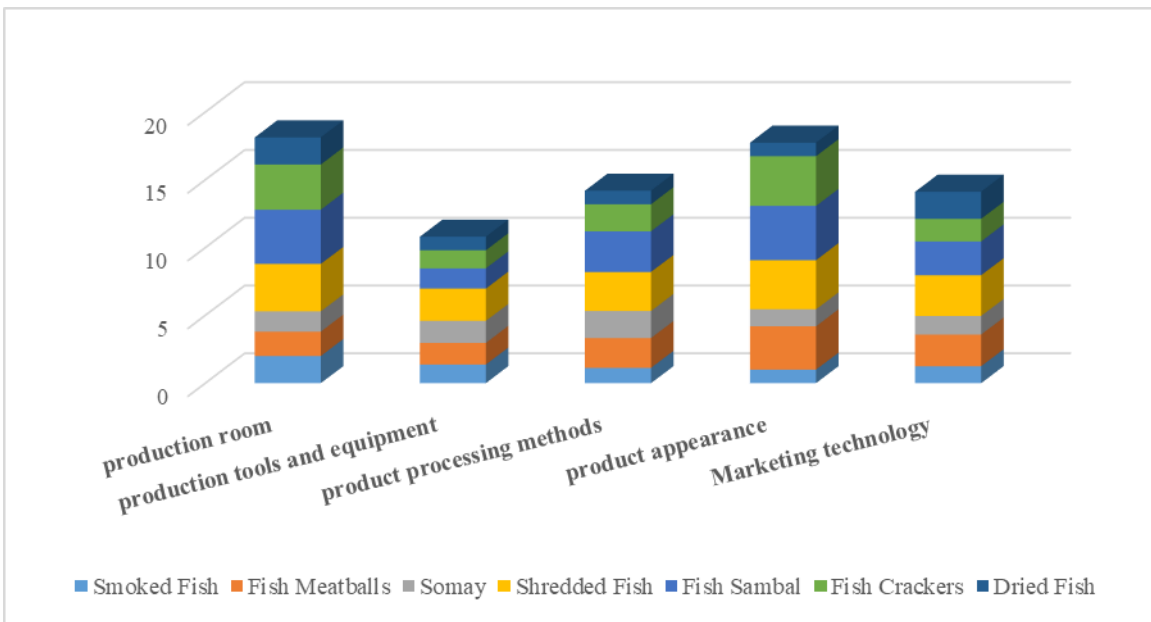
**Fig. 1.** Condition of human capital availability



**Fig. 2.** Condition of social capital availability



**Fig. 3.** Condition of nature capital availability



**Fig. 4.** Condition of technology capital availability



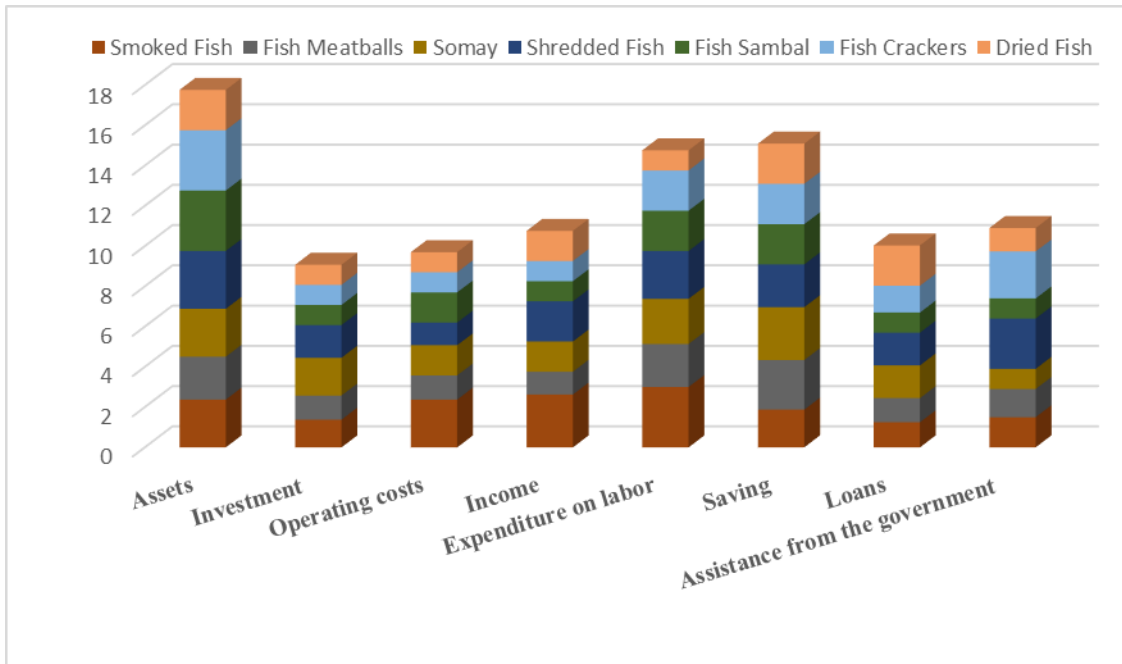


Fig. 5. Condition of financial capital availability

Assessment of access to assets with criteria from 1 (poor) to 5 (high), based on a Likert scale. Applying the sustainable livelihood approach to fishery product processing MSEs was observed for seven types of MSEs: smoked fish, shredded fish, fish meatballs, somay, fish sambal, fish crackers and dried fish. In Table (2) and Fig. (6), each type of processing business is assessed based on five assets: natural, human, social, technology and financial. There are 4 similarities in the level of mastery or ability to access capital from each type of fish processing business:

1. Smoked and dried fish businesses have asset characteristics ranging from highest to lowest: natural resources, human resources, social, financial and technology.
2. Shredded fish, fish sambal and fish crackers businesses have asset characteristics ranging from highest to lowest: social, natural resources, technology, human resources and finance.
3. The fish meatballs business has the characteristics of assets owned from highest to lowest: social, human, natural, technological, and financial.
4. Somay business has asset characteristics ranging from highest to lowest, namely natural resources, social, human resources, financial, and technology.

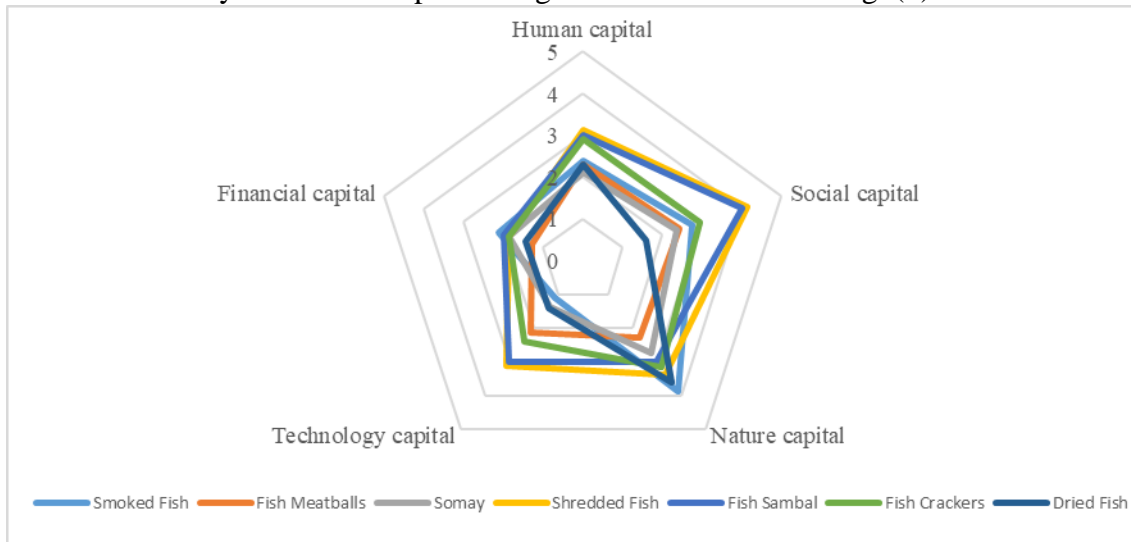
Table 2. Matrix of distribution criteria level asset MSEs fish processing in Kendari

Criteria	Very high	High	Medium	Low	Very low
Smoked fish	-	-	Nature	Social, human, financial	Technology
Fish meatballs	-	-	-	Social, human, nature, technology	Financial
Somay	-	-	-	Nature, social, human,	Financial, technology

Shredded fish	-	Social	Nature, technology	Human	Financial
Fish sambal	-	Social	Nature, technology	Human	Financial
Fish crackers	-	-	Social, nature	Technology, human, financial	-
Dried fish	-	-	Nature	Human, social	Financial, technology

Data source: Research data processing, 2023

The sustainability status of fish processing MSEs is exhibited in Fig. (6).



**Fig. 6.** The sustainability state comparative MSEs fish processing in Kendari.

## DISCUSSION

MSEs are significantly affected by various factors, such as infrastructure, raw materials, workplace, and human resources. These constraints include limited markets, access to finance, input storage, transportation facilities, and resources or inadequate technology (Ayalu *et al.*, 2022). Human capital includes the skills, knowledge and expertise of individuals or groups for economic purposes. Investment in human capital improves productivity, performance, and adaptability in business (Ayalu *et al.*, 2022). Education affects the ability to manage marketing efforts. The business of shredded fish, fish sambal, and fish crackers require more capital, higher knowledge, and skills compared to dried and smoked fish, which can be started with low educational capital. Family health is affected by the Covid-19 pandemic, hampering fisheries production. Physical health is important for productivity (Khan *et al.*, 2023). Business experience affects the quality of business management but does not guarantee the development of MSEs. Dried fish business actors with longer business experience do not show significant business development. Therefore, adaptation to change, innovation and product quality must be considered. The number of workers is related to the type of production activity, the more complex the activity, the more workers are needed. The activities in fish processing require a lot of labor, such as procuring raw materials, cleaning, cutting,

frying, smoking, and packaging and marketing products. The largest amount of labor is absorbed in the fish crackers business. Skill development is mainly in fish crackers, fish sambal, shredded fish, and fish meatballs due to the flexibility of production time. Dependence on government assistance is low, indicating independence. However, businesses that do not get support from the government are due to low access capacity.

Social capital plays an essential role in sustainable community and economic development, consisting of values, norms and beliefs that form social bonds, strengthen interactions, and achieve common goals. Fish processing MSEs in Kendari are active in various organizations, especially shredded fish and fish crackers. High participation is seen in shredded fish, fish crackers, and smoked fish, while fish meatballs, somay and dried fish have low participation. In a business or organizational context, cooperative ties are made between companies or institutions with similar interests or goals. Partnership ties can provide benefits, such as increasing efficiency and productivity, expanding market reach, and sharing risks and resources. Partnership cooperation is carried out in raw material storage and product marketing, providing efficiency, wider market reach and risk sharing. Ties with the government are low, especially among dried and smoked fish businesses that are more independent in all aspects of the business. Inter-ethnic kinship varies, but is supported by positive emotions, solidarity and mutual respect or appreciation of differences, strengthening relationships. Bugis, Muna, Buton and Tolaki ethnic groups are common. Strong social networks between businesses, communities and related parties support the exchange of knowledge and experience. The processing business with the highest social network is the shredded fish business, followed by fish sambal, somay, fish crackers, fish meatballs, smoked fish, and dried fish. Research by **Xiong et al. (2021)** shows that household social capital measured by three dimensions: social networks, social participation, and social trust have a significant positive influence on sustainable livelihoods.

Natural capital is natural resources that benefit humans, such as energy, air, minerals, forests, and land. Nature capital in fisheries processing in Kendari is measured through indicators, such as fish species diversity, availability of raw materials, waste treatment and clean water sources. The highest diversity of fish types is found in dried fish and smoked fish, which include many fish types: rays, barracuda, mackerel, kite, shark, marlin, squid, octopus, sardine, pompano, and tuna, while fish meatballs, somay, shredded fish and fish sambal use specific fish. Raw material availability is led by smoked fish, followed by somay, shredded fish, dried fish, fish sambal, fish meatballs and fish crackers. Limited raw materials are seen in fish crackers and sambal, imported from outside Kendari City, namely from Bombana, South Konawe and Bau Bau. Waste management and clean water sources have a moderate level of access. Fish meatballs and somay businesses have little waste, while waste processing in the shredded fish business is processed into derivative products and fish feed. Access to clean water sources is high for all types of MSEs, and comes from the regional drinking water company and borehole well. **Keesstra et al. (2018)** emphasize the importance of natural capital valuation, especially ecosystems and biodiversity in supporting industry and policymakers, highlighting the value of natural capital in sustainable development.

They emphasized the potential of technological capital to contribute to a sustainable livelihood framework (**Gu et al., 2012; Song et al., 2018**). Technology capital is crucial for achieving sustainability since it enhances resource management efficiency, improves

product quality and services, and boosts overall organizational performance. Technology capital can be measured through indicators, such as production room infrastructure, production equipment, product processing methods, product presentation and market technology. Fish processing requires production facilities with strict sanitation, licenses and certifications that ensure the product is safe and up to standard. There are three types of production space: separate, integrated and combined kitchen. The best facilities cover marketing, administration, packaging, production, and washing in the fish sambal, fish crackers, and fish shreds businesses. Appropriate equipment affects efficiency and product quality, especially in shredding fish, fish balls, somay and others. There are three methods of fish processing: traditional, semi-modern, and modern. Traditional methods are cost-effective but time- and labor-intensive. Modern methods are efficient and high quality but require a large investment. In general, mechanical, thermal, chemical and physical methods are used. Good product appearance increases value and attractiveness. Attractive packaging usually includes labels, prices, logos, certifications, and other information. Digital marketing technology through Facebook, Instagram, WhatsApp, and others is vital for consumer outreach in the digital age. Fish businesses should utilize these strategies. However, **Sharma and Aggarwal (2019)** found the determinants of e-commerce success were not directly relevant to technological capital in a sustainable livelihood framework and, therefore, not applicable to the SLA framework.

Financial capital plays an important role in the sustainability of rural households' livelihoods, affecting their ability to engage in economic activities and overcome hardships. Financial resources are available for people to access other resources (**Su *et al.*, 2019**). Financial performance is not directly relevant to the sustainable livelihoods framework. Assets are anything a company owns that has economic value and future benefits. In fish processing businesses, assets are generally in the value category of 50,000,000- IDR500,000,000. The highest assets are in the fish crackers and sambal business, and the lowest are in dried fish. However, the main difference between total assets and investment is that total assets include all types of company ownership, while investment only involves the value of specific investments owned by the company. Investments are expected to provide returns in the future. Investment in fish processing is generally low, ranging from 67,944,001- IDR 135,238,000. Highest to lowest investment is in the following order: somay, shredded fish, smoked fish, fish meatballs, fish sambal, fish crackers, dried fish. Production operating costs, revenue per cycle, and labor costs were highest for shredded fish businesses and lowest for fish sambal and crackers businesses. The sluggish economy generally influences low market demand, operational cost optimization, and fierce competition that affects prices and business profitability. Small business scale means smaller costs and revenues. Labor wages are still below Kendari's minimum wage (IDR 2,768,592). Limited resources and capital in MSEs prevent the payment of high wages. Savings awareness is low due to limited capital, minimal financial education, unstable cash flow, and social pressure. Improving fishing communities' access to financial capital can be done through trusted savings, loan schemes, and buffer capital. Loans from financial institutions are low due to a lack of information, difficult requirements, and poor financial records. Dried fish businesses have medium access through cooperatives. The government supports MSEs with production facilities and financial assistance. Additionally, the government assists fisheries extension

workers and skill development training from related agencies. However, it was found that some business owners generally do not receive assistance.

Overall, MSEs fish processing in Kendari have asset characteristics. From the highest level, these are social assets (24%), natural resources (23%), human resources (21%), technology (17%), and financial (15%), all in the low category (Fig. 6). In accordance with the study by **Xiong et al. (2021)** on the potential benefits of social capital in enhancing sustainable livelihoods it emphasizes the importance of relationships and social networks in enhancing livelihood capabilities. However, in contrast with the characteristics of agricultural food, according to **Parmawati et al. (2012)**. In the food sector, the highest characteristic is nature capital, serving as the foundation for agricultural center development. Following this, in descending order, are physical assets, human, financial, and social assets as the lowest level. Meanwhile, the livelihood index of small-scale fishers ( $\leq 5$  GT) in Indramayu Regency is in the moderate category (54.93%), the achievement of financial capital indicator (83.51%) is in the excellent category, natural capital indicator (60.00%) is in the moderate category, human capital indicator (56.65%) is in the moderate category, and social capital indicator (13.20%) is in the poor category (**Triyanti & Firdaus, 2016**).

Several limitations need to be considered in analyzing the performance of fisheries processing businesses using a sustainable livelihood approach. The complexity of factors affecting fisheries sustainability is difficult to quantify fully, including external factors, such as climate change, market fluctuations, and unpredictable government policies. Limited resources, such as time, funds, and data also affect the depth of analysis. Other limitations include the limited number of survey respondents, impacting the industry's overall representation. Subjective interpretations of sustainability can also be an obstacle. Recognizing these limitations is essential in adequately interpreting the research results. SLA can contribute significantly to long-term sustainable development (**Lindblom et al., 2016**).

Furthermore, it offers a framework for understanding vulnerability, adaptation, and resilience, essential for businesses operating in dynamic and often challenging environments (**Knutsson & Ostwald, 2006**). However, there are also drawbacks to consider, while SLA aims to promote sustainable livelihoods, there is a gap in understanding the role of wages in transitioning toward sustainable livelihood, which may impact the economic aspects of fish processing businesses (**Haar et al., 2018**). Moreover, perceptions of sustainable coastal living may not always align with national goals for sustainable development, potentially creating conflicts for businesses operating in coastal areas (**Rybråten et al., 2018**). Fish processing businesses need to recognize these discrepancies and navigate them effectively

## CONCLUSION

The sustainability performance of fish processing MSEs refers to the sustainable ability to keep operating and growing long-term while maintaining a balance between nature capital, human capital, social capital, technology capital, and financial capital, from climate/seasonal change shocks to the COVID-19 pandemic. Fish processing MSEs

can access livelihood assets in order of social, nature, human, technology, and financial capital.

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