Development Prospects of Smoked Fish Business in Sinjai District, South Sulawesi Province, Indonesia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This research analyses the characteristics of smoked fish business and determines the appropriate development strategy for the business in the coastal areas of Sinjai District.
Using qualitative and descriptive designs. Sampling was conducted in North Sinjai and East Sinjai Districts of Sinjai Regency from July to August 2024. The data analysis technique uses qualitative descriptive analysis and SWOT analysis to systematically identify various internal and external factors and formulate MSME development strategies. The results of the research show that (1) Characteristics of smoked fish processing MSMEs in Sinjai Regency, including: Business actors

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aged 33-70 with a dominant education level of elementary school, and having business experience of more than 10 years; the product produced has a distinctive taste, smoked fish in whole and fillet form, uses wood as fuel, simple equipment, marketing is still on a local scale, with varying product prices; MSMEs do not yet have business legality. (2) Appropriate strategies to use in developing smoked fish processing businesses in Sinjai Regency include: developing smoked fish MSMEs with training and counseling programs from related agencies, establishing collaborative partnerships between MSME actors in promoting products and implementing processing technology innovations by updating infrastructure and attend training.

1. INTRODUCTION

Sinjai Regency is one of the districts in South Sulawesi Province which has quite extensive coastal and sea areas and is located at 5º 19' 30” to 5º 36' 47” South Latitude and 119º 48' 30” to 120º 0' 0” East longitude (Kusmindari & Faizal, 2022). The area is ±819.96 km² or 1.29% of the land area of South Sulawesi. Geographically, Sinjai Regency consists of coastal, lowland and highland areas which have a coastline of ± 31 km, consisting of a mainland coastal area of 17 km and the Sembilan Island area with a coastline of ± 14 km. with an estimated utilization potential of 38,000 tons/year (DKP Sinjai, 2024). The production of fishery products in Sinjai Regency has increased from year to year. In 2022, the production volume of fishery products will be 38,873.40 tonnes, experiencing an increase of 3.02% in 2023 to 40,047.00 tonnes. The production value of fisheries products in Sinjai Regency also increased by 13.10% (BPS Sinjai, 2024). Based on statistical data from the Sinjai Regency Fisheries Service (2024), the types of processed fishery products that are growing include drying (salting) (58.79%), drying (2.91%), smoking (14.28%), freezing (18 .38%), processing of crushed meat and surimi (2.42%), processing of crackers, chips, dents (1.87%), fish floss (1.08%), and fresh fish fillets (0.28%).

The smoked fish processing business is a growing industry and is quite interesting to research. Smoking is a way of preserving meat using a combination of heat and chemicals produced from burning wood (Adawyah, 2007; Adeyeye & Oyewole, 2016). Processing fish by smoking can give a delicious aroma, brownish or blackish color, good texture and a distinctive and delicious taste to the processed fish meat. The fish smoking process not only extends the shelf life of fish products, but also provides a distinctive taste that consumers are interested in (Heruwati, 2002; Hadi et al., 2022; Zees et al. 2024; Fitriyah et al., 2023). The unique taste and texture of smoked fish makes it a favorite choice in various dishes, both in restaurants and households (Anam et al., 2023). Smoked fish is a processed product that has high economic value and stable demand in the local market (Karim et al., 2021). The problem encountered in the field is using a direct smoking system which requires more wood as a source of smoke, the use of smoke is less effective (requires a relatively long time) because the smoke does not directly reach the center of the smoke. fish, but more is wasted due to the influence of wind direction, the smoke emitted causes air pollution and causes discomfort for workers and the environment, simple equipment, limited production with local marketing, limited capital and manual processing which sometimes ignores sanitation, resulting in low quality (Patekkai et al., 2019; Salman et al., 2019).

2. MATERIALS AND METHODS

This research was conducted in Sinjai Regency. The research implementation time is from July to August 2024.

In this research the author used field research and a qualitative approach. Field research is conducting research by observing and researching conditions directly in the field or directly at the research object. A qualitative approach is an approach that emphasizes its analysis on deductive and inductive inference processes as well as on analysis of the dynamics of relationships between observed phenomena, using scientific logic. This does not mean that the qualitative approach does not use quantitative data support at all, but the emphasis is not on testing hypotheses, but rather on efforts to answer research questions through normative ways of thinking. This research attempts to describe research objects based on facts and data and events, trying to connect events or research objects while analyzing them based on previously developed concepts, making it easier for researchers to solve problems.
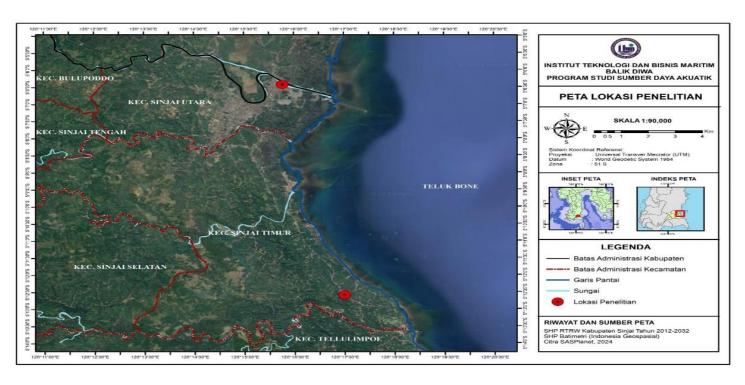
Fig. 1. Map showing study Location

This research uses primary data and secondary data. Primary data was obtained by directly observing several MSMEs processing smoked fish and creating documentation. Conduct direct observations of the production process, business management and marketing strategies implemented by the business used as a case study. Conducted in-depth interviews with 25 respondents. The determination of respondents in this study was based on certain criteria.

The following are respondents with the criteria set out in this research, consisting of:

1. Smoked Fish Producer: Owner or manager of a fish processing business that uses traditional smoking methods. The number of respondents was 10 people.
2. Consumers: Local consumers in Sinjai Regency who regularly consume smoked fish. The number of respondents was 10 people.
3. Stakeholders from the Government and Related Agencies: District Government Apparatus at the Fisheries Service, Cooperatives, SMEs and Employment Service as well as the Industry, Trade and ESDM Service (DP3ESDM). The number of respondents was 5 people.

Conduct interviews with business owners using a list of questions to obtain information about: (a) The history of the development of smoked fish processing MSMEs; (b) Source, type and conditions of availability of raw materials; (c) Labor force characteristics; (d) Smoked fish processing process; (e) business development and innovation strategies that have been implemented; (f) Volume of production and marketing of smoked fish products. (g) Strengths and Weaknesses; (h) Opportunities and challenges faced; and (i) interviews with consumers to get direct feedback about smoked fish products, consumer perceptions of quality, taste, texture and satisfaction with smoked fish products.

Secondary data was obtained from reports and documents sourced from the Sinjai Regency Fisheries and Maritime Service, annual statistical data from the Sinjai Regency Central Statistics Agency, the Employment Service, the Sinjai Regency Trade, Industry and ESDM Service, as well as various reference materials such as: seminar papers, journals, books, magazines and other documents relevant to the smoked fish processing industry in Indonesia and globally.

To get an idea of the characteristics of the smoked fish processing business, qualitative descriptive data analysis was used. Qualitative descriptive analysis provides an objective and accurate picture of conditions, as well as making an assessment of the current condition of the smoked fish processing business and the results are used to plan future improvements.

To determine the smoked fish business development strategy, the author uses SWOT analysis. The SWOT analysis method is to identify various factors sequentially and systematically to formulate a company strategy (Rangkuti, 2016). This analysis is based on logic that can maximize strengths and opportunities, but at the same time can minimize weaknesses and threats. SWOT analysis aims to find the organization's position in the competitive strength map (Purhantara, 2010).

The data processing method in SWOT analysis consists of qualitative analysis and quantitative analysis. Qualitative analysis is used to understand the company's environment such as strengths, weaknesses, opportunities and threats facing the company. Quantitative analysis is used to compile the IFAS matrix, EFAS matrix, IE matrix, SWOT Quadrant matrix, and QSPM (Quantitative Strategic Planning Method) matrix. This quantitative data was processed using Microsoft Excel 2010. After analysis, the data was presented. The data presented in this research are in the form of tables and pictures from the results of the SWOT analysis which are narrative in nature. According to Purhantara (2010), the process for conducting a SWOT analysis goes through the following stages:

a. Evaluate the organization's strategic goals.
b. Carry out a strategic environmental analysis consisting of an analysis of the conditions of the organization's objectives or an analysis of the internal environment and an analysis of the competitive environment or external environment
c. Conduct IFAS, EFAS analysis, and prepare the organization's competitive business profile.
d. Develop an IE analysis matrix and SWOT analysis matrix.

3. RESULTS AND DISCUSSION

3.1 Results

Table 1. Data on Fisheries Micro, Small and Medium Enterprises (MSMEs) in 2023

No o.	Name of Business Unit/Group	Chairman	Address	Number of Members	Product Type
1	Tenggiri	Risda	Lappa	19 People	Fish Meatballs, Shredded, And etc.
2	Sumber Mitra	Junaedi	Lappa	18 People	Smoked fish, Shredded And etc.
3	Putra Mandiri	Abd. Salam	Lappa	13 People	Wet Fish
4	Komila	Sulaiman	Lappa	13 People	Dried Fish
5	Carmin	Nurliah	Lappa	10 People	Wet Fish
6	Baronang	Nurcahaya	Lappa	10 People	Wet Fish
7	Laskar Sehati	Mariam	Lappa	10 People	Wet Fish
8	Bintang Kejora	Ritawati	Lappa	10 People	Wet Fish
9	Teri Lappa	Lisnayanti	Lappa	20 People	Dried Fish
10	Damai Sejahtera Bersama	Srianti	Lappa	19 People	Wet Fish
11	Sipakatuo	Mindawati	Tongke - tongke	14 People	Wet Fish
12	Samataring Jaya	Hj.Lina	Tongke - tongke	15 People	Wet Fish
13	Khas Mangrove	Sulfirayana	Tongke - tongke	11 People	Seaweed Crackers
14	Tulu Mario	Hj.Mare	Tongke - tongke	10 People	Smoked fish
15	Mutiara Laut	Trisnawati	Tongke - tongke	20 People	Fish Crackers
16	Tiram Laut	Armawati	Samataring	13 People	Oyster Satay
17	Karya Sejati	Rohani	Samataring	15 People	Smoked fish
18	Sinar Bangko	Fatmawati	Panaikang	16 People	Fish Meatballs/Fish Crackers Tuna
19	Sipakalebbi	Hasni	Panaikang	16 People	Fish Crackers
20	Massahakue	Nurjannah	Pasimarannu	17 People	Dried Fish
21	Permata	Hasniah	Pasimarannu	13 People	Fish Crackers
22	Mallimpoe	Irsa	Pasimarannu	13 People	Fish Crackers
23	Rayhana Reski Food	Ade Setia Anugerah	Sinjai Tengah	20 People	Fish Meatballs, Otak - otak, And etc.
24	Mutiara	Nahira	Buhung Pitue Island	19 People	Dried Fish
25	Daun Bambu	Hasyim/Rosy idiana	Buhung Pitue Island	15 People	Dried Fish
26	Samaturu	Rosmani	Kanalo Island	15 People	Dried Fish
27	Bunga Mawar	Safina	Persatuan Island	14 People	Dried Fish
28	Sabar Menanti	Dulmi	Burungloe Island	15 People	Dried Fish
29	Buhung Pitue II	Hj. Hariani	Burungloe Island	15 People	Dried Fish
30	Usaha baru	Sarina	Sanjai	13 People	Fish Crackers
31	Mawar Merah	Nurfaidal	Sanjai	10 People	Fish Crackers
32	Usaha Maju	Mawarna	Sanjai	14 People	Wet Fish
33	Bina Putri	Nismawati	Sanjai	11 People	Shredded ikan, Fish Meatballs

No.	Name of Business Unit/Group	Chairman	Address	Number of Members	Product Type
34	Burung Camar	Nukmawati	Sanjai	13 People	Shredded ikan, Fish Meatballs
35	Harapan Baru	Nurlinda	Sanjai	15 People	Fish Crackers
36	Wanita Citra Sejati	Buati	Sanjai	13 People	Fish Meatballs
37	Teratai	Nirwati	Sanjai	13 People	Wet Fish
38	Wanita Sejati	St. Aminah	Sanjai	10 People	Dried Fish
39	Tassiwata	Magfirah	Amanagappa	10 People	Meatballs
40	Bawal	Sitti Sudarmi	Tongke - tongke	11 People	Crackers
41	Bintang Laut	St. Farida	Yos Sudarso	12 People	Dried Fish

Source: Fisheries Statistics, 2023.

Table 2. Production and Production Value of Marine Fisheries in Sinjai Regency in 2019-2023

Years	Product (Tons)	Production Value (Rp.1.000,-)
2019	35.935,50	484.255.673,-
2020	36.632,12	659.378.160,-
2021	37.760,20	546.494.975,-
2022	38.873,40	819.016.910,-
2023	40.047,00	926.380.174,-

Source: Sinjai Fisheries Statistics, 2023

Table 3. Production Volume of Processed Fish Raw Materials of Marine Fisheries Businesses by Treatment Method in 2019-2023

Main Commodities	Years (Tons)					Average Increase (%)
	2019	2020	2021	2022	2023	
Drying/Salting	3.814,25	4.916,56	3.302,45	897,23	1.244,5	(9,5)
Scavenging	25,87	28	66,00	44,46	48,30	29,9
Processing of Fish Crackers, Fish Chips and Peyek	-	-	-	28,47	29,14	2,0
Smoked Fish	228,5	231,23	120,62	217,96	130,50	(1,5)
Freezing	250,3	252,1	998,00	280,5	600,00	84,5
Other Processing (Fish Floss)	3,45	3,74	20,26	16,48	14,75	(7,0)
Surimi & Fish Jelly Processing	1,78	1,83	19,30	36,9	33,74	(17,2)
Others (processed king crab)	1,2	1,24	-	-	-	-
Fresh Product Handling (Fillet)	20,45	21,60	24,98	4,28	4,21	(50,5)
Total	4.345,80	5.456,30	4.551,61	1.526,27	2.104,98	(4,8)

Source: Sinjai Fisheries Statistics, 2023.

3.2 Discussion

Characteristics of smoked fish processing business: There are 41 fishery product processing and marketing groups in Sinjai Regency, consisting of 576 fish processors (DKP Sinjai, 2024). There are 5 (five) smoked fish processing groups. Fish smoking is one of the potential fishery product processing businesses in Sinjai Regency. Smoked fish began to be produced in the 80s. The fish smoking business is one type of household-based community business. Smoked fish processors in Sinjai Regency carry out the production process simply. Home industries generally start from family businesses which are generally hereditary and can automatically provide benefits to the livelihoods of the surrounding village community.

The types of fish that are processed into smoked fish are stingrays, barracuda, tuna, cendro,

skipjack, mackerel and cockatoo. The availability of raw materials is supported by the potential fish catch in Sinjai Regency which is also quite large. Catch production in 2022 will reach 38,873.40 tonnes and will increase in 2023 to 40,047.00 tonnes (DKP Sinjai, 2024). Some of this catch is used as raw material for smoked fish. The availability of abundant raw materials at relatively cheap prices, the processing process is quite easy and the market absorption is quite high, making the fish smoking business a promising business opportunity.

Smoked fish produced by MSMEs has not been marketed outside the district because current production only meets local needs. Traditional markets that sell smoked fish include Bikeru Market, Lancibung Market, Mannanti Market and Lappae Market. More people buy smoked fish because the aroma and taste of smoked fish is different compared to raw fish that is grilled itself. The fish is smoked using firewood, belts and coconut shells with the aim of preserving and giving flavor to the fish.

The performance of fisheries businesses is greatly influenced by the potential of human resources as the main actors in the fisheries sector. The characteristics of individual respondents greatly influence the development of fish smoking businesses. Based on Table 4. The characteristics of respondents as fish processors who carry out fish smoking activities include: age, education level, business experience and number of family members of the respondents are as follows:

a. The age of respondents in fish processing businesses ranged from 33 to 70 years. According to Anzani & Fitriani (2024), the population aged 15-64 years is included in the productive age category. Thus, 90% of smoked fish processors fall into the productive age category so they can support the fish smoking business.
b. The majority of smoked fish processing businesses (50%) have an education level

equivalent to elementary school. A low level of education influences the lack of ability to master technology and only relies on physical strength with limited equipment. This causes their level of empowerment to be low (Ohorella et al., 2022).

c. Business experience is determined by the length of time a person has been in business. According to (Syafruddin et al., 2022), the longer the business period, the relatively more knowledge and skills a person has in running and developing his business effectively and efficiently. Business experience ranges from 3 years to 47 years. As many as 50% of smoked fish business people have business experience of between 11-20 years. This shows that smoked fish processors have relatively long business experience and already know the ins and outs of the fish smoking business. Thus, this characteristic can be used as a support, especially in relation to business development efforts aimed at increasing production and business productivity.

d. The number of family members is 2 to 5 people. Family members who have entered productive age can become human resources that support family economic activities, both in household businesses and other family businesses. This contribution of labor from productive family members can reduce the economic burden on the head of the family and increase overall family income. In this context, extended families can function as independent economic units that help each other in carrying out various business activities, especially in the informal sector such as agriculture, small trade, or home industry (Rahmat, 2019).

e. Based on Table 5, the dominant characteristics of consumers of smoked fish products are women, the age level of consumers ranges from 20-59 years, has an education level ranging from high school to master's and generally works as private employees.

Table 4. Characteristics of smoked fish processors in Sinjai District

No.	Name	Age (years)	Education	Business Experience (Years)	Number of Family (People)
1.	Sauna	48	Junior High School	26	5
2.	Hasniar	40	Elemntary School	15	4
3.	Asmaniar	42	Elemntary School	17	5
4.	Hasmiati	45	Elemntary School	16	4
5.	Hj. Mare	70	-	47	2
6.	Hj. Herlina	58	High School	35	3

No.	Name	Age (years)	Education	Business Experience (Years)	Number of Family (People)
7.	St. Aminah	54	Elemntary School	12	4
8.	Mawati	33	Elemntary School	14	3
9.	Nirwati	46	Junior High School	3	2
10.	Marwah	53	Vocation High School	3	4

Source: primary data processed,

Table 5. Consumer characteristics based on age, gender, education and occupation

No.	Age	Gender	Education	Jobs
1	20	P	D3	Self-employed
2	22	P	High School	Student
3	23	P	High School	Student
4	24	P	D3	Self-employed
5	26	P	D4	Self-employed
6	27	P	D3	Self-employed
7	27	L	S1	Self-employed
8	53	L	S1	Civil servants
9	56	P	SMEA	Self-employed
10	59	L	S2	None

Source: primary data processed, 2024

Smoked fish processing business development strategystics:

1. Identification of strengths and weaknesses

Table. 6 Internal Factors of SWOT Analysis

		Internal Factors (Strength & Weakness)			
	No.	Strategic Factors	Weight	Rating	Score
S	1.	Long business experience	0.104	4.00	0.415
	1.	Competitive Price	0.090	3.80	0.357
	2.	Fish resources available	0.076	3.80	0.294
	3.	The product has appeal	0.123	3.00	0.369
	5.	Production tools available	0.136	3.00	0.407
					1.843
W	1.	Limited business capital	0.097	1.80	0.174
	2.	The production process is still traditional	0.131	1.60	0.210
	3.	Short product economic life	0.130	1.60	0.208
	4.	Less promotion	0.108	1.40	0.151
					0.744
		Total	1.000		2.586

Source: primary data processed, 2024

2. Identification of opportunities and threats

Table 7. External Factors SWOT Analysis

		External Factors (Opportunity & Threats)			
	No.	Strategic Factors	Weight	Rating	Score
O	1.	Continuity of existing raw materials	0.121	4.00	0.486
	2.	Smoked fish products are favored by the public	0.105	4.00	0.419
	3.	Government support in fisheries sector development	0.107	2.00	0.214
	4.	Joining a fisheries business group	0.179	3.00	0.536

External Factors (Opportunity & Threats)				
	No.	Strategic Factors	Weight	Rating	Score
					1.655
T	1.	Erratic weather	0.186	2.20	0.409
	2.	Competition in the processed fish industry	0.136	3.00	0.407
	3.	Changes in government policy	0.167	2.40	0.400
					1.216
		Total	1.000		2.870

Source: primary data processed, 2024

Fig. 2. Catesius Diagrams of MSMEs

Based on the results of the IFE and EFE weighting and ratings, a Cartesian diagram was obtained as shown in Fig. 2. Quadrant positions of smoked fish processing MSMEs in Sinjai district. Next, a strategy can be developed that can be carried out by MSMEs processing smoked fish in Sinjai Regency, according to Table 8.

Prospects for smoked fish business development in sinjai regency: In determining the prospects for smoked fish development, the focus is on the SO (Strength and Opportunities) strategy, namely optimizing the strengths and opportunities possessed. The strategies obtained based on the SWOT matrix include: the development of SMEs in smoked fish processing with training and counseling programs from related agencies. Establishing partnership cooperation between MSME players in promoting products. Application of processing technology innovations by updating infrastructure and attending training.

The resulting strategy based on SWOT Analysis is presented through the SWOT Matrix in Table 8.

Fig. 2 shows several alternative strategies that can be applied in the development of smoked fish processing businesses in Sinjai Regency. Quadrant I is a very favorable situation, where the company has opportunities (Opportunities) and strengths (Strenghts) so that it can take advantage of existing opportunities. The strategy that must be applied in this condition is to support an aggressive growth policy (growth oriented strategy).

This strategy is in line with the criteria contained in the SWOT Cartesian Diagram in Fig. 2. Smoked fish processors have opportunities in the medium category that can be utilized in running their business by maximizing their average strengths. The SWOT diagram shows that the smoked fish processing business is in quadrant 1, where the strategy has strengths and opportunities so that it can take advantage of existing opportunities. The strategy applied in these conditions supports aggressive policies, where the type of formulation applied is SO (Strength Opportunities), which is a strategy that focuses on using strengths to take advantage of opportunities.

Table 8. SWOT Diagrams Provide Strategic Alternatives of MSMEs

Internal Factors External Factors	Strength (S) S1) Long enough business experience S2) Competitive price S3) Fish resources available S4) Products that have appeal S5) Production tools available	Weaknesses (W) W1) Limited business capital W2) The production process is still traditional W3) Short product economic life W4) Less promotion
Opportunities (O) O1)Continuity of existing raw materials 02)Smoked fish products are favored by the public. 03)Government support in the development of the fisheries sector 04)Joining a fisheries group business	SO strategy 1) Development of micro, small and medium enterprises in smoked fish processing with training and counseling programs from related agencies. 2) Establish cooperation and partnerships between Micro, Small and Medium Enterprises actors in promoting products 3) Implementation of processing technology innovations by updating infrastructure and participating in training.	WO Strategy 1) Providing business capital loan assistance and infrastructure facilities 2) Improving skills and mastery of technology 3) Improvement of promotion and marketing systems (Activities of fostering and developing fisheries business systems
Threat (T) T1) Erratic weather T2) Competition from the fish processing industry T3) Government policy changes	ST Strategy Improving knowledge and skills of human resources through technical guidance and training	WT Strategy Improving the quality of raw materials and processed fishery products

4. CONCLUSION

The conclusions of this research include (1) Characteristics of smoked fish processing MSMEs in Sinjai Regency, including: Business actors aged 33-70 with a dominant education level of elementary school, and having business experience of more than 10 years; the product produced has a distinctive taste, smoked fish in whole and fillet form, uses wood as fuel, simple equipment, marketing is still on a local scale, with varying product prices; MSMEs do not yet have business legality. (2) Appropriate strategies to use in developing smoked fish processing businesses in Sinjai Regency include: developing smoked fish MSMEs with training and counseling programs from related agencies, establishing collaborative partnerships between MSME actors in promoting products and implementing processing technology innovations by updating infrastructure and attend training.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Adawyah, R. (2007). *Fish processing and preservation*. Bumi Aksara.

Adeyeye, S. A., & Oyewole, O. B. (2016). An overview of traditional fish smoking in Africa. *Journal of Culinary Science & Technology*, 14(3), 198-215.

Anam, B. K., Setiadi, A., & Santoso, S. I. (2023). Feasibility analysis of sustainability and development strategy of fish smoke centers in Demak Regency. *IOP Conference Series: Earth and Environmental Science*, 1246(1), 012031.

Anzani, N., & Fitriani, A. (2024). Conditions of Indonesia's increasing population and its implications for natural carrying capacity through census data and the latest news. *Al-Furqan: Journal of Religion, Social and Culture*, 3(3), 1283–1289.

Fitriyah, N., Putra, T. R., & Prabowo, T. A. (2023). SWOT analysis of MSMEs for halal processed tuna fish products in Ten District, Bangkalan Regency. *Journal of Scientific Research and Development*, 5(2), 564–579.

Hadi, A., Khazanah, W., Andriani, A., & Husna, H. (2022). The effect of various smoking sources on protein, microbiological, and organoleptic content of smoked tilapia (*Oreochromis niloticus*). *AcTion: Aceh Nutrition Journal*, 7(2), 179–186.

Heruwati, E. S. (2002). Traditional fish processing: Prospects and development opportunities. *Journal of Agricultural Research and Development*, 21(3), 92–99.

Karim, M., Salman, D., Genisa, J., & Rahmadanih. (2021). Dynamic strategy and contingency power of SMEs fish processing units in achieving sustainability levels (Case study: SMEs of boneless milkfish processing units in Pinrang Regency, Indonesia). *IOP Conference Series: Earth and Environmental Science*, 921(1), 012045.

Kusmindari, C. D., & Faizal, M. (2022). Feasibility study of canned smoked fish as the micro enterprises in South Sumatra province, Indonesia. *Jurnal Optimasi Sistem Industri*, 21(1), 10–9.

Ohorella, R., Baskoro, M. S., & Harijati, S. (2022). Strategy for development of market-oriented small and medium enterprises (UKM) processing smoked fish in Bone Regency. *Journal of Mathematical Science and Technology*, 23(2), 93–105.

Patekkai, M., Arief, A. A., & Fachry, M. E. (2019). The analysis of smoked fish *Katsuwonus pelamis* feasibility in Bone Regency. *International Journal of Scientific Research and Publications*, 9(3), 755–759.

Purhantara, W. (2010). *Qualitative research methods for business*. Science Graha.

Rahmat, S. T. (2019). The role of the family as a basis for forming children's character in welcoming the demographic bonus era. *Lonto Leok Journal of Early Childhood Education*, 2(1), 1–20.

Rangkuti, F. (2016). *Techniques for dissecting business cases SWOT analysis*. Gramedia.

Salman, D., Karim, M., Genisa, J., & Rahmadanih. (2019). Relationship between institutional sustainability and SMEs production sustainability (Case study: SMEs of fish processing unit, in Pinrang Regency, Indonesia). *IOP Conference Series: Earth and Environmental Science*, 473(1), 012045.

Sinjai, D. P. K. (2024). *Fisheries statistics of Sinjai Regency*. Fisheries Service of Sinjai Regency.

Syafruddin, S. E., Periansya, S. E., Farida, E. A., Nanang Tawaf, S. T., Palupi, F. H., St, S., Butarbutar, D. J. A., Se, S., & Satriadi, S. (2022). *Human resource management*. CV Rey Media Graphics.

Zees, F., Sulistijowati, R., & Yusuf, N. (2024). Organoleptic quality of smoked Jubilee fish at different liquid smoke concentrations. *The NIKe Journal*, 12(1), 9–13.

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