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Short communication

REVITALIZATION STRATEGIES FOR THE TRADITIONAL FISH PROCESSING INDUSTRY IN PUGER: A VALUE CHAIN APPROACH TO STRENGTHENING COASTAL ECONOMIC RESILIENCE

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ABSTRACT

The fisheries and marine sector plays a strategic role in supporting economic development, particularly in archipelagic countries where coastal communities depend heavily on marine resources. In this context, the traditional fish processing industry functions as a critical component of the fisheries value chain by generating added value, creating employment, and supporting local economic resilience. This study examines the traditional fish processing industry in Puger District, Jember Regency, Indonesia, which has developed through products such as salted fish, pindang, and shrimp paste but remains constrained by persistent structural limitations. This study aims to analyze value chain inefficiencies and formulate a revitalization strategy to strengthen industry competitiveness and sustainability. A qualitative research design was applied using structured interviews, direct observations, and document analysis involving 55 key stakeholders, including processors, traders, and government representatives. Data were analyzed using the Miles and Huberman interactive model, integrated with value chain analysis and SWOT analysis to identify critical constraints and strategic intervention points. The findings reveal that the industry operates predominantly at a micro scale with heavy dependence on traditional methods, particularly sun drying, resulting in production instability, inconsistent product quality, and limited compliance with sanitation standards. Additional constraints include weak upstream coordination, limited access to cold chain infrastructure, restricted market reach, low digital adoption, and unequal value distribution across the chain. These interconnected inefficiencies reduce the capacity of producers to access higher-value markets and limit the contribution of the industry to optimal economic resilience. The study identifies that effective revitalization requires an integrated approach linking technological upgrading, institutional strengthening, and market development. Key strategies include the adoption of appropriate technologies such as solar dryers and energy-efficient cold storage, strengthening cooperative-based institutions to improve bargaining power and access to financing, enhancing product standardization and sanitation practices, and expanding digital marketing and market integration, including opportunities in marine tourism. This study contributes by providing an empirical and systematic framework that links value chain constraints with targeted revitalization strategies, offering practical implications for policy development and sustainable coastal economic resilience.

Key words: Coastal economic resilience, fisheries value chain, traditional fish processing industry

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INTRODUCTION

The fisheries and marine sector makes a significant contribution to both the global and national economy, particularly in supporting food security, employment, and income generation [1,2]. In Indonesia, as an archipelagic country with abundant marine resources, this sector plays a strategic role in driving economic development and sustaining coastal livelihoods [3–6]. The sector not only contributes to national economic growth but also functions as a primary source of livelihood for coastal communities, making it central to inclusive and sustainable development [7].

Within this context, Micro, Small, and Medium Enterprises (MSMEs) in the fisheries sector, particularly the traditional fish processing industry, serve as a key driver of local economic activity in coastal areas [8,9]. These enterprises create added value from raw fishery products, expand employment opportunities, and support income distribution among local communities. Strengthening MSMEs in the fisheries sector is therefore essential for enhancing economic resilience and promoting inclusive growth, particularly through improvements in product quality, processing capacity, and market access [10–13].

Puger District in Jember Regency, East Java Province, represents one of the major marine-based economic centers with significant fisheries production potential [14,15]. The area is characterized by long-standing traditional fishing and fish processing practices, supported by local knowledge and community-based production systems. Fisheries production in Puger reached 32,000 kg in 2023 with a value of 347 million rupiah, indicating its economic importance at the regional level [16–18]. In addition to capture fisheries, the presence of traditional processing activities such as salted fish, pindang, and shrimp paste production highlights the role of downstream industries in supporting local livelihoods and value creation [19,20].

Despite its potential, the traditional fish processing industry in Puger faces multiple structural challenges that limit its development. Production processes remain highly dependent on simple technologies and weather conditions, resulting in inefficiencies and inconsistent product quality [21]. Inadequate sanitation and hygiene practices further reduce product competitiveness and increase the risk of contamination [22]. From a market perspective, limited access to broader distribution networks and weak marketing capacity restrict the ability of producers to compete with modern processed products [23]. These constraints increase the vulnerability of business actors to economic shocks and external pressures, including price fluctuations and environmental changes [24].

Previous studies have emphasized that strengthening fisheries based MSMEs requires not only capacity building but also integrated strategies that connect

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production systems, market access, and institutional support [25]. However, most existing studies tend to focus on descriptive assessments of local conditions without developing an analytical framework that links upstream and downstream activities within the fisheries value chain. In the context of Puger, there is still limited research that systematically examines the traditional fish processing industry using a value chain perspective to identify strategic intervention points [26]. This limitation results in fragmented policy recommendations that are not fully aligned with the complexity of local industry conditions.

Therefore, there is need for a more structured and research-based approach to understand how internal constraints and external opportunities interact in shaping industry performance and resilience [27]. This study aims to analyze the traditional fish processing industry in Puger using a value chain approach and to formulate a comprehensive revitalization strategy that integrates technological, economic, and institutional dimensions. Specifically, this study seeks to: (1) identify key constraints and opportunities across the fisheries value chain, (2) examine the role of existing processing practices in supporting local economic resilience, and (3) develop strategic recommendations to enhance the competitiveness and sustainability of the industry. By addressing these objectives, this study contributes to the development of a more systematic and evidence-based framework for revitalizing traditional fisheries industries in coastal areas.

This study is positioned not merely as a descriptive assessment of local conditions, but as an analytical investigation that links structural constraints within the fisheries value chain to targeted development interventions. By integrating value chain analysis with SWOT analysis, this study provides an evidence-based framework to explain how inefficiencies emerge and how they can be systematically addressed to strengthen coastal economic resilience.

MATERIALS AND METHODS

Research Design and Study Area

This study employed a qualitative research design to analyze the traditional fish processing industry in Puger District and to formulate a revitalization strategy based on value chain analysis. A qualitative approach was selected to enable an in-depth understanding of the structural constraints, institutional dynamics, and adaptive strategies of local actors within the fisheries sector. The study was conducted in Puger Subdistrict, Jember Regency, East Java Province, Indonesia, from April to June 2024. The research location was selected purposively due to its significant role as a coastal fisheries production and processing center. Figure 1 presents the geographical location of the study area.

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Figure 1: Map of Puger district, Jember regency, East Java, Indonesia

Data Collection and Sampling Procedure

This study followed ethical research principles in accordance with the institutional guidelines of Dr. Soetomo University. All participants were informed about the objectives of the study, and their voluntary participation was ensured through informed consent before data collection. This study did not require a formal ethical clearance number as it involved non-sensitive data collection; however, all procedures followed institutional ethical guidelines and informed consent principles.

Data were collected using structured interviews, direct observations, and document analysis. The sampling technique used was purposive sampling, involving 40 fish processors, 10 traders, and 5 government representatives selected based on their roles in the fisheries value chain.

Data Analysis

Data analysis was conducted using the Miles and Huberman interactive model, which consists of data collection, data reduction, data display, and conclusion drawing [28]. Data reduction involved categorizing findings into key themes such as production systems, market access, institutional conditions, and technological constraints. Data display was conducted through narrative and tabular forms to support interpretation.

To strengthen analytical rigor, this study integrated value chain analysis with SWOT analysis. Value chain analysis was used to identify inefficiencies across stages, while SWOT analysis was applied to evaluate internal and external factors. This integration enabled the development of targeted and evidence-based revitalization strategies. This analytical approach allows the study to systematically link empirical findings with strategic recommendations, ensuring that conclusions are grounded in observed data rather than normative assumptions.

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RESULTS AND DISCUSSION

Industry Profile

The traditional fish processing industry in Puger operates predominantly at a micro scale, with all observed units classified as household-based enterprises (Table 1). This structure indicates that value addition activities are decentralized and labor-intensive, limiting production efficiency, standardization, and scalability. As a result, producers face constraints in capturing higher economic value and accessing more competitive market segments [29,30].

Product concentration in dried anchovies, salted fish, and shrimp paste reflects low diversification, increasing vulnerability to market fluctuations. In addition, complete reliance on sun drying introduces production instability due to weather variability. This dependence directly affects production continuity and product quality, indicating that technological limitations at the processing stage are a key constraint in value chain performance [31-33].

The observed income range of IDR 2.5–4.0 million (Indonesian Rupiah) per month suggests that the sector contributes to household income but remains below its potential. This gap reflects inefficiencies in processing technology and limited access to higher-value markets. These findings demonstrate that existing processing practices support local livelihoods but are not sufficient to optimize economic resilience due to structural inefficiencies.

Value Chain Analysis of the Traditional Fish Processing Industry

The value chain analysis identifies structural inefficiencies across six main stages: upstream, handling, processing, distribution, marketing, and consumption. These constraints are interconnected and directly influence the ability of the industry to generate value and sustain economic resilience [34, 35].

In the upstream stage, limited bargaining power and dependence on intermediaries reduce price control and create instability in raw material supply. At the handling stage, inconsistent practices and limited cold chain use lead to quality deterioration and post-harvest losses. Processing activities remain constrained by traditional methods, resulting in low productivity and inconsistent product quality.

At the distribution stage, limited logistics capacity restricts access to higher-value markets, while marketing remains dominated by conventional channels with low digital adoption, reducing competitiveness. Finally, changing consumer preferences toward higher-quality and standardized products creates additional pressure on traditional producers to improve product quality and compliance.

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SWOT Analysis and Strategic Implications

The SWOT analysis reveals that the traditional fish processing industry in Puger possesses strong internal resources, including abundant raw materials, traditional knowledge, and a strong community base. However, these strengths are constrained by structural weaknesses, particularly in technology, product quality, sanitation, and market access.

External opportunities include government support, digital market expansion, and marine tourism development. At the same time, threats such as competition from modern processed products, regulatory pressures, and climate change increase vulnerability.

The integration of SWOT analysis with value chain findings demonstrates that structural constraints are interconnected across multiple stages. Technological limitations at the processing stage and weak market access emerge as critical bottlenecks. These findings provide the basis for formulating targeted revitalization strategies, addressing the third research objective.

The findings confirm that the traditional fish processing industry plays a significant role in supporting economic resilience; however, this role remains structurally constrained and has not been fully optimized due to persistent inefficiencies across the value chain [3,36,37]. This finding extends previous studies by demonstrating that these constraints are not isolated but interconnected across multiple stages of the value chain.

Consistent with previous studies, limited adoption of technology reduces productivity and competitiveness [38], while inadequate sanitation practices affect product acceptance and food safety compliance [39]. In addition, exposure to external shocks such as climate change and market fluctuations increases vulnerability, emphasizing the need for adaptive and resilient strategies [40,41].

From a value chain perspective, these constraints operate as an integrated system, where weak upstream coordination affects raw material quality, which in turn influences processing outcomes and downstream market access. This indicates that improving a single stage without addressing the entire system will not produce significant impact.

Importantly, these findings establish a direct linkage between empirically observed value chain constraints and targeted development interventions, ensuring analytical validity and practical relevance.

Strategic Implications

The findings indicate that revitalization requires an integrated approach that simultaneously addresses technological, institutional, and market dimensions.

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Technological upgrading, particularly through the adoption of solar dryers and energy-efficient cold storage, directly addresses the dependence on weather and production instability identified in the processing stage [42]. Institutional strengthening through cooperative-based models improves bargaining power, facilitates access to financing, and enhances coordination among value chain actors [43,44].

Furthermore, improving marketing capacity through digital platforms and product branding addresses constraints in market access and value capture identified in the distribution and marketing stages. Integration with marine tourism also provides opportunities to expand market reach.

These strategies demonstrate that combining traditional practices with appropriate technological innovation can reduce structural inefficiencies and improve competitiveness [45,46].

Overall, the proposed strategies are directly derived from empirically identified value chain constraints, ensuring both analytical validity and practical relevance.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

This study demonstrates that the traditional fish processing industry in Puger plays an important role in supporting coastal economic resilience; however, its contribution remains structurally constrained by interconnected inefficiencies across the value chain. Key bottlenecks include dependence on traditional processing technologies, weak upstream coordination, limited access to cold chain and distribution systems, low product standardization, and restricted market access.

The findings confirm that these constraints operate as an integrated system, limiting the ability of producers to capture higher value and compete in more advanced market segments. A value chain-based approach enables the identification of critical intervention points and provides a systematic basis for designing targeted revitalization strategies.

This study contributes by demonstrating that structural constraints in traditional fisheries industries are interconnected across value chain stages and must be addressed through coordinated strategies. Technological upgrading, institutional strengthening, and market development emerge as key priorities to improve competitiveness and sustainability.

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Conflict of Interest

The authors reported no potential conflict of interest.

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Table 1: Demographic and operational profile of micro-scale fish processing industry in Puger

Processing Unit Feature	Description / Range	Number of Units (n=40)	Percentage (%)
Operating Scale	Micro-scale	40	100%
Workers per Unit	2 workers	12	30%
	3 workers	12	30%
	4 workers	8	20%
	5 workers	8	20%
Main Products	Dried anchovies	30	75%
	Salted mackerel	22	55%
	Fermented shrimp paste (Terasi)	16	40%
	Other products (e.g., pindang, shredded fish)	6	15%
Drying Method	Relies on sun drying	40	100%
Labor Intensity	Labor-intensive	40	100%
Monthly Income (per unit)	IDR 2.5 - 3.0 million	16	40%
	IDR 3.1 - 3.5 million	14	35%
	IDR 3.6 - 4.0 million	10	25%

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Table 2: SWOT analysis

Internal	**STRENGTH (S)**	**WEAKNESS (W)**
	Availability of Raw Materials Traditional Skills Strong Community Base Local Specialty Products	Technology & Equipment Limitations Inconsistent Quality & Standardisation Unattractive Packaging & Branding Weather Dependence Limited Market Access Limited Capital & Access to Financing Low Sanitation & Hygiene
External		
OPPORTUNITIES (O)	**S-O STRATEGY**	**W-O STRATEGY**
Government Support Increasing Demand for Healthy/Local Products Development of E-Commerce & Digital Marketing Culinary Tourism Potential Collaboration with Research Institutions/Academics Certification & Standardization Program	Increasing production of local specialty products to meet market demand. Community collaboration with research institutions. Digital promotion of local specialty products through e-commerce. Development of culinary tourism based on traditional products. Improving product quality through certification.	Modernization of equipment and technology with government support. Improvement of product quality and standardization through training. Redesign of packaging and digital branding. Adoption of alternative drying technology. Expansion of market access through digital platforms.
THREATS (T)	**S-T STRATEGY**	**W-T STRATEGY**
Modern Product Competition Fluctuation in Raw Material Prices Strict Regulation Impact of Climate Change Fisheries Sustainability Shifting Consumer Preference	Differentiation of local specialty products to compete with modern products. Strengthening community networks to mitigate price fluctuations. Community education on regulations. Implementation of sustainable fishing practices. Innovation of tradition-based products to adapt to consumer preferences.	Phased investment in technology to enhance competitiveness. Improving product quality to meet regulatory standards and consumer preferences. Diversification of products and raw material sources. Strengthening financial capacity and risk management. Climate adaptation programs and resource conservation.

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