



Fish Value Addition and Livelihood Outcomes of Fishing Communities: Evidence from Mkinga District, Tanzania

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ABSTRACT

Fish value addition is widely promoted as a strategy for improving livelihoods in sub-Saharan African fishing communities, yet evidence from Tanzania's coastal districts remains limited. This study examined the association between fish value addition and livelihood outcomes in Mkinga District, Tanga Region, an under-researched coastal area, focusing on income generation and household welfare among fishery actors. A cross-sectional design involving 338 randomly selected registered fishermen was used, with data gathered through questionnaires, semi-structured interviews, focus group discussions, and documentary review. The study was grounded in the Sustainable Livelihoods Approach, operationalised across human, social, financial, physical, and natural capital. Value chain mapping, descriptive statistics, comparative price analysis, and multiple linear regression assessed value chain structure, perceptions, and economic performance. Eight major value chain strands were identified, linking fishers, processors, wholesalers, retailers, vendors, and consumers. Notably, 99.1% of respondents sold only fresh fish and were not engaged in value addition, despite recognising its potential benefits. Adoption was constrained by limited processing equipment (8.7%), high startup costs (98.3%), and market barriers (93.0%). Regression analysis showed no significant relationship between socio-economic characteristics or perceived barriers and daily revenue ($R^2 = 0.028$, $p = 0.220$), suggesting revenue is driven mainly by trading volume and price rather than individual endowments. Processed fish commanded higher prices, yet many households still faced poor housing, food insecurity, and unsafe water access. The study concludes that value addition could improve livelihoods if supported by stronger cooperatives, affordable technologies, infrastructure, and market systems, offering new community-level evidence from Mkinga District.

Keywords: Fish value addition; Fishing Value Chain; Livelihood Outcomes; Post-Harvest Losses; Food Security

JEL Codes: Q22, Q13, O13, and I31

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1. INTRODUCTION

Fish value addition, which encompasses a range of processes aimed at enhancing the economic value, shelf life, and marketability of fish products, has become a critical strategy for improving the livelihoods of fishing communities worldwide (Food and Agriculture Organization [FAO], 2007; Kamal & Ismail, 2023). These processes range from basic activities such as cleaning and filleting to more advanced techniques, including smoking, drying, freezing, canning, and the production of value-added products such as fish sauce and fish oil. By transforming raw fish into higher-value commodities, value addition can increase household incomes, reduce post-harvest losses, and expand access to both domestic and international markets, including export opportunities (Ninan, 2018).

The global seafood industry recognises value addition as foundational to the economic and social resilience of fishing communities. In Southeast Asia and Northern Europe, where advanced value addition is well established, communities benefit from elevated revenues, employment diversification, and improved food security (Yeap, 2012; Ninan, 2018). In sub-Saharan Africa, however, people largely fail to realise the potential of value addition. Post-harvest losses driven by inadequate processing and preservation infrastructure continue to undermine the economic returns of millions of fishers (Getu & Misganaw, 2015; Keerthana et al., 2022). Despite promising pilot initiatives in Ghana and Nigeria, the fisheries sector's full potential across Africa is hampered by limited market linkages, restricted access to modern technology, and systemic underinvestment (Mindjimba et al., 2019).

The global seafood industry recognizes value addition as a fundamental driver of the economic and social resilience of fishing communities. In regions such as Southeast Asia and Northern Europe, where value-addition practices are well established, fishing communities have experienced increased revenues, diversified employment opportunities, and enhanced food security (Yeap, 2012; Ninan, 2018). In contrast, many countries in sub-Saharan Africa have yet to fully realize the benefits of fish value addition. Post-harvest losses resulting from inadequate processing and preservation infrastructure continue to reduce the economic returns of millions of fishers across the region (Getu & Misganaw, 2015; Keerthana et al., 2022). Although pilot initiatives in countries such as Ghana and Nigeria have demonstrated the potential of value-addition interventions, the fisheries sector across much of Africa remains constrained by weak market linkages, limited access to modern technologies, and insufficient investment (Mindjimba et al., 2019).

In Tanzania, the fisheries sector plays a vital role in ensuring food security and supporting rural livelihoods. More than four million people are engaged in fishing and fisheries-related activities, with over 400,000 individuals directly employed in the sector (Muringai et al., 2022). Coastal communities, including those in Mkinga District of Tanga Region, depend heavily on fisheries as a primary source of income, employment, and nutrition (Peart et al., 2021). Despite this dependence, a large proportion of fishers in Mkinga continue to live below the international poverty line of USD 1.90 per day (National Bureau of Statistics [NBS], 2022). Their livelihoods are further constrained by inadequate fishing equipment, small and inefficient vessels, limited fish-processing facilities, and restricted access to profitable markets (Mkinga District Council, 2015).

Previous studies conducted in Mkinga District and other coastal areas of Tanzania have examined various aspects of the fisheries sector, including fish supply and demand dynamics (Peart et al., 2021), fisheries resource sustainability (Tolentino-Zondervan & Zondervan, 2022), and the contribution of artisanal fishing to household income (Churu, 2023). For instance, Churu (2023) reported that artisanal fishers in Mkinga District recorded the lowest gross margin of 12.2%, equivalent to only TZS 443.60, highlighting the persistent economic challenges and poor livelihood outcomes experienced by many fishing households. Critically, however, these studies did not systematically examine how specific value addition practices along the fishing value chain affect household livelihoods. This gap provides the impetus for the current study.

Accordingly, this research examines the association between fish value addition and livelihood outcomes among fishing households in Mkinga District, guided by four specific objectives: to characterise the structure and coordination of the fishing value chain; to evaluate fishers' perceptions of value addition practices; to assess the price differentials across value chain segments as indicative evidence of economic benefits; and to investigate the contributions of chain-generated earnings to the livelihoods of fisheries stakeholders. The original contribution of this study is primarily geographical and empirical: it provides the first systematic, community-level examination of the gap between value addition potential and actual adoption in Mkinga District a coastal area largely absent from the academic literature and explicitly maps the structural barriers that prevent fishers from realising the economic returns documented in more developed fisheries contexts. While the cross-sectional design precludes causal inference, the study generates baseline evidence to inform future longitudinal and econometric research, as well as actionable policy recommendations for value chain development in coastal Tanzania.

2. LITERATURE REVIEW

2.1 Value Addition in the Fishing Sector

Value addition is the process of altering a product's place, time, and form characteristics to make it more appealing to customers (Coltrain et al., 2000). In the context of fisheries, this process encompasses cleaning, filleting, smoking, drying, freezing, packaging, and branding, all of which transform raw fish into higher-value commodities that command premium prices and gain access to wider markets (FAO, 2007). Beyond economic outcomes, value addition promotes skill development, gender empowerment, and sustainable resource use by incentivising reduced overfishing through higher returns per unit of catch (Adeyeye & Oyewole, 2016).

2.2 Fishing Value Chain Structure

Value chain mapping is recognised as an indispensable first step in assessing the economic and environmental performance of fishery systems (Acosta-Alba et al., 2022). Studies from Kenya's Nyanza Region (Musa et al., 2016) and Ethiopia's Gamo Zone (Kamaylo et al., 2021) identify distinct stakeholder groups, including seed producers, grow-out farmers, assemblers, processors, and retailers, each capturing different shares of value. Assemblers and processors typically secure higher margins through economies of scale, whereas primary producers (fishers) often receive the lowest returns due to high operational costs and limited bargaining power (FAO, 2020; Tana et al., 2021).

The World Bank (2012, as cited in Mpemba & Mombo, 2019) estimated that 25.4 million people are employed in Africa's fisheries industry, of whom 17.6 million are engaged in post-harvest activities. This structural characteristic, whereby value accrues predominantly during post-harvest stages, illustrates the transformative potential of value addition for primary producers.

2.3 Profitability Differentials Along the Value Chain

Profitability varies significantly across different strands of the value chain. Fishers at the production stage experience the lowest margins due to high operational costs, including fuel, gear maintenance, and limited access to finance (FAO, 2020). In contrast, processors and wholesalers, particularly those serving urban or export markets, achieve substantially higher margins through economies of scale, quality-enhancing processes such as drying, smoking, and freezing, and advantageous market positions (Onyango & Yahya, 2022; Beran, 2018). Infrastructure quality, price volatility, and access to cold-chain technology further influence retailers' profitability (Peart et al., 2021).

2.4 Livelihood Outcomes and Value Addition

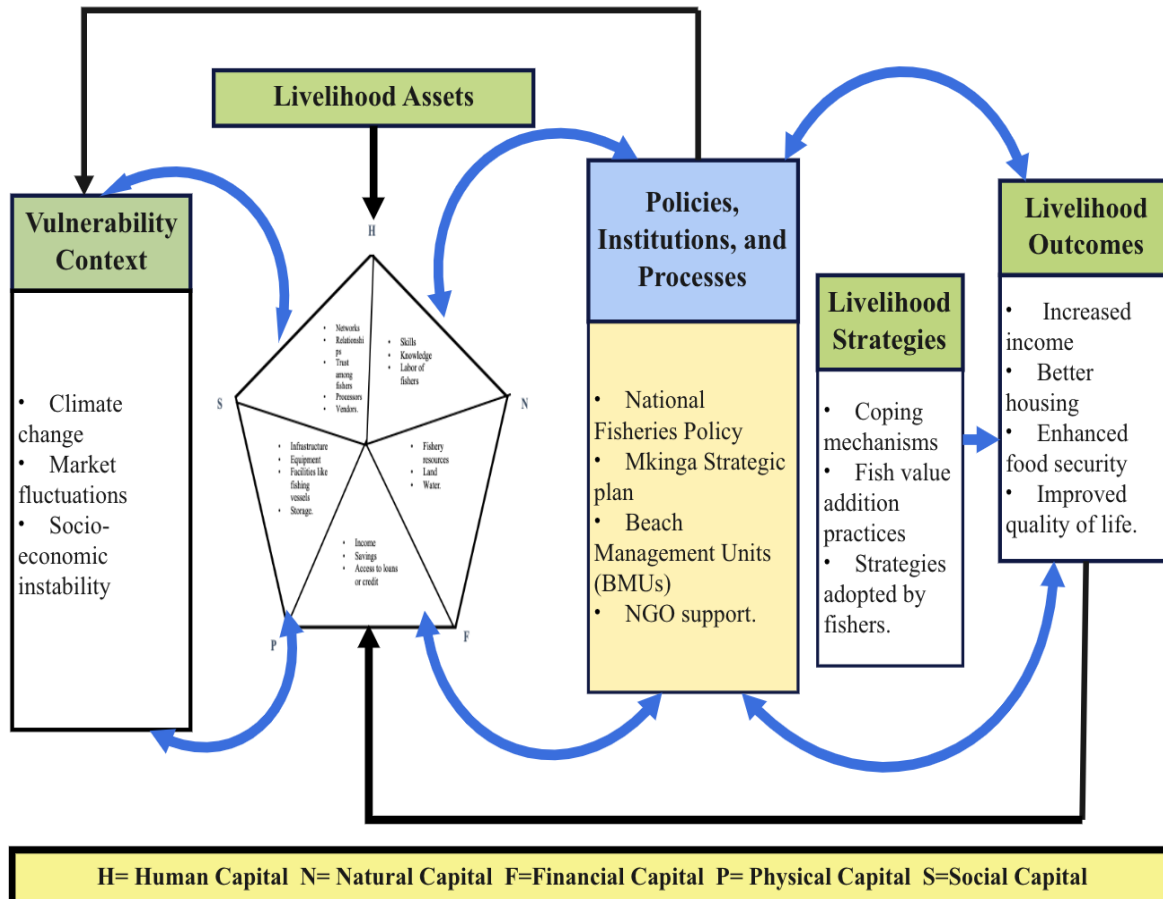
The Sustainable Livelihoods Framework (Natarajan et al., 2022) provides a robust analytical lens for examining the multidimensional impacts of value addition. Value addition can enhance financial capital through increased incomes, physical capital through investment in processing infrastructure, social capital through cooperative networks, and human capital through training in advanced techniques (Al-Omoush et al., 2020; Uongozi Institute, 2017). Conversely, Akbari et al. (2023) note that fishers' long-term economic stability is often undermined by fluctuating fish stocks and market price volatility, irrespective of value-addition efforts. Addressing the unequal distribution of profits along the value chain, where intermediaries capture disproportionate margins, requires targeted interventions, including cooperative models, improved market access, and sustainable fishing practices (Roest et al., 2018; Kuijpers et al., 2023).

2.5 Theoretical Framework

This research employs the Sustainable Livelihoods Approach (SLA) as an interpretive framework rather than a quantitative model. The SLA frames livelihoods as consisting of five capital assets human, social, financial, physical, and natural that operate amid vulnerability contexts and are mediated by policies, institutions, and processes to foster sustainability. For the purposes of this study, each capital was operationalised using measurable indicators drawn from the field survey. Human capital was assessed through educational attainment and access to training on value addition techniques (Table 4). Social capital was measured by BMU and cooperative membership and frequency of interaction with extension workers (Table 3). Financial capital was captured through revenue, price per kilogram, and daily trading volumes (Table 5). Physical capital was evaluated through housing quality indicators including roofing, wall, and floor materials, access to energy and water, and sanitation (Table 6). Natural capital was implicitly addressed through respondents' fishing activity and dependence on marine resources. Fish value addition, as an intervention, primarily targets financial capital through price premiums, and physical capital through investment in processing infrastructure, while alleviating vulnerability through income diversification and reducing post-harvest losses. The SLA thus serves as an analytical lens guiding variable selection and results interpretation across all four study objectives, enabling a holistic evaluation of how the gap between value addition

potential and actual adoption manifests across livelihood dimensions. In particular, it elucidates the pathways through which product form transformations and market integration may generate superior economic returns and elevated socio-economic welfare (Venkatappa et al., 2025)

Figure 1: Sustainable Livelihoods Framework diagram



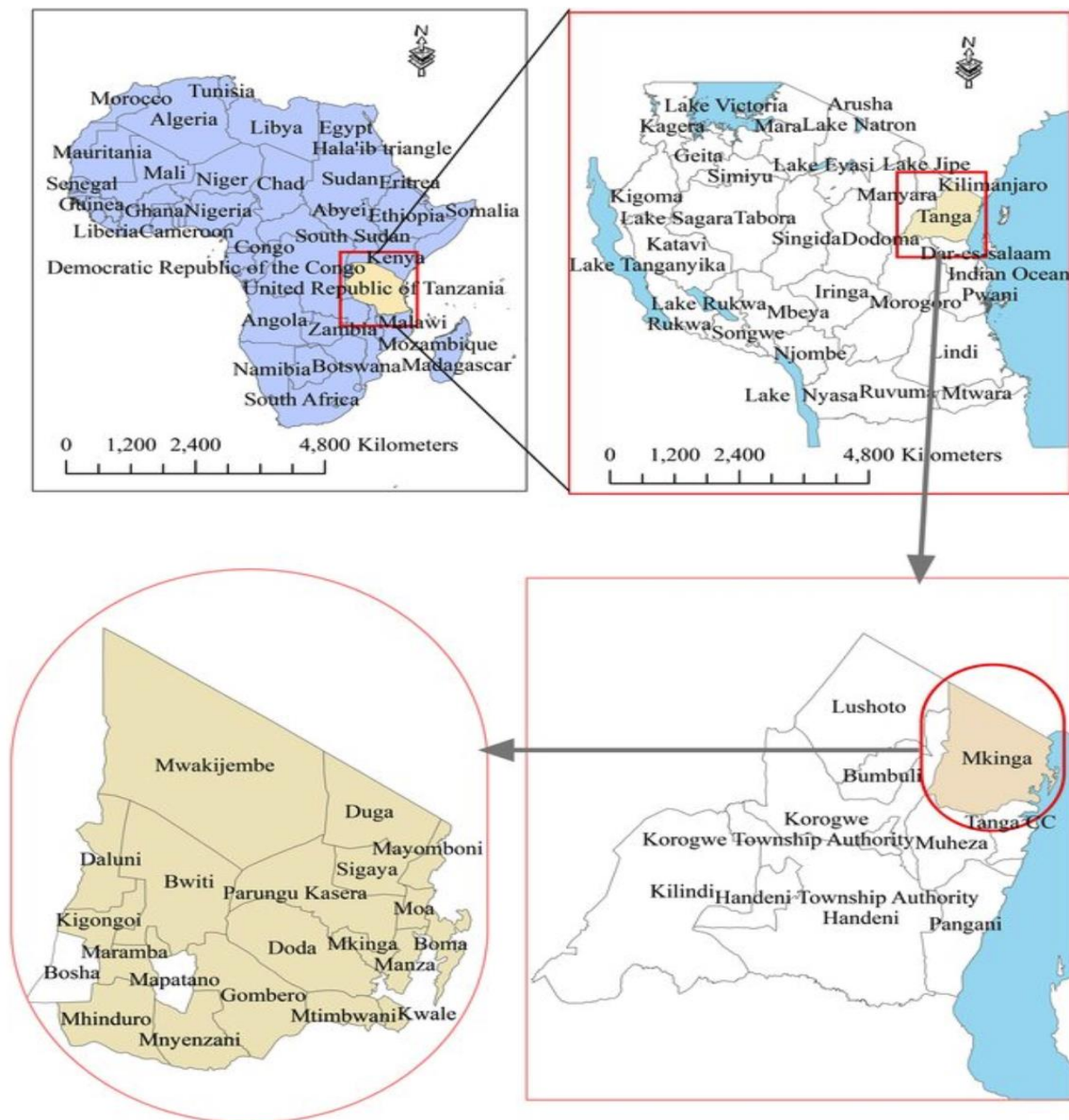
Source: Adapted from Natarajan *et al.* (2022) and modified by the researcher.

3. MATERIALS AND METHODS

3.1 Study Area

Mkinga District, located in the northeast of Tanzania within the Tanga Region, serves as a vital coastal hub for the nation's "blue economy."

Covering an area of approximately 2,948 km², its unique geographical positioning, bordering Kenya to the north and the Indian Ocean to the east, creates a strategic corridor for both domestic and cross-border seafood trade. As of 2022, 146,802 people live in the district, and the vast majority depend on the marine environment for their survival (Hyuha et al., 2025).

Figure 2. Map of Mkinga District, Tanga Region, Tanzania

Source: Adapted from Mkinga District Council and Hyuha *et al.* (2025).

3.2 Research Design and Sampling

A cross-sectional research design was employed, which is well-suited for capturing point-in-time assessments of community-level phenomena. The target population comprised 2,811 registered fishermen in Mkinga District, from which a sample of 338 respondents was randomly drawn using Cochran's sample size formula. $n_0 = \frac{Z^2 \cdot p(1-p)}{e^2}$. This method ensured statistical validity and representativeness of the wider fishing community (Boniphace et al., 2025).

Other stakeholders in the value chain including traders, fish vendors, processors, and district officials were recruited through purposive, convenience, and snowball sampling methods to examine the qualitative aspects of chain governance. This strategy yielded a comprehensive understanding of the diverse perspectives and roles across the fishery value

chain, thereby integrating quantitative representativeness with qualitative depth (Roche et al., 2023).

3.3 Data Collection

Data collection employed four complementary instruments. Structured questionnaires with closed and Likert-scale items were administered to the 338 fishermen. Semi-structured interviews using a checklist were conducted with key informants, including district fisheries officers and Beach Management Unit (BMU) representatives. Focus Group Discussions (FGDs) were held with homogenous groups of fishers and processors to elicit experiential and attitudinal insights. Documentary analysis of the Mkinga District Profile (2015) and national policy documents provided historical and contextual triangulation.

3.4 Data Analysis

Value chain mapping and flowchart visualisation were employed to examine the structure and coordination of the fishing value chain (Objective 1). Descriptive statistics, including frequencies, percentages, and averages, were calculated to evaluate fishermen's perceptions of value addition (Objective 2). The examination of price differentials encompassing average revenue, price per kilogram, and daily trading volumes across chain segments was conducted as indicative (not definitive) evidence of potential economic benefits (Objective 3). It is important to note that the study does not include full cost-of-production data or net profit calculations; the price premium analysis therefore serves as a proxy indicator rather than a comprehensive profitability assessment. Future research should incorporate cost-benefit analysis and return on investment calculations to yield more complete findings. To strengthen the analytical depth of the profitability assessment, a multiple linear regression model was estimated to test the association between daily fishing revenue (the dependent variable) and seven socio-economic and value-chain structural predictors: age, gender, education level, frequency of extension contact, awareness of value addition methods, access to processing equipment, and exposure to market access barriers. Quantity traded and price per kilogram were deliberately excluded as predictors, since revenue is arithmetically derived from these two variables and their inclusion would produce a statistically inflated but substantively uninformative model. The regression was estimated using ordinary least squares (OLS) in Microsoft Excel, with statistical significance assessed at the $p < 0.05$ threshold using two-tailed t-tests (residual $df = 330$). Livelihood analysis, guided by the SLA framework with indicators operationalised across five capital dimensions (see Section 2.5), was employed to assess the overarching household welfare conditions of fisheries stakeholders (Objective 4). With the exception of the regression model described above, the study is predominantly descriptive in design; findings are presented as associative evidence and stated trends, and causal interpretation is avoided except where supported by the inferential test.

3.5 Ethical Considerations

Before data collection commenced, ethical approval was secured from the Tengeru Institute of Community Development (Ref. TICD/MCD/F040/2022), the Tanga Regional Administrative Secretary, and the Mkinga District Council. Given the predominantly rural and low-literacy profile of the study population, informed verbal consent was obtained from all participants a procedure approved by the relevant ethics committees as contextually appropriate and consistent with standard practice in community-based fieldwork in rural Tanzania. Written

consent was considered but was deemed potentially exclusionary for participants with limited literacy; the verbal consent procedure was documented by the lead researcher. Confidentiality was strictly maintained: all data were anonymised at the point of collection, no personally identifiable information was recorded in the dataset, and responses were aggregated in all analyses. Participation was entirely voluntary, and participants were informed of their right to withdraw at any time without consequence.

4. RESULTS

4.1 Socio-Economic Profile of Respondents

The majority of respondents (54.8%; $n = 185$) were aged 34–54 years, representing prime working-age adults. 226 respondents were male and 112 were female, reflecting cultural norms limiting female headship of fishing households in the area. Most respondents (87.8%; $n = 297$) had completed only primary education (seven years of schooling), with 8.7% ($n = 29$) achieving secondary education and 3.5% ($n = 12$) having no formal education. A substantial majority (90.4%; $n = 306$) were married (Table 1).

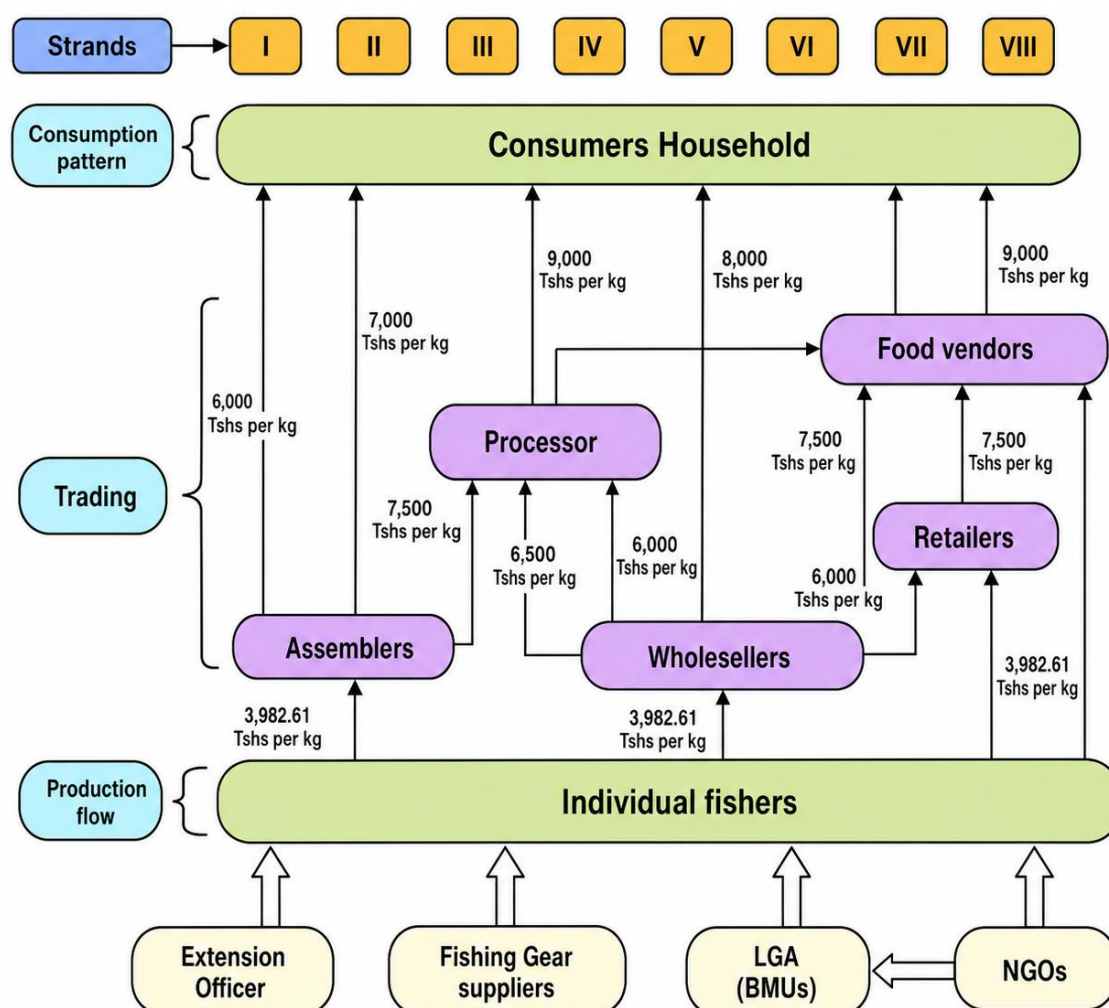
Table 1. Socio-economic characteristics of respondents ($n = 338$)

Variable	Category	Frequency	Percentage (%)
Age Group	19–33 years	59	17.4
	34–54 years (majority)	185	54.8
	55 years and above	47	13.9
Education	No formal education	12	3.5
	Primary education	297	87.8
	Secondary education	29	8.7
Marital Status	Single	18	5.2
	Married	306	90.4
	Divorced	15	4.3
Gender	Male	226	66.86
	Female	112	33.14

Source: Field Data (2024)

4.2 Structure of the Fishing Value Chain

Value chain mapping revealed eight distinct strands in Mkinga's fishing value chain, distinguished by the number and kind of intermediaries engaged, as well as the format in which fish is marketed (fresh, processed, or cooked). Table 2 summarises the eight strands and their respective average pricing.

Figure 3. Fishing value chain in Mkinga District

TZS = Tanzanian Shillings. Prices represent approximate average transaction values at the final consumer stage.

Source: Researcher's construct based on field data (2024).

The direct fisher-to-consumer strand (Strand II) had the lowest average price (TZS 3,983/kg), while processed fish strands (III, VII, VIII) were associated with prices of up to TZS 9,000/kg at the downstream consumer end more than double the fresh fish price. These price differentials serve as indicative evidence of the potential economic benefits that value addition may offer, particularly to the processors, food vendors, and traders who populate downstream chain positions. It is critical to note that these higher prices are not captured by primary fishers: as shown in Table 3, 99.1% of surveyed fishermen ($n = 335$) sell exclusively in fresh fish strands and do not themselves engage in any value addition activities. The higher-priced processed strands are operated by separate actors (processors, food vendors, and traders) who are not part of the 338-respondent fisher sample. Individual fishermen (primary producers), assemblers/collectors (aggregating catches from different fishers), processors (freezing, drying, smoking), wholesalers (bulk distributors), merchants (local market sellers), food vendors (preparing cooked dishes), and end consumers are all distinct and important actors in the chain.

The value chain is dominated by informal coordination: 99.1% of fishermen (n = 335) reported no formal or informal contracts with purchasers, and all 338 respondents (100%) belonged to Beach Management Units (BMUs) but not commercial cooperatives. This lack of institutional coordination leads to market uncertainty, price volatility, and decreased negotiating leverage for primary producers (Table 3). It is important to distinguish here between two analytically separate dimensions: (1) the fishers' perceptions of value addition's potential benefits (examined in Section 4.3), which are largely positive; and (2) actual current engagement in value addition activities among the surveyed fishers, which is zero (Table 3). The profitability differentials discussed in Section 4.4 reflect prices observed at different points in the broader value chain involving processors, vendors, and traders who are separate from the fisher respondents and represent the economic opportunity that fishers currently forgo, rather than gains they are already capturing.

Table 3. Value chain coordination indicators (n = 338)

Coordination Indicator	Yes (%)	No (%)
Formal/informal contracts with buyers	0.9 (n = 3)	99.1 (n = 335)
BMU membership	100.0 (n = 338)	0.0
Business cooperative membership	0.0	100.0 (n = 338)
Regular interaction with extension workers	26.1 (n = 88)	73.9 (n = 250)
Engaged in any value addition activity (e.g., fried fish)	0.0	100.0 (n = 338)
Primary market channel: fresh fish only	99.1 (n = 335)	0.9 (n = 3)

Source: Field Data (2024)

4.3 Fishermen's Perceptions of Value Addition Practices

Fishermen's perceptions of value addition were mainly positive regarding potential benefits, but revealed critical gaps in actual enabling conditions (Table 4). It is important to note that these responses capture perceived potential rather than observed outcomes, as none of the surveyed fishers currently engage in value addition activities (see Table 3). Almost all respondents (99.1%; n = 335) agreed that value addition may significantly contribute to income improvement, and all 338 respondents (100%) agreed that investing in fish processing and packaging is essential for business sustainability. A unified view emerged that value addition could secure better livelihoods for future generations (100%; n = 338) and that local cooperative support is vital for success (100%; n = 338).

Despite this largely positive outlook, the enabling conditions for adoption are severely lacking. Only 8.7% of respondents (n = 29) had access to the tools and equipment required for value addition a direct deficit in physical capital. The high initial cost of processing operations was cited as prohibitively high by 98.3% (n = 332), reflecting constrained financial capital. Market access barriers were reported by 93.0% (n = 314), signifying weak social and market linkage capital. Awareness of specific processing methods stood at 61.7% (n = 209), identifying a human capital gap requiring targeted training and extension programming. Together, these constraints map precisely onto the SLA vulnerability context in which fishers operate and explain the complete absence of value addition adoption at the primary producer level.

Table 4. Fishermen's perceptions of value addition practices (n = 338)

Perception Domain	Statement	Yes(%)
Income Impact	Value addition is associated with higher income (perceived)	99.1
Business Sustainability	Investing in processing/packaging is essential	100.0
Awareness	Well-informed about value addition methods	61.7
Training Needs	Training on value addition techniques is crucial	99.1
Resource Access	Has access to necessary tools and equipment	8.7
Financial Support	Government/NGO support would enable investment	95.7
Market Demand	High demand for value-added products locally	73.0
New Markets	Value addition opens new market opportunities	100.0
Cost Barriers	Initial setup cost is too high	98.3
Market Barriers	Faces difficulties accessing markets for value-added products	93.0
Post-harvest Loss	Value addition reduces post-harvest losses	97.4
Quality/Shelf Life	Value addition improves quality and shelf life	97.4
Cultural Integration	Traditional practices can integrate with modern techniques	89.6
Community Support	Community encourages value addition	91.3
Environmental Sustainability	Value addition contributes to sustainable fishing	98.3
Collaboration Benefits	Collaboration with other fishers enhances value addition	99.1
Future Optimism	Optimistic about future of value addition	99.1
Intergenerational Impact	Value addition may contribute to better livelihoods for future generations (perceived)	100.0

Source: Field Data (2024)

4.4 Profitability of Fishing Value Chain Strands

The price and revenue analysis for the 338 surveyed fishers revealed considerable variation in trading conditions (Table 5). It should be noted that these figures represent gross revenue and price data at the primary fisher level only; full profitability analysis incorporating production costs, equipment, fuel, and labour was beyond the scope of the current study and represents a limitation. The mean daily fish transaction volume was 22.98 kg, with an average price of TZS 3,982.61 per kg, resulting in a daily gross revenue of TZS 83,904.35 (approximately USD 32 at 2024 exchange rates). Daily trading quantities ranged from 3 to 90 kg, while prices per kilogram for fresh fish fluctuated between TZS 2,000 and TZS 6,000, reflecting market volatility (Table 5).

Table 5. Summary of price and revenue indicators for fishing value chain (n = 338)

Indicator	Value
Sample size	338 fishermen
Average quantity traded per day	22.98 kg
Average price per kilogram (fresh fish)	TZS 3,982.61
Average daily revenue (fisher level)	TZS 83,904.35 (~USD 32)
Price range (fresh fish, per kg)	TZS 2,000–6,000
Daily traded volume range	3–90 kg
Indicative price differential: processed vs. fresh fish (downstream chain)	+125% (TZS 9,000 vs. TZS 3,983)

Note: TZS = Tanzanian Shillings. USD equivalent calculated using approximate 2024 exchange rate of TZS 2,600/USD.

Source: Field Data (2024)

Strands that included processing activities (Strands III, VII, and VIII) were associated with prices of TZS 9,000/kg, more than double the direct fresh fish price. This price premium is indicative evidence that value addition may contribute to higher economic returns along the chain, though it should be interpreted cautiously: the study did not collect full cost-of-production data (inputs, labour, energy, equipment depreciation) from processors, and therefore net profit margins and return on investment cannot be calculated. The TZS 9,000/kg figure represents transaction price at point of sale, not net profitability. These data nonetheless serve as a proxy for the financial capital gains available to downstream chain actors. Within the SLA framework, the price premium signals that value addition activities if accessible to primary fishers could meaningfully strengthen their financial capital. High operational costs (fuel, gear maintenance), limited access to capital, inadequate processing facilities, and market price fluctuations continue to constrain fisher earnings at the production stage, consistent with findings from comparable African contexts (FAO, 2020; Onyango & Yahya, 2022). Future research should incorporate full cost-benefit analyses across all chain actor categories to provide a more complete picture of net profitability.

4.4.1 Multiple Regression Analysis of Revenue Determinants

To examine whether socio-economic and value chain structural characteristics are associated with daily fishing revenue while controlling for confounding factors, a multiple linear regression model was estimated using ordinary least squares (OLS) in Microsoft Excel, with daily revenue (TZS) as the dependent variable. Age, gender, education level, extension contact, value addition awareness, equipment access, and market barrier exposure were entered as predictors. Quantity traded and price per kilogram were deliberately excluded, since daily revenue is arithmetically derived from these two variables; their inclusion produces a tautological model ($R^2 > 0.97$) that explains the accounting identity rather than substantive livelihood determinants. The regression results are reported in Table 5a.

Table 5a. OLS regression results: predictors of daily fishing revenue (TZS) (n = 338)

Predictor Variable	Coefficient (B)	Std. Error	t-value	p-value	Significant (p<0.05)
Age (years)	114.54	225.93	0.507	0.6125	No
Gender (Male = 1)	−908.65	5,643.41	−0.161	0.8722	No
Education level	13,997.97	7,667.25	1.826	0.0688	No
Extension contact (Yes = 1)	−8,199.07	6,080.99	−1.348	0.1785	No
Value addition awareness (Yes = 1)	2,714.34	5,505.34	0.493	0.6223	No
Equipment access (Yes = 1)	9,503.55	9,597.96	0.990	0.3228	No
Market barrier (Yes = 1)	−15,689.98	10,422.19	−1.505	0.1332	No
Constant (Intercept)	85,260.03	18,008.50	4.734	<0.001	Yes

Source: Field Data (2024); regression estimated via Excel OLS (LINEST function)

The model explained a small proportion of the variance in daily revenue ($R^2 = 0.028$; Adjusted $R^2 = 0.007$), and the overall model was not statistically significant ($F(7, 330) = 1.36$, $p = 0.220$). None of the seven predictors reached conventional statistical significance at the $p < 0.05$ threshold, although education level approached significance ($B = 13,997.97$, $p = 0.069$), suggesting a possible but inconclusive positive association between educational attainment and daily earnings. The intercept was significant ($B = 85,260.03$, $p < 0.001$), indicating a substantial baseline revenue level not explained by the measured socio-economic predictors.

These regression results provide a more rigorous statistical complement to the descriptive findings reported in Sections 4.1–4.4: they confirm that, within the current sample, observable socio-economic characteristics and the structural barriers captured in this survey (extension contact, awareness, equipment access, market barriers) do not statistically explain variation in current daily earnings. This is consistent with the conceptual picture established earlier in this paper namely, that the surveyed fishers operate within a largely homogeneous fresh-fish trading system (100% non-engagement in value addition; Table 3) where revenue is driven almost entirely by quantity traded and prevailing market price, rather than by individual socio-economic endowments or perceived barriers. This null result should not be read as evidence that value addition adoption is irrelevant to livelihoods; rather, it reflects the absence of within-sample variation in actual value addition practice, which is the central structural constraint this study identifies (see Section 5). A regression model capable of testing the livelihood effect of value addition itself would require a sample including fishers and processors who have already adopted value-added practices a comparison this cross-sectional, single-strand sample cannot provide. This limitation is addressed further in Section 6.3.

4.5 Contribution of Profits to Fishery Livelihoods

The livelihood analysis indicates a community experiencing structural disadvantage across many capitals, notwithstanding elevated homeownership rates (Table 6). Although 94.8% of respondents ($n = 320$) were homeowners, house quality was substandard: 76.5% of

roofs (n = 259) were constructed from leaves or grass, 76.5% of walls (n = 259) from mud, or raw bricks, and 73.9% of flooring (n = 250) from dirt. Only 20.0% (n = 68) had access to power for lighting; the majority depended mostly on solar energy (76.5%; n = 259). All 338 families (100%) relied on uncovered wells for potable water, posing a considerable public health hazard.

Table 6. Livelihood indicators of fishing households in Mkinga District (n = 338)

Livelihood Indicator	Response Category	Frequency	%
House ownership	Own house	320	94.8
Roofing material	Leaves/grass (rudimentary)	259	76.5
	Corrugated iron (durable)	50	14.8
Wall material	Mud/cow dung/raw bricks	259	76.5
	Cement blocks	53	15.7
Floor material	Earth floor	250	73.9
	Cement floor	71	20.9
Sanitation	Open defecation (bush)	162	47.8
	Covered pit latrine	176	52.2
Cooking energy	Firewood/charcoal	335	99.1
Lighting energy	Solar power	259	76.5
	Electricity (grid)	68	20.0
Drinking water	Uncovered well (sole source)	338	100.0
Food insecurity	Regularly food insecure	182	53.9
Food self-sufficiency	25–50% self-sufficient	303	89.6
Remittances (relatives)	Somewhat reliable	317	93.9
Govt support (TASAF)	Not reliable at all	288	85.2

Source: Field Data (2024)

Food insecurity regularly impacted 53.9% of households (n = 182). Climate change, excessive reliance on fisheries, inadequate storage facilities, elevated living costs, and limited access to water were all recognised (100%) as significant factors contributing to food insecurity. The overall household food self-sufficiency was minimal, with 89.6% of respondents (n = 303) reporting a self-sufficiency level of only 25–50% in food production. Government assistance via the Tanzania Social Action Fund (TASAF) was deemed untrustworthy by 85.2% of respondents (n = 288), highlighting the instability of external safety nets.

Mapping these findings onto the SLA framework reveals a community with a reasonable natural capital base (access to marine resources) but critically deficient in financial capital (inadequate and volatile incomes), physical capital (rudimentary housing, no cold-chain infrastructure, unsafe water), social capital (BMU membership but no commercial cooperatives or extension engagement for 73.9% of respondents), and human capital (87.8% with primary education only; 38.3% lacking awareness of value addition methods). These findings show that, while fishing activity provides a minimal livelihood floor, current earnings are inadequate to break the cycle of poverty. The structural challenges of inadequate value addition infrastructure, restricted financial services, and market isolation hinder fishing communities from converting resource abundance into sustainable prosperity, as noted by Opondo et al. (2023) and Kuijpers et al. (2023)

5. DISCUSSION

The findings confirm that Mkinga District's fishing value chain is structurally underdeveloped relative to its economic potential, consistent with patterns documented across sub-Saharan Africa (Beran, 2018; FAO, 2020). The eight-strand chain is dominated by fresh fish transactions: 99.1% of the 338 surveyed fishers sell only fresh fish and do not engage in value-added activities such as smoking, drying, or frying. While this broad pattern is familiar from the literature, what this study contributes beyond existing Tanzanian and African fisheries research is a systematic, community-level documentation of the gap between value addition aspiration and structural adoption in a specific, under-studied coastal district. Unlike Churu (2023) and Peart et al. (2021), who examined income and supply-demand dynamics in the district without explicitly mapping the value addition adoption gap, this study provides baseline quantitative evidence showing that fishers overwhelmingly recognise value addition's potential (99.1%) yet are entirely excluded from it structurally (100% non-engagement). This disjunction not previously documented with this clarity for Mkinga is the study's core empirical contribution, and it has direct policy implications for targeting supply-side infrastructure investments rather than awareness campaigns. Primary producers in smallholder fisheries chains consistently receive the lowest margins due to asset poverty and restricted access to processing technologies (Beran, 2018; FAO, 2020), and Mkinga fits this model precisely.

The contradiction of strong attitudinal acceptance and near-zero practical implementation of value addition is consistent with findings from comparable African fishing contexts (Pita et al., 2020), though the Mkinga case is notable for the sharpness of this divide. Fishermen overwhelmingly associate value addition with income improvement (99.1%; $n = 335$) but are structurally excluded from adopting it: only 8.7% ($n = 29$) have access to processing equipment, 98.3% ($n = 332$) identify initial costs as prohibitively high, and 93.0% ($n = 314$) report market access barriers. These findings extend those of Churu (2023), who documented persistently low fisher margins in Mkinga (12.2% gross margin), by revealing the specific structural constraints that perpetuate the aspiration-capacity gap. Addressing this gap requires supply-side interventions infrastructure provision, subsidised equipment, and market linkage support rather than awareness campaigns alone. This disparity between aspiration and capacity highlights the need for supply-side interventions that are more than just awareness-raising, but also infrastructure-enabling.

The documented price differential between processed fish strands (TZS 9,000/kg) and fresh fish (TZS 3,983/kg), representing a 126% premium, provides indicative evidence of the economic gains that may be associated with value addition adoption. These figures represent price-point comparisons across different chain actors rather than direct net profitability estimates, given that full production cost data for downstream processors were not collected in this study. As indicative evidence, however, the premium is consistent with findings from Acosta-Alba et al. (2022) and Kamaylo et al. (2021), who found significant price premiums for processed fish across African value chains. However, the benefits are still concentrated among processors and wholesalers, with fishermen receiving merely the raw commodity price. This distributional imbalance, as emphasised by Kuijpers et al. (2023) in the Ugandan context, needs

cooperative arrangements that allow fishermen to participate in downstream processing and selling.

The livelihood analysis, structured through the SLA framework, reveals systematic capital deficiencies across Mkinga's fishing communities. High homeownership rates (94.8%; $n = 320$) are associated with poor housing quality and low physical capital, while widespread food insecurity (53.9%; $n = 182$) and near-total dependence on unsafe water sources (100%; $n = 338$) signal critically weak financial capital and inadequate social protection. This configuration asset ownership without livelihood security reflects what Natarajan et al. (2022) refer to as "asset-poor livelihood systems," in which physical capital accumulation does not translate into improved capabilities due to deficits in complementary assets (financial capital, human capital, market access). Across all five SLA capitals, the community shows acute vulnerability: natural capital (marine resources) is present but unsecured; human capital is limited by low education and training access; social capital is constrained by the absence of functional cooperatives; financial capital is insufficient and volatile; and physical capital is degraded. The near-total reliance on uncovered wells for drinking water (100%; $n = 338$) and on firewood/charcoal for cooking (99.1%; $n = 335$) demonstrates that current fishing revenues are insufficient to enable investment in basic service upgrades let alone in value addition infrastructure.

The unreliability of TASAF support (85.2% of respondents rated it "not reliable at all"; $n = 288$), combined with the absence of formal credit access, constrains the community's adaptive capacity and resilience. This is consistent with the findings of Pomeroy et al. (2020), who argue that financial inclusion is required to build economic resilience in small-scale fisheries. Without access to microfinance or subsidised financing, fishermen are unable to invest in processing equipment, cold-chain infrastructure, or market linkages all of which would be necessary to promote value addition adoption. Within the SLA framework, this represents a critical missing link: weak financial capital and absent social capital (in the form of cooperative credit mechanisms) reinforce each other, locking communities in a low-capital equilibrium that prevents progression up the value chain.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study provides systematic, community-level evidence from 338 registered fishermen in Mkinga District, Tanzania an under-researched coastal area indicating that fish value addition holds significant potential for improving fishing community livelihoods, but that potential remains entirely unrealised at the primary producer level. The fishing value chain encompasses eight distinct strands, but is dominated by low-value fresh fish trades: not a single surveyed fisher (0%) currently engages in value addition activities, despite near-universal recognition (99.1%) of its potential income benefits. This study's core original contribution is the systematic documentation of this aspiration-adoption gap and its structural causes within a specific, underserved district context. Processed fish strands are associated with price premiums exceeding 125% above fresh fish prices, representing indicative rather than definitive evidence of potential economic benefits, as full cost-of-production data were not collected. A multiple regression model confirmed that, within this sample, current daily revenue is not significantly explained by socio-economic characteristics or perceived structural barriers ($R^2 = 0.028$, $p =$

0.220), reinforcing the conclusion that earnings are driven by trading volume and price rather than by individual endowments in a context of universal non-adoption of value addition. Applying the SLA framework, the community exhibits deficiencies across all five capital dimensions: weak financial capital (low, volatile incomes), degraded physical capital (substandard housing, no processing infrastructure), limited human capital (87.8% primary education only), underdeveloped social capital (no commercial cooperatives; 73.9% without extension access), and vulnerable natural capital. Livelihood conditions characterised by substandard housing, universal reliance on unsafe drinking water, and pervasive food insecurity (53.9%) confirm that current revenue levels are inadequate for sustainable livelihoods. Given the cross-sectional design and the absence of within-sample variation in value addition practice, causal claims about the effect of value addition adoption itself cannot be made; all findings are presented as associative evidence. Future research employing longitudinal designs and econometric approaches applied to samples spanning both adopters and non-adopters will be needed to establish causal pathways between value addition adoption and livelihood outcomes.

6.2 Policy Recommendations

Based on these findings, the following targeted focused recommendations are proposed:

- Strengthen fisher cooperatives and Beach Management Units to improve vertical and horizontal coordination, enhance collective bargaining power, and create platforms for shared investment in processing technologies.
- Implement accessible loan and subsidy initiatives tailored for fish processing equipment (smoking kilns, drying racks, refrigeration units) to reduce the prohibitive entry costs associated with value addition adoption.
- Establish market information systems that deliver real-time price data, mitigate information asymmetries, and link Mkinga fishers with urban and regional markets, especially the potential at the Kenya border.
- Invest in processing infrastructure, such as fish handling centres, cold-chain facilities, and enhanced rural road connectivity, to mitigate post-harvest losses and broaden market access for value-added goods.
- Execute specialised training and extension initiatives on fish processing methodologies, business administration, and food safety regulations, specifically aimed at engaging fishers with limited educational backgrounds.
- Incorporate gender-responsive programming to facilitate women's involvement in value-added processing and marketing, in accordance with findings from Musa et al. (2016) regarding the impact of targeted credit facilities on gender-equitable value chain growth.

6.3 Limitations and Future Research

This study is cross-sectional and limited to Mkinga District, which restricts both temporal and spatial generalisability. Several additional limitations should be noted. First, the absence of full cost-of-production data for downstream chain actors (processors, vendors) means that profitability analysis is limited to price differentials rather than net margins; future studies should incorporate comprehensive cost-benefit analysis and return on investment calculations across all actor categories. Second, while a multiple regression model was incorporated to strengthen the analytical depth of this study (Section 4.4.1), the model tested associations

between socio-economic characteristics and current revenue within a sample exhibiting no variation in actual value addition adoption (100% non-engagement); it could not, therefore, test the relationship between value addition practice itself and livelihood outcomes. Future research should sample fishers and processors who have already adopted value addition practices, enabling regression or quasi-experimental designs (such as, propensity score matching, regression discontinuity, or difference-in-differences) that can estimate the livelihood effect of adoption directly and move towards causal inference. Third, women processors and traders were not disaggregated as a separate analytical group; future studies should explicitly incorporate gender-disaggregated analysis in line with recommendations from Musa et al. (2016) and the evidence on gender-differentiated roles in fisheries value chains. Fourth, the SLA was applied as an interpretive framework rather than a quantitative model; future work should develop composite livelihood capital indices to allow more rigorous cross-community comparison. Future research should use longitudinal designs to track livelihood changes following value addition interventions, and extend to other coastal districts in Tanzania to generate more generalisable evidence.

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Declarations

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REFERENCES

- Acosta-Alba, I., Nicolay, G., Mbaye, A., Dème, M., Andres, L., Oswald, M., Zerbo, H., Ndenn, J., & Avadi, A. (2022). Mapping fisheries value chains to facilitate their sustainability assessment: Case studies in The Gambia and Mali. *Marine Policy*, 137, Article 104634. <https://doi.org/10.1016/j.marpol.2021.104634>
- Adeyeye, S. A., & Oyewole, O. B. (2016). An overview of traditional fish smoking in Africa. *Journal of Culinary Science & Technology*, 14(3), 198–215. <https://doi.org/10.1080/15428052.2015.1102785>
- Akbari, N., Failler, P., Pan, H., Drakeford, B., & Forse, A. (2023). The impact of fisheries on the economy: A systematic review on the application of general equilibrium and input–output methods. *Sustainability*, 15(7), Article 6089. <https://doi.org/10.3390/su15076089>
- Al-Omoush, K. S., Simón-Moya, V., & Sendra-García, J. (2020). The impact of social capital and collaborative knowledge creation on e-business proactiveness and organizational agility in responding to the COVID-19 crisis. *Journal of Innovation & Knowledge*, 5(4), 279–288. <https://doi.org/10.1016/j.jik.2020.10.002>
- Beran, K. (2018). Value chain improvements in small-scale fisheries: Case studies from West Africa [Doctoral dissertation, University of Rhode Island]. URI Open Access Dissertations. <https://doi.org/10.23860/diss-beran-kristine-2018>
- Boniphace, M. K., Greyson, N., & Makarius, L. (2025). The contribution of *Dioscorea hirtiflora* to the livelihoods of local communities in Lindi and Mtwara Regions, Tanzania. *Journal of Development and Agricultural Economics*, 17(3), 73–83. <https://doi.org/10.5897/jdae2025.1450>
- Churu, A. (2023). Assessing the influence of artisanal fishing on income and livelihood of the coastal communities in Tanzania: The case of Mkinga District, Tanga Region. *Brazilian Journal of Development*, 9(12), 30668–30684. <https://doi.org/10.34117/bjdv9n12-007>
- Coltrain, D., Barton, D., & Boland, M. (2000). Value added: Opportunities and strategies. Arthur Capper Cooperative Center, Kansas State University.
- Fahad, S., Naushad, M., & Faisal, S. (2020). Analysis of livelihood in the world and its impact on world economy. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3717265>
- Food and Agriculture Organization. (2007). National fishery sector overview: The United Republic of Tanzania (FCP/TZ). FAO Fisheries and Aquaculture Department. <https://www.fao.org/fishery/facp/tza/en>
- Food and Agriculture Organization. (2020). The state of world fisheries and aquaculture 2020. FAO. <https://www.fao.org/interactive/state-of-fisheries-aquaculture/2020/en/>
- Getu, A., & Misganaw, K. (2015). Post-harvesting and major related problems of fish production. *Fisheries and Aquaculture Journal*, 6(4), Article 154. <https://doi.org/10.4172/2150-3508.1000154>
- Hyuha, G., Nyamle, N., Kilonzi, M., Makoye, P. M., Chuwa, C. S., Aiko, B., & Sirili, N. (2025). From injury to outcome: A mixed-methods study of animal-related injuries in a rural district of Tanzania. *PLOS Neglected Tropical Diseases*, 19(9), e0013494. <https://doi.org/10.1371/journal.pntd.0013494>

- Kamal, M. K., & Ismail, S. (2023). Analysing the global economic impact of the fisheries industry in Southeast Asia: A multi-regional input-output perspective. *Marine Policy*, 156, Article 105797.
- Kamaylo, K., Galtsa, D., Tsala, T., Erekaló, K., Oyka, E., & Hanko, M. (2021). Value chain analysis of fish in Gamo Zone, Southern Ethiopia. *Cogent Food & Agriculture*, 7(1), Article 1916183. <https://doi.org/10.1080/23311932.2021.1916183>
- Katikiro, R. E. (2014). Perceptions on the shifting baseline among coastal fishers of Tanga, Northeast Tanzania. *The International Journal of Marine and Coastal Law*, 29(3), 508–523. <http://dx.doi.org/10.1016/j.ocecoaman.2014.01.009>
- Keerthana, P. S., Gopan, S., Rajabudeen, R., Fathima, R., Shibu, K., Nisha, R., Udayan, P., Elvis, T., Gifty, T., Das, A., Kaippilly, D., Safeena, M. P., & Sreekanth, G. B. (2022). Post-harvest losses in the fisheries sector: Facts, figures, challenges and strategies. *International Journal of Fisheries and Aquatic Studies*, 10(4), 107–114. <https://doi.org/10.22271/fish.2022.v10.i4b.2691>
- Kuijpers, R., Smits, E., Steijn, C., & Mulumba, N. (2023). Profit margins and intermediary market power: Evidence from the matooke value chain in Uganda. *Journal of Agribusiness in Developing and Emerging Economies*. <https://doi.org/10.1108/JADEE-06-2022-0105>
- Mindjimba, K., Rosenthal, I., Ouadi, Y., Bomfeh, K., & Randrianantoandro, A. (2019). FAO-Thiaroye processing technique: Towards adopting improved fish smoking systems in the context of benefits, trade-offs and policy implications from selected developing countries. FAO. <https://doi.org/10.4060/ca4667en>
- Mkinga District Council. (2015). Mkinga District profile. Mkinga District Council.
- Mpemba, A., & Mombo, F. M. (2019). Fishing contributions to the household income in Mafia District, Tanzania. *Ocean Life*, 3(2), 74–85. <https://doi.org/10.13057/oceanlife/o030204>
- Muringai, R. T., Mafongoya, P., Lottering, R. T., Mugandani, R., & Naidoo, D. (2022). Unlocking the potential of fish to improve food and nutrition security in Sub-Saharan Africa. *Sustainability*, 14(1), Article 318. <https://doi.org/10.3390/su14010318>
- Musa, S., Aura, C., & Kundu, R. (2016). Mapping the value chain for farmed fish and gender analysis along the aquaculture value chain in Kenya. *WorldFish Working Paper*.
- Natarajan, N., Newsham, A., Rigg, J., & Suhardiman, D. (2022). A sustainable livelihoods framework for the 21st century. *World Development*, 155, Article 105898. <https://doi.org/10.1016/j.worlddev.2022.105898>
- National Bureau of Statistics. (2022). Tanzania national population and housing census 2022. Government of Tanzania. <https://www.nbs.go.tz/statistics/topic/census-2022>
- Ninan, G. (2018). Fish processing and value addition: A global scenario. ICAR-Central Institute of Fisheries Technology.
- Onyango, P., & Yahya, B. (2022). A situational analysis of small-scale fisheries in Tanzania: From vulnerability to viability. SAMAKI Initiative Working Paper.
- Opondo, F. A., Chagwiza, C., Ouko, K. O., & Mkandawire, E. (2023). Diversification of small-scale fishing activities in exploring entrepreneurial opportunities along the tourism value chain in South Africa. *Cogent Social Sciences*, 10(1), Article 2286751. <https://doi.org/10.1080/23311886.2023.2286751>

- Peart, J., Tran, N., Chan, C. Y., Maskaveva, A., Shoko, A. P., Kimirei, I. A., & Madalla, N. A. (2021). A review of fish supply–demand in Tanzania (Program Report 2021-32). WorldFish. <https://doi.org/10.13140/RG.2.2.17013.65760>
- Pita, C., Villasante, S., & Pascual-Fernández, J. J. (2020). Managing small-scale fisheries under data poor scenarios: Lessons from around the world. *ICES Journal of Marine Science*, 77(7–8), 2805–2817. <https://doi.org/10.1016/j.marpol.2019.02.008>
- Pomeroy, R., Arango, C., Lomboy, C., & Box, S. (2020). Financial inclusion to build economic resilience in small-scale fisheries. *Marine Policy*, 118, Article 103982. <https://doi.org/10.1016/j.marpol.2020.103982>
- Roche, A. G., Jeckoniah, J., & Massawe, F. A. (2023). Gendered factors and small-scale fish business growth in Mwanza, Tanzania. *Business Excellence and Management*, 13(2), 80–96. <https://doi.org/10.24818/beman/2023.13.2-06>
- Roest, K., Ferrari, P., & Knickel, K. (2018). Specialisation and economies of scale or diversification and economies of scope? Assessing different agricultural development pathways. *Journal of Rural Studies*, 59, 222–231. <https://doi.org/10.1016/j.jrurstud.2017.04.013>
- Tana, L., Cheffo, A., Mehedi, M., & Wubie, A. (2021). Value chain analysis of fish production and marketing from Lake Tana. *Ethiopian Journal of Agricultural Sciences*, 31(2), 77–94.
- Tolentino-Zondervan, F., & Zondervan, N. A. (2022). Sustainable fishery management trends in Philippine fisheries. *Ocean & Coastal Management*, 223, <https://doi.org/10.1016/j.ocecoaman.2022.106149>
- Uongozi Institute. (2017). Enhancing value addition in the extractive sector in Africa: Why is it important and how can it be achieved? Proceedings of Uongozi Institute Conference, December 4–5, 2017, Accra, Ghana.
- Venkatappa, S., Krishnamma, P. N., & Sreedevi, M. S. (2025). *Value addition and product diversification in the fishery sector: A review*. Archives of Current Research International. <https://doi.org/10.9734/acri/2025/v25i11660>