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Small-Scale Fish Traders' Sourcing Practices and Fish Sustainability in Lake Victoria, Magu District, Tanzania

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Abstract: *This study surveyed the influence of small-scale fish traders' sourcing methods on fish sustainability in Lake Victoria, Mwanza, Tanzania, specifically in Magu District. Structured questionnaires and interviews were utilized to collect primary data for the cross-sectional study design. All of the Magu District's small-scale fish sellers were part of the target population. Purposive sampling and simple random sampling techniques were used to choose the sample, while Cochran's formula was used to determine the sample size of 384 respondents. Quantitative data was analyzed using descriptive and inferential statistics, while qualitative data was analyzed using the content analysis method. The results showed that, at the significant level of $p<0.05$, the sourcing procedures of small-scale fish traders (SSFT) favorably improve fish sustainability, as indicated by the regression coefficient of P-vale (.000). Additionally, a descriptive statistic showed that sourcing practices contribute to fish sustainability by (Mean=3.97). Small-scale fish dealers' primary sourcing practices include determining if fish are mature before purchasing, avoiding purchasing specific species during their breeding season, and adhering to local fish trade laws when selecting which fish to purchase. The study findings concluded that fish species sustainability is impacted by SSFT sourcing practices. In order to guarantee that only legal fish are supplied to customers and to inform the public about which fish are safe to eat, the study advises fish regulatory bodies to maintain their strong enforcement of fish legislation.*

Keywords: *Small scale fish traders, Sourcing practices, Fish sustainability, Lake Victoria, Magu*

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1. Introduction

The fishing industry is a vital component of the world's most global economy, but it confronts a number of challenges related to sourcing practices, including overfishing, illegal and uncontrolled fishing (Mancion, 2020; Nguyen et al., 2021; Petrosky & In, 2025). With the growth of food security guidelines that consider fishing practices that boost value chains, post-harvest operations, trade to both fishers and fish-workers, the sustainability of fish species is a collective voice to both developed and developing countries (Costa-Pierce et al., 2022; Tri Nguyen, 2024). The need for understanding how small-scale trader's sources fish by considering social relations within Lake Victoria fishing communities shape the lake's fishery throughout the value chain is growing as a result of issues like overfishing and lake transparency, as well as a chance for fisheries to show their dedication to sustainability (Mancion, 2020; Petrosky & In, 2025). Healthful sourcing practices and awareness of small-scale fisheries contribute to the sustainability of fish species and the spread of aquaculture knowledge, which can result in a more sustainable food system and fish commerce worldwide (Petrosky & In, 2025).

In Africa, aquaculture industry includes small-scale fisheries that supply fish that produced domestically and contributes to the continent's overall output (Abdel-Hady et al., 2025). East Africa's Lake Victoria is essential to the output of inland small-scale fisheries, supporting regional fishing industries and export markets (Kuboja et al., 2024; Mpomwenda, 2018; Oboh et al., 2025). In Tanzania, small scale fish traders' complying with sustainable fishing practices is a big challenge, which in turn, shape fishing practices that lead to either sustainable or unsustainable fisheries (Kuboja et al., 2024; Paruğ et al., 2024).

Moreover, the Lake Victoria fishery is a major source of employment, economic growth, and food security for the people of Mwanza City (Bank, n.d.). Small-scale fish dealers are crucial to the delivery of fish from landing locations to local market consumers. The majority of SSFT work in the informal sector and engage in a variety of purchasing activities that may have a substantial impact on the fish stock's sustainability. Despite the policies in place, Lake Victoria is experiencing growing issues about sustainable fisheries, including illegal fishing (Mpomwenda et al., 2024). SSFT frequently sources fish without taking the ecological impact into account in an effort to maximize profit and satisfy consumer demand (Nassali et al., 2020).

So far due to serious fish species loss, the lake has been closed numerous times. This is a concern for SSFT because these traders rely on hand-to-mouth transactions on a daily basis. Additionally, this can hasten their transition to obtaining their everyday necessities through illicit ways. Therefore, the sustainability of fish species has not been thoroughly examined in relation to the sourcing practices of small-scale fish traders, despite their critical position in the fish value chain. It was unknown how SSFT's sourcing practices may promote illicit fishing and fish species extinction. Therefore, the purpose of this study was to address this issue by examining how the sourcing patterns of small-scale fish dealers affect the sustainability of fish species in Lake Victoria, Mwanza, especially in Magu District.

2. Literature Review

2.1 Theoretical Literature Review

The study was guided by the 'Tragedy of the Commons theory' developed by Garrett Hardin in 1968. The theory provides how individuals acting on their own self-interest can overuse and deplete the shared resources that will lead to a negative outcome for the entire community. The theory helped the study by explaining how the sourcing practices of the small-scale fish traders influence or contribute to the overexploitation of fish stocks in Lake Victoria, which negatively affects the entire community that depends on these resources and also harms the environment. Thus, the theory suggested the variable of the study (sourcing practices of SSFT) and how they affect the sustainability of fish species in Mwanza.

2.2 Common sourcing practices of small-scale fish traders

Gayeski et al., (2018), who investigated the difficulty of identifying sustainably managed Pacific Salmon fisheries, noted that existing certification programs often fail to incorporate current ecosystem science. However, there were still limited studies on how SSFT in developing regions like Mwanza City adopt sustainability fish criteria in their sourcing practices. Moreover, Imbwae et al., (2023) surveyed the socio-economic and environmental challenges of small-scale fisheries in Lake Kariba, Zambia. The study found no decline in fish species with regard to socioeconomic activities; however, experts reported a decline in fish species from the lake.

However, the study did not focus on small fish traders' purchasing practices and was not conducted in Tanzania. Additionally, (Kuboja et al., (2024) surveyed how the relationship of communities in Lake Victoria shapes the fisheries activities. Using mixed methodology, the study found that interventions that aimed at protecting Nile perch fisheries needed to be considered so as to create an environment that supports sustainable fisheries in the lake. So far, Luomba, (2016) assessed illegal, unreported, and unregulated fishing as a main governing problem. After analysis, the findings revealed that complexities, dynamic, and scale issues were the main challenges of efforts to overcome the illegal, unreported, and unregulated problem in the fishing sector. Nevertheless, the study did not entirely focus on how the purchasing practices of SSFT could lead to the depletion of the fish population in the lake, which necessitated this study.

Moreover, a study of breeding season conducted in Ethiopia argued that among the vital fishing practices that promote fish sustainability for all types of species is adherence to breeding seasons, as fishing during that period may result in a decline of fish populations in lakes and seas (Agumassie, 2019). This study is vital for the study at hand, as the study facilitates the gathering of knowledge for fish sustainability, but also the study locality was part of Africa, which justifies the importance of the same study in Tanzania.

2.3. Conceptual framework

In this study, the independent variable is the sourcing practices of small-scale fish traders, while the dependent variable is fish sustainability in Lake Victoria. To understand the social relationships that small-scale fish traders use to ensure fish sustainability, sourcing practices should be linked to fish sustainability. The study connects traders' practices to obtaining fish while accounting for fish breeding season, maturity of fish, prices of fish (i.e., the cheapest supplier), incorporation of fisheries, and the needs of customers and measures how compliance with fishing regulations, avoiding endangered species, and purchasing fish from licensed suppliers facilitate sustainable fish species.

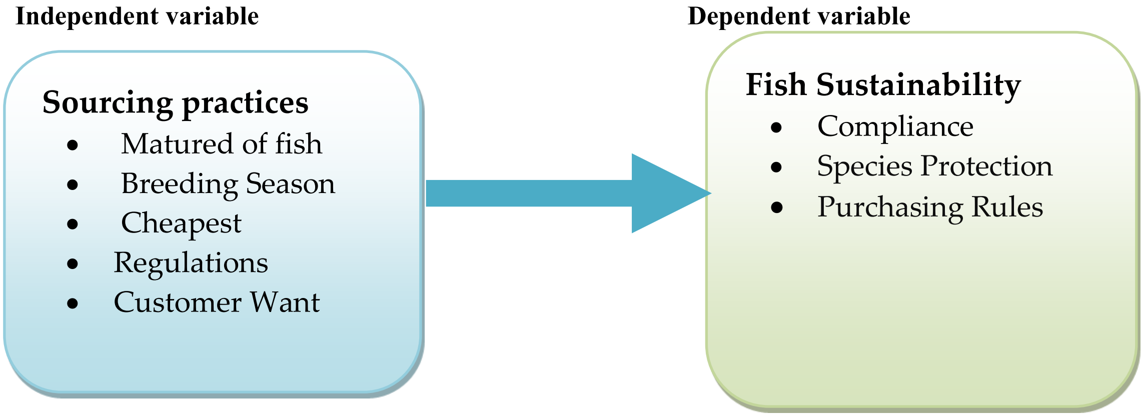

Figure 1: Conceptual framework

Source: (Own construction, 2025)

3. Methodology

3.1 Study Area

This study was carried out in the Magu District in the Mwanza region. Since Mwanza accounts for 45.7% of fishing activity among the five regions surrounding Lake Victoria, it was chosen purposely. In contrast, Kagera accounts for 22.4% of fishing activity, Mara for 21.8%, Geita for 8.5%, and Simiyu for 1.6% of fishing activity (URT, 2021). Ihale, Nyamikoma, and Nyakaboja landing sites were deliberately chosen as the study's research sites because they are prospective land sites in both the Magu district and the Mwanza area. The study sites were chosen using the criterion that the landing locations were located in Mwanza, which has a significant fish processing business. However, traders used fishing gear less frequently because all beaches were involved in excessive fish exploration (Munubi & Nyakibinda, 2020; Robert Galan Mashenene, Evelyne Fredrick Magambo, 2025).

3.2 Research Design, and Data Collection Methods

To describe the impact of sourcing practices on improving fish sustainability in Lake Victoria, Mwanza, the study used a cross-sectional research design to gather data from small-scale traders. The design was selected because it fits the variables selected for this study and works well with both qualitative and quantitative data (Saunders et al., 2019; Thornhill, 2023). Additionally, the study made use of primary data that was acquired straight from the SSFT through interviews and structured questionnaires. Both qualitative and quantitative data were gathered through the questionnaires. Because each responder had to answer the same set of questions, the use of questionnaires allowed for the collection of a large amount of data while reducing bias. The study was able to gather information through interviews that was not possible with questionnaires.

3.3 Population, sampling procedures and sample size

All small-scale fish dealers in Magu District, especially those operating in the landing sites in Ihale, Nyamikoma, and Nyakaboja, who buy and sell different kinds of fish to the general public (consumers), were included in the study's target group. To choose the sample, simple random sampling methods and purposive sampling approaches were used. Only SSFT were chosen using a purposive sampling technique, and research participants were then chosen using a simple random technique. Due to their low production, which frequently isolates them in discussions of traders and producers, small-scale fish traders were selected (Petrosky & In, 2025). The study used Cochran's formula to determine the unity of inquiry as the sample size because the nature of the small-scale fish trading industry makes it impossible to pinpoint a precise number of these dealers. The following is the formula:

$$n=\frac{Z^2\cdot p\,(1-p)}{e^2}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

This is interpreted as;
n = Sample size
Z = the Z-value (1.96 for 95% confidence level)
p = Estimated proportion of the population (0.5), and
e = Margin of error (0.05 for 5%).

With the assumption of a 95% confidence level, a 5% margin of error and an estimated proportion of 0.5, the sample size is calculated as;

$$n=\frac{1.96^2\cdot 0.5\cdot (1-0.5)}{0.05^2}$$

= 384 respondents

Nevertheless, 318 respondents provided data for the study, yielding an 82.8% response rate. According to Mugenda (2018), a response rate of 70% or above is dependable and statistically adequate for the study, confirming the validity of the data gathered from the respondents.

3.4 Ethical Consideration

The study considered research ethics throughout the research process. Informed consent was obtained from all participant, and confidentiality was maintained. According to, Arafat, (2024) research ethics are pillars that guide a researcher to conduct their work without causing harm. Hence, participants were informed of their right to withdraw at any stage of the study without penalty.

3.5 Data Processing and Analysis

The Statistical Package for the Social Sciences (SPSS) software version 25 was utilized as an analytical tool to evaluate quantitative data using descriptive and inferential statistics. To determine the association between sourcing procedures and fish sustainability, descriptive statistics such as mean scores, standard deviations, frequency, and percentages were calculated, and an inferential statistic using a simple linear regression model was also used. The content analysis method was used to analyze qualitative data in order to find themes and patterns. After the qualitative data were transcribed, they were grouped into relevant themes and sub-themes, which were subsequently the subject of in-depth debates and interpretations.

The below linear regression model guided the simple linear regression analysis, which included binary regression. $Y = \boldsymbol{\beta_0} + \beta_1 SP + \mathcal{E}$ --(1)

Where:
Y - Denotes Fish Sustainability
$\boldsymbol{\beta_0}$ **-** Denotes Constant
SP – Sourcing Practices
M – Matured
C – Cheapest
BS – Breeding Season
R – Regulation
CW – Customer Want
$\boldsymbol{\beta_1, n}$ **−**Is a regression Coefficients for variables M,C, BS, R, and CW respectively.

4. Results and Discussion

4.1 Descriptive statistics

The respondent's description of the methods utilized by SSFT for trading and how each method supports the sustainability of fish in Lake Victoria is shown in Table 1 below. The results were based on survey responses to determine the impact of sourcing procedures on fish sustainability.

Table 1. Small scale fish trader's sourcing practices

	N	Minimum	Maximum	Mean	Std. Deviation
I regularly check if the fish are mature before buying	318	1	5	3.89	.770
I follow local fish trade regulations when choosing which fish to buy (closed seasons, protected species, catch limits)	318	0	5	2.98	1.381
I avoid buying certain species during their breeding season	318	1	5	3.97	.717
I always buy fish from the cheapest supplier regardless of their size/how they were caught	318	1	5	3.70	1.130
I buy fish based on what my customers want, even if it is not sustainable sourced	318	1	5	3.18	.950
Valid N (listwise)	318				

Source: Field survey data, (2025)

According to Table 1, the average degree of SSFT trader concern on fishing gear was (mean=3.89 (0.770) standard deviation for the practice of checking fish maturity and (mean=3.97 (0.717) standard deviation for the habit of not purchasing fish during breeding seasons. These results suggest that fish dealers vary on average in their adherence to fishing regulations, such as those pertaining to breeding season, species protection, and fish catching limitations, which support sustainable seafood procurement methods. The results of this study are consistent with those of Mburu et al., (2018), who discovered that a green employee selection process has an impact on sustainability, likely to SSFT checks and chooses mature fish before purchasing fish promote sustainability. Since the majority of traders buy from suppliers who sell mature fish, it may be inferred that SSFT avoids overharvesting immature stock and encourages adherence to the breeding seasons by buying and selling mature fish. Additionally, this shows that this trader group practices good sustainable sourcing, which may prevent the capture of juvenile fish and guarantee fish sustainability.

Furthermore, on the other hand findings showed a week complies with the fishing regulations by a small-scale fish trader since respondent responses on "following local regulations" account for (mean 2.98)(1.381) standard derivation, buying from the cheapest supplier (mean 3.70) and buying based on customer demand (mean 3.18). This reveal that economic and market drivers are influencing sourcing practices—sometimes in ways that conflict with sustainability goals. These results are supports with those showed that there is a need for both small-scale and large scale fishers adopt changes in fishing policy and regulation as it promote sustainable practices (Harun et al., 2022; Petrosky & In, 2025). Also, according to Cohen, (2023a, 2023b), economic condition is among of the factor that contributed to sustainable fish as market pressures in term of the price of fish and need to satisfy certain class of the customers may enforce purchase and sale fish which are matured or not. As a result, it can be concluded that the level of sourcing sustainably is average the global sourcing pattern is still weakened by weak regulation compliance and strong economic. So, there is a need for authorities to promote fishing regulation that promotes sustainable souring and establish fishers' associations to moderate economic pressures.

4.2 Regression Analysis

4.2.1 Model Fit

The study used simple linear regression, which computes the regression coefficient, analysis of variances (ANOVA), and coefficient of determination (R2). Additionally, the model's fit was examined to ensure that it wasn't overfitting the data or missing important correlations.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.434[a]	.189	.176	.781

a. Predictors: (constant), b5Customerwant, b1Matured, b4Regulations, b2Cheapest, b3 Breedingseason
Source: Field survey data, (2025)

Tables 2 and 3 display the results of the mode fit test for the linear regression model. According to table 2's model summary, the overall correlation coefficient (R) between the independent variables of fish sustainability and sourcing practices was 0.434. This suggests that sourcing methods and fish sustainability at Lake Victoria have a respectable positive correlation. Furthermore, tables 2 demonstrate that, with an adjusted R2 of 0.176, the model only accounts for 17.6% of the differences in sustainability at Lake Victoria. Therefore, other factors not included in the model account for 82.4% of the variation in fish sustainability.

Table 3: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.257	5	8.851	14.514	.000[b]
	Residual	190.272	312	.610		
	Total	234.528	317			

a. Dependent Variable: DEP, b. Predictors: (Constant), b5CW, b1M, b4R, b2C, b3BS
Source: Field survey data, (2025)

Nonetheless, Table 3 showed that the model's overall significance was 0.000 with a F value of 14.514. Thus, sourcing procedures have a statistically significant impact on fish sustainability at Lake Victoria, Mwanza, as indicated by the significance level being less than 0.05.

4.3 Factors influencing Sourcing practices towards fish sustainability

Table 4: of coefficients independent variable

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.
1	(constant)	2.788	.388		7.189	.000
	b1Matured	.112	.057	.101	1.961	.050
	b2Cheapest	.051	.061	.043	.834	.405
	b3Breedseason	.264	.032	.424	8.269	.000
	b4Regulations	-.025	.039	-.034	-.655	.513
	b5Customerwant	.011	.046	.012	.241	.810

a. Dependent Variable: DEP
Source: Field survey data, (2025)

Additionally, Table 4 displays the coefficients of independent variables sourcing practices, which include the dimensions of "Matured," "Breeding season," "Cheapest," "Regulations," and "Customer want." The results of the study showed that, with a regression coefficient of (β =.112, p =.050), the matured dimension to the sourcing practice variable had a positive significance relationship on fish sustainability. This suggests that, while holding other variables fixed, an increase of one unit in fish checking maturity increases fish sustainability by 0.112. This remark is related to the findings that fishermen must prioritize standards and certification of catches, such as catching matured fish, in order to adhere to sustainable practices in fish (Harun et al., 2022). Therefore, it can be said that sustainable practices like regularly inspecting fish for maturity by SSFT before purchasing them have an impact on increasing fish sustainability.

> *"For instance, last week I had a supplier send fish that had been caught without taking into account the standards needed to be sold at the market. The fish did not meet the catching restrictions set by the fisheries sector, therefore even if the supplier was selling at the lowest price, I did not do business with him" (Interviewee No. 5, 2025).*
>
> *"We had a supplier who sent us fish that were young species, and we decided to cease buying from them since we were selling those fish and were quite concerned that we may be punished for doing so. As of right now, he is the market leader for selling mature fish because he couldn't find a place to sell those juvenile species" (Interviewee No. 309, 2025).*

Additionally, the results demonstrate the impact of breeding season on fish sustainability. As indicated by the regression coefficient of (β =.424, p =.000) in Table 4, breeding season as a sourcing practice dimension had a positive and significant effect on the dependent variable, fish sustainability. This suggests that, while all other model parameters are held equal, an increase of one unit in the breeding season raises fish sustainability by 0.424. These results collaborate with those of Agumassie, (2019) and Noah, (2021), who found that fish during the breeding season may result in a decrease in fish populations since each species' breeding season is crucial to fish sustainability. Because SSFT behavior of checking for matured fish protects young species, so far it can be claimed that avoiding purchasing fish during mating seasons increases the likelihood of fish sustainability.

> "*We encounter challenges because we engage in small-scale business, particularly when the lake is restricted to fish breeding. Although there is a lot of pressure at this time, we recognize that the closed season is crucial because it enables the fish to spawn in huge quantities, which is advantageous since we then have fish that satisfy the standards established by the fishing authorities" (Interviewee No. 89, 2025).*

5. Conclusion and Recommendations

5.1 Conclusion

Based on the findings, the study concludes that sourcing practices of SSFT have an influence on the sustainability of fish in Lake Victoria. It means that there is an influence of purchasing practices of SSFT towards sustainability of fish species. The key sourcing practices include; checking fish if are mature before buying, not buying certain species during their breeding season and following local fish trade regulations when choosing which fish to buy.

5.2 Recommendations

Based on the study findings, the study recommend that fish regulatory authorities should enforce fish laws to ensure only legal fish are distributed to consumers and educating the general public on what fish are legal to be consumed and the sources from which they can be obtained.

5.3 Areas for future research

The study recommends future studies to focus on how informal fish distribution channel affects fish species sustainability in Lake Victoria. This is because the supply chain of fish involves various participants while fishing regulation seem to have been abandoned hence understanding the interplay among them is important to enhancing fish sustainability.

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