Food and Agriculture Organization of the United Nations

FISH4ACP

Unlocking the potential of sustainable fisheries and aquaculture in Africa, the Caribbean and the Pacific

SUMMARY REPORT

The Lake Tanganyika sprat and sardine value chain in Zambia

February 2024

german cooperation

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Abbreviations

AIDS	acquired immune deficiency syndrome
BMZ	Federal Ministry for Economic Cooperation and Development (Germany)
AFRACA	African Rural and Agricultural Credit Association
CAS	catch assessment survey
CPUE	catch per unit effort
DoF	Department of Fisheries
DRC	Democratic Republic of the Congo
ETP	endangered, threatened and protected
FAO	Food and Agriculture Organization (of the United Nations)
GBV	Gender-based violence
GDP	gross domestic product
HIV	human immunodeficiency virus
LTA	Lake Tanganyika Authority
LTDP	Lake Tanganyika Development Project
MCS	monitoring, control and surveillance
MFL	Ministry of Fisheries and Livestock
MSP	multi-stakeholder partnership
OACPS	Organisation of African, Caribbean and Pacific States
SFVC	sustainable food value chain
STD	sexually transmitted disease
SWOT	strengths, weaknesses, opportunities and threats
ToT	training of trainers
USD	United States dollar
VC	value chain
VCA	value chain analysis
VCA4D	value chain analysis for development

Exchange rate
1USD: 16 ZMW (1 September 2022)

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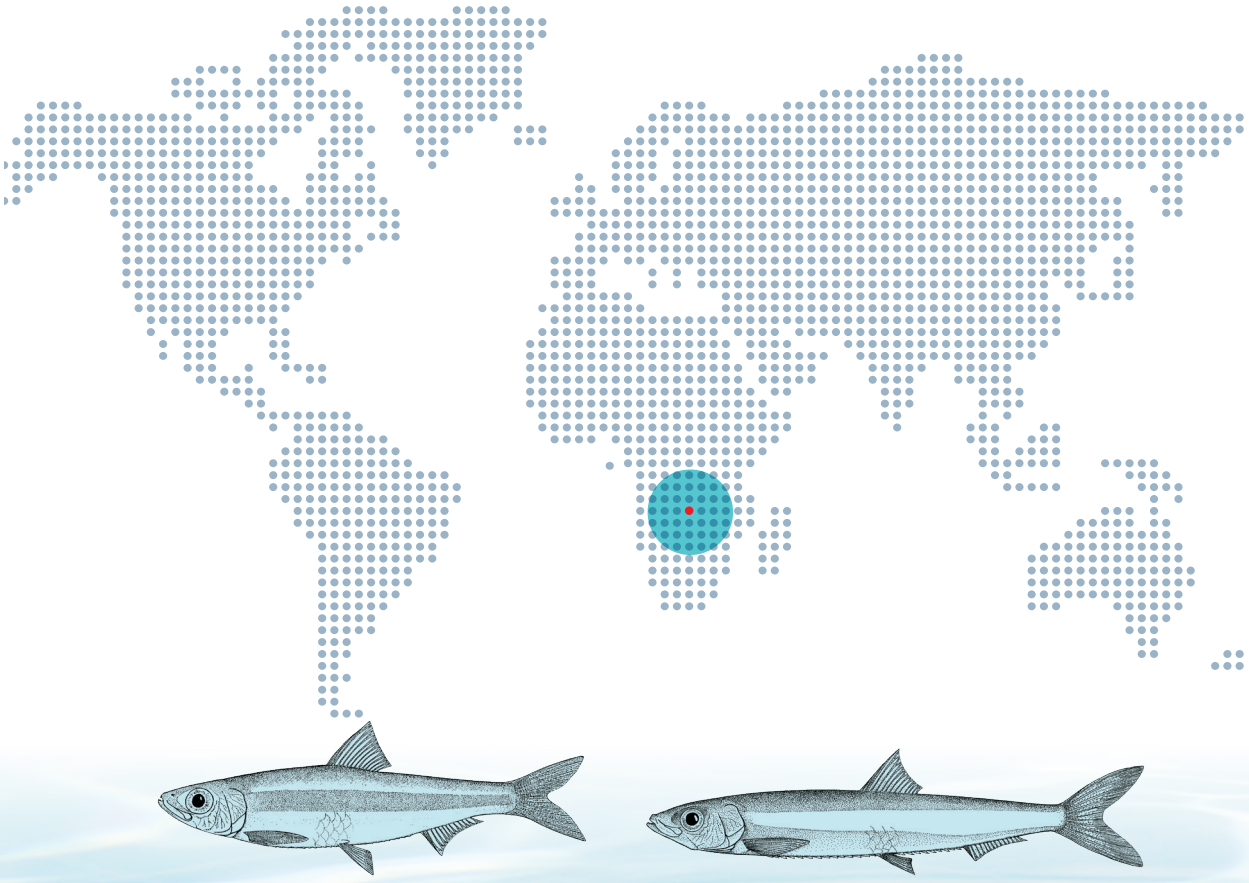
1. Introduction

FISH4ACP is an initiative of the Organisation of African, Caribbean and Pacific States (OACPS) to support sustainable fisheries and aquaculture development. This five-year value chain (VC) development programme (2020 to 2025) is implemented by the Food and Agriculture Organization of the United Nations (FAO) with funding from the European Union and the German Federal Ministry for Economic Cooperation and Development (BMZ).

The Lake Tanganyika sprat and sardine VC in Zambia is one of 12 VCs competitively selected from over 70 proposals worldwide for support from the FISH4ACP programme (Ministry of Fisheries and Livestock of Zambia, 2019). The proposal was submitted by the Ministry of Fisheries and Livestock with the view to enhance the productivity of the small pelagic fisheries in Zambia, as they make up 30 percent (Ministry of Fisheries and Livestock of Zambia, 2019) of the captures fisheries sector, which contribute about 3.2 percent to the country's annual GDP (Ministry of Agriculture and Ministry of Fisheries and Livestock, 2016). The scope of this VC project is the fishery for Lake Tanganyika sardine (*Limnothrissa miodon)* and the Lake Tanganyika sprat (*Stolothrissa tanganicae)*



Lake Tanganyika sprat
(*Stolothrissa Tanganicae*)

Lake Tanganyika sardine
(*Limnothrissa miodon*)

based in Lake Tanganyika, north of Zambia, in the Mpulungu and Nsama districts. Both species are known locally as **kapenta** and are caught and sold together.

The **FISH4ACP methodology** used to carry out this study is an approach based on FAO's Sustainable Food Value Chain (FAO, 2014) and Agrinatura's Value Chain Analysis for Development (VCA4D) methodologies. The methodology has four main components: the functional analysis, the sustainability assessment, development of the upgrading strategy, and implementation planning. As part of the methodology, the FISH4ACP team in collaboration with WorldFish Zambia carried out the primary and secondary data collection from July to October 2022. A total of 108 key informant and actor interviews, 409 survey interviews and 8 focus group discussions were conducted. The approach was highly participatory, involving VC stakeholders from the public and private sector from the outset to promote national ownership of all four components, thereby increasing the likelihood of success of the project interventions.

2. Functional analysis

A functional analysis was completed that maps and documents the components of the VC and provides insight into how the VC functions. The functional analysis enabled the preparation of the VC map below, which is supported by the following narrative that sets out the catching, processing and trade sectors.

Lake Tanganyika covers an area of 32 600 km² and is the world's longest lake and second largest by volume (Petit and Shipton, 2012) unregulated and unreported (IUU. The lake has territorial waters within the Democratic Republic of Congo (DRC), Burundi, Zambia and Tanzania (LTA, 2020). Lake Tanganyika's fishery production is likely inland Africa's second largest after that of Lake Victoria, but reliable catch statistics have been lacking since 1995 (Kolding *et al.*, 2019). The kapenta in the south of Lake Tanganyika has two seasons: high and low. The high fishing season is when most fish are caught, especially *Limnothrissa miodon*, and runs from May to November (Phiri and Shirakihara, 1999) Stolothrissa tanganicae and Limnothrissa miodon, and one predatory centropomid fish, Lares stappersi in the southern end Zambian waters. During the low season, from December to May, catches are lower but contain larger quantities of *Stolothrissa tanganyicae*. Kapenta is exclusively fished by artisanal fishers. Operations can be characterised by one large mother boat servicing 4 small boats that operate ring nets or mutobi nets as fishing gear.

Figure 1. A fisher preparing to dry the ring nets after a fishing trip

Noting the limited extent of data collection, a total landing volume in the region of 17 000 tonnes was extrapolated. Of this total, about 2 percent is estimated to be consumed directly by fishers, and 5 percent lost through post-harvest losses. Of the remaining volume available, it is estimated that about 95 percent of kapenta landed on the Zambian shores of Lake Tanganyika is dried, about 5 percent is frozen and a negligible percentage is consumed and/or traded fresh.

Drying is an activity predominantly carried out by female processors. In the high season, processors dry an average of 58 kg per day and in the low season 12 kg per day. Using their own capital, processors buy *pamasos* (small bowls) containing 20 or 40 litres of fresh kapenta from fishers. The fresh kapenta are then dried on the ground, on top of mosquito nets or old ring nets. Sun-drying

takes one to two days, during which the processors turn over the kapenta by hand to facilitate the drying process.

Once dried, the kapenta are measured out using 20-litre containers and sold to wholesalers. Ngwenya market in Mpulungu is the hub of kapenta trading and retail on Lake Tanganyika. Through wholesalers, about 60 percent of dried kapenta is exported to neighbouring the Democratic Republic of the Congo and bout 40 percent is sold to retailers around the lake. Dried kapenta, packaged in 90-kg bags, is mainly transported by bus and hired trucks to Lusaka through Kasama, to cities on the Copperbelt (Kitwe, Ndola and Chilambombwe) and the Kasumbalesa border point with the Democratic Republic of the Congo.

Figure 2. Processed kapenta stored in a 20-litre container after processing

The domestic market for kapenta is concentrated in major urban areas in the Copperbelt districts and in Lusaka. Of the dried kapenta destined for national markets and sold by retailers, around 70 percent is sold to consumers in Lusaka and the Copperbelt and about 30 percent to consumers around Lake Tanganyika, on the Zambian districts of Mpulungu and Nsama.

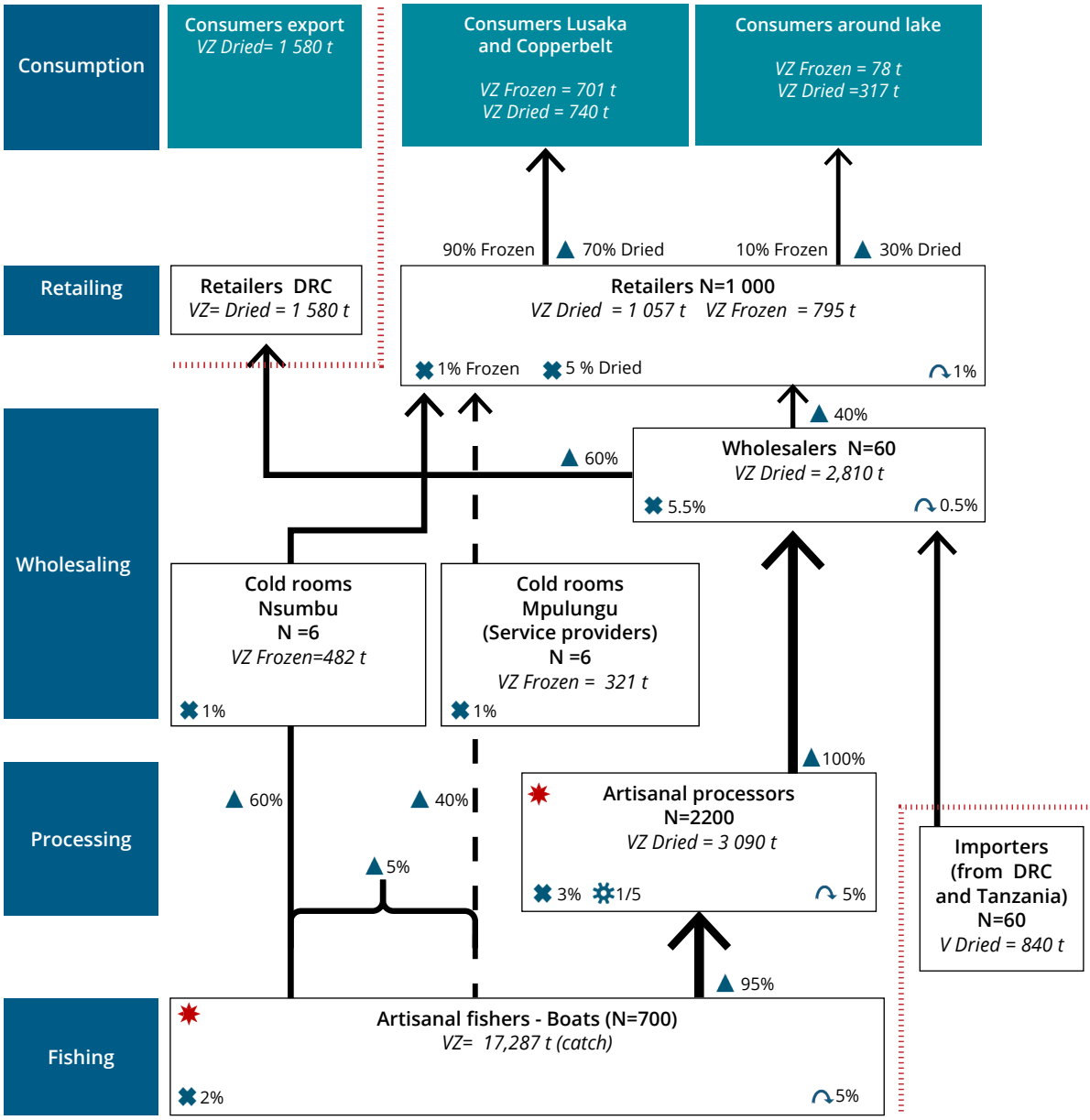
It is estimated that 5 percent of the kapenta commercialised by fishers is frozen in the cold storages by the shores of Lake Tanganyika. The cold storages in Nsama district buy the kapenta from the fishers, freeze it and store it to then transport and sell it in Kasama, Lusaka and Copperbelt towns. Cold storages in Mpulungu district have stopped purchasing fresh kapenta due to the low volumes being received. Instead, they offer their freezing services for a fee. Around 90 percent of frozen kapenta is packed in 20kg sacks and transported by bus to Kasama, Lusaka and Copperbelt towns. The remaining ten percent is sold around the lake.

There is no official data on the dried kapenta imported from the Democratic Republic of the Congo and the United Republic of Tanzania that enters through its disctricts by lake Tanganyika. Key informants estiamted that there are around 60 Tanzanian and Congolese exporters that travel to Nsama and Mpulungu districts and import a total load of around 120 tonnes of dried kapemta each month (high season). Imported dried kapenta is transported in bags between 120 kg and 150 kg. Studies show that a significant amount of the fish imported into Zambia is informally exported to Democratic Republic of the Congo through the Kasumbalesa border point (Mussa *et al.*, 2017).

Two main leverage points (or points of maximum impact) have been identified: the artisanal fishers and the artisanal processors:

- Artisanal fishers are the largest type of actor in terms of number (estimated at 14 000). Except for the captain, most fishing crews earn below the national minimum wage[2] and are the entry point for interventions to improve the sustainability of the resource.
- According to the VCA, there are 2 200 artisanal processors in the VC and an estimated 87 percent are women. Processors earn a yearly income below the national poverty line. Female processors are the most vulnerable group in the VC.

Figure 3. Kapenta value chain map



[2] Basic wage ranges between ZMW 1 050 and ZMW 2 167 per month according to https://wageindicator.org/salary/minimum-wage/zambia . Assuming 21 working days per month.

3. Sustainability and resilience assessment

Economic assessment

Calculations in this section are based on the data collected by FISH4ACP in 2022. In 2021, the ***Regional charter of the member states of the Lake Tanganyika Authority providing for measures for the sustainable management of fisheries in Lake Tanganyika and its basin*** *was signed by the member states of the Lake Tanganyika Authority (Lake Tanganyika Authority, 2021). Article 14 of this charter states that each year a closed fishing season will be observed by all riparian countries from 15 May until 15 August (high season for kapenta fishing in Zambia). The objective of this closure as stated in the charter is "the reconstitution of the fish stock. The closed fishing season will be first implemented in 2023. Given this annual closure coincides with the high season for kapenta fishing, it is likely to impact the VC economic results negatively due to reduced landings.*

The economic assessment focuses on the actor-level and value chain-level contributions to economic growth.

For the purpose of the sustainability assessment and in line with the FISH4ACP VCA methodology and VC map, five standard types of businesses (operations) were identified in the kapenta VC: fishing operations, processors, cold rooms, wholesalers and retailers. Most processors and retailers are individual owner-operators, while wholesalers and cold rooms employ individuals to assist on an as needed basis. Fishing operations are typically run by a director who is the owner of one or more boats and of the necessary ancillary equipment. Directors informally hire a crew of around 14 to 22 male workers per vessel to fish: a captain (1), a salesman (1), net pullers (12) and light operators (8). Crew (except for the captain) earn **below the national minimum wage**[3]. Processors earn a yearly income below the national poverty line of ZMW 214 per month or ZMW 2 568 per year (USD 160 per year) (The World Bank, 2020).

There are a **low number of full-time remunerative jobs** in the kapenta VC. Most of the actors receive incomes from buka buka (*Lates angustifrons*) fishing and trading, and from other activities such as farming. All business types have **positive profits** (net income), though the net profits of all VC actors decreased compared with preceding years, which anecdotally was attributed by some interviewees to a reduced catch per unit effort (CPUE). Processing and wholesaling are the least profitable operations in the VC, with a return on sales of 2 percent and 3 percent, respectively.

The fishing operations and retailers generate around two-thirds of the direct **value added** of the VC. This reflects the underdeveloped processing segment of the VC, characterized by mostly traditional processing practices that generate little value added. Around three-quarters of the total value added in the VC is direct value added generated by VC actors. This is due to the underdeveloped situation and/or low performance of support service provision in the VC.

Since the **sector is mostly informal**, most of the actors in the VC (except for cold rooms) do not pay tax. Fishers, cold rooms and wholesalers pay some public fees (e.g. fishing licence, levies), but

[3] Basic wage ranges between ZMW 1 050 and ZMW 2 167 per month according to https://wageindicator.org/salary/minimum-wage/zambia. Assuming 21 working days per month.

processors and retailers pay none. The whole VC contributes around USD 345 000 to the national budget in terms of taxes and public fees. The VC is a minor contributor to GDP (though is critical to livelihoods), so is less likely to attract public investment.

Table 1, based on 2022 data collected by FISH4ACP, shows the retail prices of dried kapenta in Mpulungu (Zambia) and in Kigoma (United Republic of Tanzania). A kilogram of dried kapenta in the United Republic of Tanzania is USD 0.6 cheaper than in Zambia. When we account for the cost of imports, the difference decreases even if Tanzanian kapenta is still USD 0.2 per kilogram cheaper than in Zambia, with Tanzanian kapenta fetching USD 8.8 per kilogram in Zambia against USD 9 per kilogram for the Zambian kapenta.

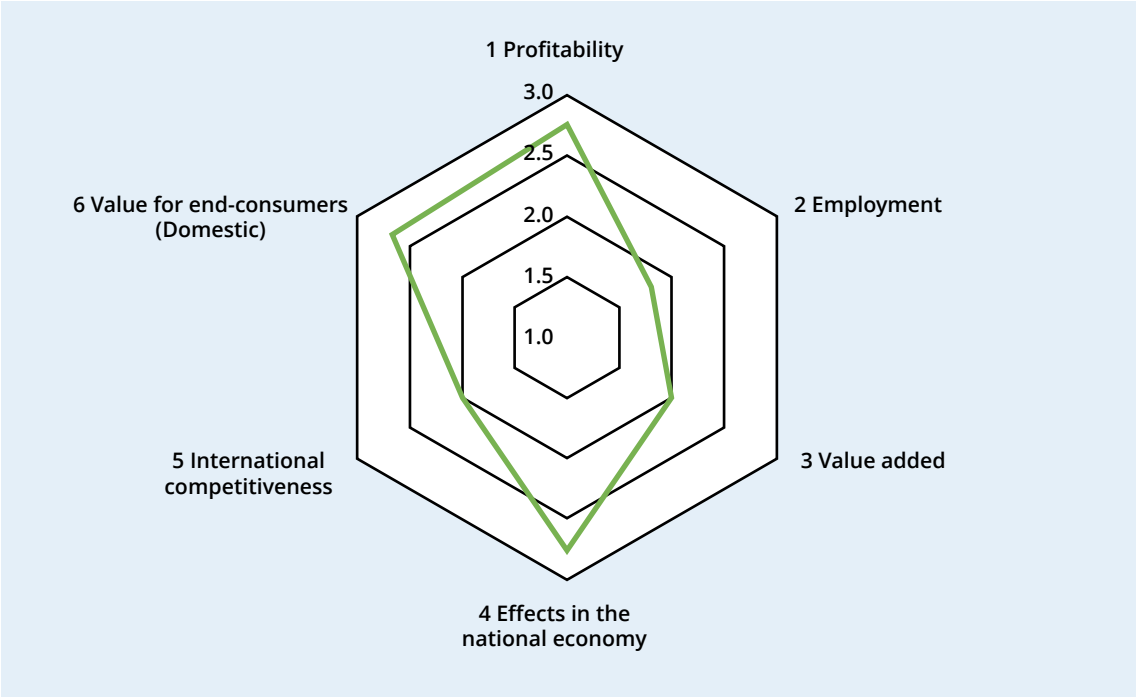
Table 1. Import parity price for Lake Tanganyika kapenta

Item	USD/kg	USD/kg
Retail price of dried kapenta in Kigoma, Tanzania in low season	8.4	
Transport cost to Zambia	0.23	
Export permit, health certificate, customs, etc.	0.17	
Import Parity Price Sub-total		8.8
Retail price of dried kapenta in Mpulungu, Zambia in low season		9

The FISH4ACP study's consumer survey suggests that more than 70 percent of the survey sample (150 consumers) eat kapenta both at home and outside. Consumers prefer dried kapenta over frozen kapenta, and would be willing to increase their consumption. The least appreciated characteristic of kapenta is its quality: poor handling techniques lead to a deterioration in the kapenta's quality, which is often not up to the consumer's standards (sand, freshness). The price of dried kapenta is now significantly higher than the prices of its **substitute products**: beans, buka buka, chicken, meat and bream. Despite this, kapenta remains an important fish for the urban and rural poor: due to its small size, kapenta is the only fish sold in Zambia that can be purchased in small volumes and thus at a low price.

Figure 4 summarizes the results of the analysis of the economic sustainability of the kapenta VC. Low scores are negative, and high scores are positive (the maximum score is 3).

Figure 4. Economic sustainability performance scores for the value chain



Social assessment

The objective of the social sustainability assessment is to measure the social impacts of the value chain's activities, both positive and negative.

Key to the underlying causes of poverty in the kapenta value chain are the social and cultural norms that define the **gender** roles in the kapenta fishery. These gender roles shape the power relations and social structures. The kapenta VC is very traditional in terms of gender roles: men fish and women mainly dry the kapenta and retail it. Female processors often have no alternative source of income other than buying and processing fish. The high workload of women (who are responsible for all domestic work, with an average family size of 6 to 8 children, have very little time) constrain women's ability to engage in other activities.

With the increased competition for reduced kapenta volumes, women are often coerced into offering sex to fishers to have access to fish. **Fish for sex** exchanges sometimes involve underage women (e.g. the daughters of female processors). The main drivers for 'fish for sex' seem to be the unequal gender relationships and perceptions around masculinity: fishers and processors interviewed by FISH4ACP explained that it is prestigious for men to have sex and impregnate as many women as possible. The very low use of condoms could be linked to the high levels of HIV and syphilis in fishing communities and a significant number of child-headed households (households of orphaned siblings headed by the older child).

The most vulnerable households in the kapenta VC are those headed by single mothers and older children (orphans). Single mothers often have no choice but to carry their children with them while searching for kapenta to buy. Child marriages are common in Lake Tanganyika's fishing communities, with vulnerable households informally offering their underage daughters in

marriage to wealthy fishers in exchange for money and with the expectation that the fisher will provide for the girl. These arrangements are informal and lead to an increase in pregnant minors.

As far as accessing resources, VC actors indicated that men and women face similar difficulties in accessing land for similar business activities such as trading and processing. Access to finance is low among the VC actors, and if there are financial services available they are not tailored to the VC. Only 32 percent of female processors had access to mobile money accounts, and none of them had a bank account. The gap in access to finance is being filled by mobile money services, which 65 percent of VC actors report using. The increasing uptake of mobile money services has allowed VC actors to transact without the need to carry around large sums of money. It is also considered to be convenient because mobile money agents are found in different locations and communities, unlike traditional banks which might have only one branch in the whole town.

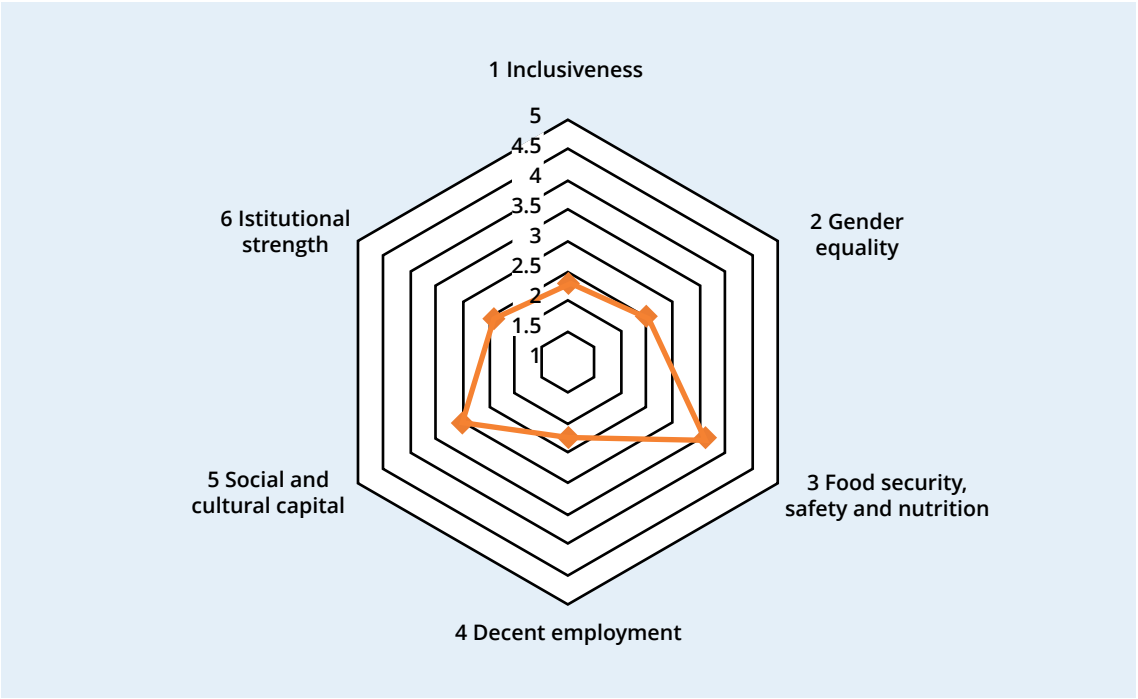
Only 7 percent of workers in the VC indicated having a written contract, with the majority (65 percent) indicating having a **verbal agreement** and the rest (28 percent) no contract at all. Therefore, it is difficult to take any action when disputes arise because the working relationship is not documented and formalized, leaving very little evidence for pursuing any claims. Most VC actors do not belong to any **association or representative body**. Time poverty and social norms limit the capacity of women to participate in associations, with 95 percent of processors not belonging to any association.

The lack of modern equipment and infrastructure to process and store kapenta leads to some spoilage. Despite this, the reported physical **losses of kapenta** are low as poor quality kapenta can still be sold (at a cheaper price) or used to feed animals. However, the **loss in value** due to selling kapenta at a cheaper price because of its low quality and/or marketing problems is high. Fishers and processors interviewed by FISH4ACP claimed to sell 34 percent and 54 percent, respectively, of their catch and processed fish for a lower than optimum price.

Over 92 percent of respondents indicated that everyone in the household has access to kapenta, but prices are increasing due to the lower volumes being landed. The increase in prices is negatively impacting low-income households' access to kapenta, while VC actors find it more lucrative to sell kapenta than to consume it. **Food security** is an issue in specific fishing communities that rely on fish as their only or primary source of income. Key informants mentioned that vulnerable households in these communities might go without a meal for two days. The annual closed fishing season, first implemented in 2023, risks having a negative impact on the food security of fishing communities, as they will not be allowed to fish between 15 May and 15 August (the high season for kapenta fishing).

A summary of the social sustainability assessment across different domains considered within the FISH4ACP methodology is presented in Figure 3. The scores range from 1 (highly concerning/ unsustainable) to 5 (not concerning/sustainable).

Figure 5. Social sustainability performance scores for the value chain



Environmental assessment

The environmental sustainability assessment aims to determine the value chain´s impacts on the natural environment.

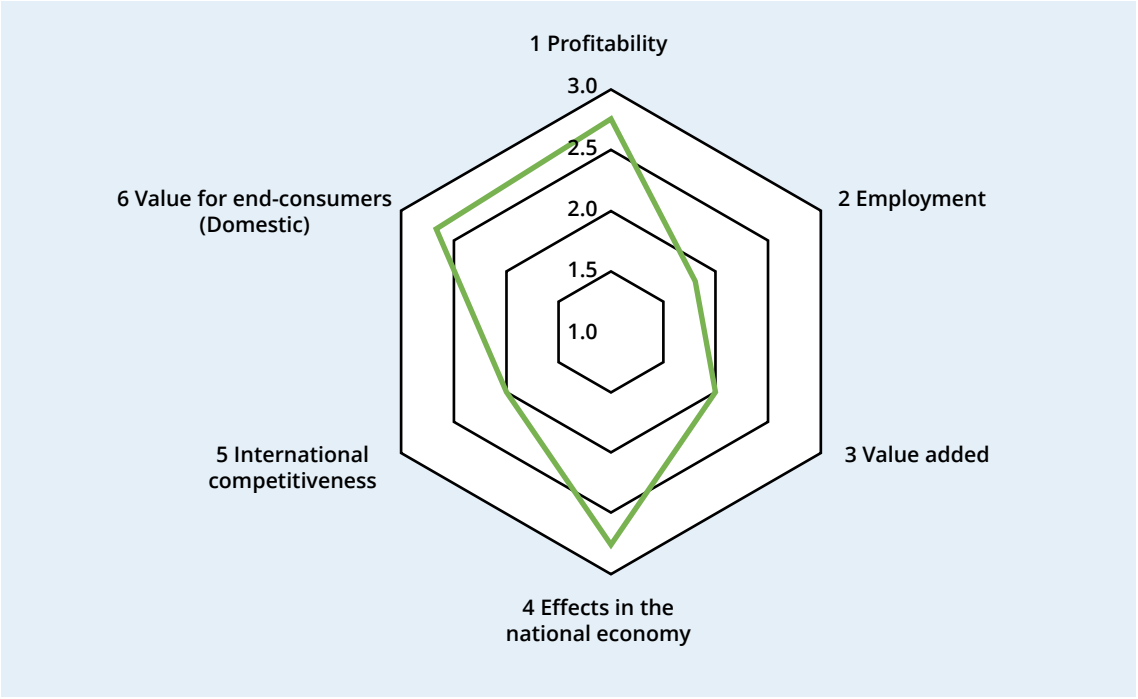
Fishing in Lake Tanganyika has increased, leading to greater competition for the available kapenta and declining returns for all participants. Around 87 percent of the answers of the FISH4ACP survey mentioned that there are more fishing boats than 5 years ago, while 72 percent of the fishers stated that their catches have decreased in volume over the last five years, and 77 percent replied that the kapenta average size is reducing. This, combined with the lack of recent stock assessmentsand recent trends on catch per unit of effort, results in the fish stock sustainability domain to be rated as concerning. With regard to the species recorded in Lake Tanganyika, according to the IUCN Red List (IUCN, 2023) – a widely recognized system for classifying species at high risk of global extinction – two are considered "endangered" (Lates angustifrons and Lates microlepis), one species is considered "vulnerable" (Latesmariae) and three species are classified as "least concern" (Hydr ocynus goliath, Citharinus gibbosus and Lates stappersii). The IUCN identifies the most common threat to these species as mortality due to fishing and the harvesting of aquatic species. These species are negatively affected by the low selectivity of the gears used to fish kapenta.

The VC analysis revealed low levels of electricity consumption in the VC. All fishers and most processors and retailers rely on solar panels for their needs. Fuel is mainly consumed for fishing activities and for the transport of dry and frozen kapenta to the market. Other combustibles recorded during the field investigation were charcoal and wood, but for domestic (cooking) purposes. Considering all value chain activities, the carboon footprint is 0.6 kg CO2 per kg of end-product. Almost no VC actors use cool boxes or ice for their fish. The water footprint is thus negligible as only cold storages and one-fifth of the traders use a limited amount. Considering the low of use of water by the VC, its pollution and treatment is not a current concern.

The assessment of **food loss** in the value chain considers the loss at fishing, processing, wholesale and exporting functions, and aims to estimate what share of production does not reach the retail level. The kapenta actors experience commodity losses, estimated at a total of 11 percent in fresh equivalent weight across the entire VC, during both fishing and post-harvest handling (processing, packaging, storage and transportation). Most fishers store the captured kapenta directly at the bottom of their boats, which leads to losses and contamination of the kapenta: losses are greater on rainy days, during extended fishing trips and when large volumes are captured. Processors face significant losses on rainy days as most of them dry kapenta on the ground. Another source of losses mentioned is the power cuts for cold storage facilities. Food waste[4] refers to the fish lost in the retail and consumption functions of the value chain, and is estimated to be 5 percent for the kapenta VC, mainly associated with the poor quality of dried kapenta and bad packaging protection from humidity.

A summary of the environmental sustainability assessment across different domains considered within the FISH4ACP methodology is presented below. The scores range from 1 (highly concerning/ unsustainable) to 3 (not concerning/sustainable).

Figure 6. Environmental sustainability performance scores for the value chain



Resilience assessment

The most relevant shocks mentioned by VC actors are storms on the lake, leading to large waves and strong winds. Storms occur during two periods each year: between July and August (dry season) and between December and January (rainy season). They severely affect fishers who must choose between going fishing and risking death, or staying safe ashore and making no income to feed their families. Many stay ashore, which leads to increased hunger at the family and community level.

[4] Definition based on SDG Sub-Indicator 12.3.1.b (http://www.fao.org/sustainable-development-goals/indicators/1231/en/).

The VC's resilience to shocks is assessed across six domains: redundancy, diversity, connectivity, collaboration and governance, learning and adaptation, and participation and inclusion. According to the actor interviews, **redundancy is very low** because VC actors have no or very limited storage capacity and a very low level of savings to tap into in case of shock. The VC has a **low diversity** of value-added products, production systems and technologies, and thus no alternatives in case a shock disrupts these. **Connectivity is very low**, with a lack of reliable physical infrastructure and access to the internet. The levels of **participation, inclusion and collaboration** among our VC actors in the event of a shock seems to be low, with several actors replying to our interviews that in case of hardship it is "*each one for themselves*". Most actors mentioned not receiving support from the government to recover or cope with shocks, but a minority of respondents were beneficiaries of the government's Social Cash Transfer programme and found it very effective (Arruda and Dubois, 2018). The VC levels of **learning and adaptation are very low** as most actors' response to shocks is reactive, and with around 83 percent of fishers and 53 percent of processors still suffering from the impacts of the last storm.

Sustainability heat map

The **sustainability heat map** provides a synthesis of the economic, social and environmental sustainability assessments, and the resilience analysis. Red means highly concerning, yellow means concerning and green means no concern.

Table 2. Kapenta value chain sustainability and resilience heat map

Economic Sustainability	Social Sustainability	Environmental Sustainability
Net income	Wage & employment distribution	Electricity use
Trend in net income	Value added distribution	Fuel Consumption
Return on sales	Poverty and vulnerability	Carbon footprint
Return on investment	Discrimination	Renewable clean energy use
No. of jobs in FTE	Women's economic involvement	Water and ice consumption
No. of full-time jobs	Gendered division of labour	Water pollution & wastewater treatment
Average gross wage paid to hired workers	Gendered access to productive resources	Stock status and stock dynamics
Total value of net wages	Women's decision-making and leadership	Fishing pressure
Direct value added at VC level	Availability of food	Impact on associated species
Indirect value added at VC level	Accessibility of food	Status of vulnerable ecosystems
Total value added	Utilization of food	Status of ETP species
Net impact on the balance of trade	Stability of food	Application of biosecurity measures

(cont.)

Economic Sustainability	Social Sustainability	Environmental Sustainability
Net impact on public funds	Respect of labour rights	Appropriate animal husbandry and handling
National protection coefficient	Child and forced labour	Responsible use of drugs and chemicals
Food safety violations	Job safety and security	Air pollution
Consumer price benefit surplus	Job attractiveness	Inorganic solid waste pollution
Consumer evaluation	Collective action	Organic solid waste pollution
Price relative to substitutes	Coordination of transactions	Food loss
	Social cohesion	Food waste
	Cultural traditions	
	Policy, regulations and standards	
	Access to finance	
	Access to natural resources	
	Access to information	
Resilience		
Redundancy	Diversity	Connectivity
Collaboration and governance	Learning and adaptation	Participation and inclusion

4. Upgrading strategy

SWOT analysis

An analysis of the strengths, weaknesses, opportunities and threats (SWOT) of the VC was performed at the FISH4ACP inception workshop in a participatory manner. The SWOT analysis was further developed to include the new strengths, weaknesses, opportunities and threats identified through the data gathering, validation workshop and discussions with experts and VC actors.

Table 3. SWOT analysis of the Lake Tanganyika sprat and sardine value chain

Strengths (internal)

- Wide availability of kapenta fishing skills in lacustrine communities.
- Low investment cost of fishing and processing (using current production methods).
- Kapenta being small can be dried quickly.
- Availability of cold rooms for freezing kapenta.
- Main source of income for lacustrine communities.
- Wide availability of labour willing to work with kapenta in fishing communities around the lake.

Weaknesses (internal)

- Lack of adequate transport for kapenta.
- Quality issues limit access to markets.
- Widespread use of illegal gear due to poverty, political interference and weak enforcement.
- Limited management of lake-wide kapenta fishery leading to uncertain sustainability of kapenta stocks.
- Inadequate government funding for monitoring and enforcement of the kapenta fishery.
- Weak lake management by the public sector (need for improved regulation and enforcement).
- Deficient environmental management of the lake.
- Women coerced into unprotected 'fish for sex' potentially linked to a high prevalence of HIV and STDs.
- Decision-making often monopolised by men.
- Very few actors have bank accounts or insurance.
- Children neglected when parents go fishing/buying.
- Significant number of child-headed households, with underage children having no choice but to work, being vulnerable to 'fish for sex'.
- Low levels of resilience against shocks affecting fishing communities, the main reported shock being storms: fishers have to choose between going fishing and risking death, or staying safe ashore and making no income to feed their families.
- Most kapenta processors dry kapenta on the ground, which negatively impacts the quality of kapenta on rainy days.
- A significant number of actors are below the poverty line and earn below or around the national minimum salary.
- Lack of investment in the VC due to limited financial resources of VC actors.

Opportunities (external)

- High demand for kapenta in Zambia and Democratic Republic of the Congo.
- Potential untapped market for larger kapenta sizes.
- Nutritional content of kapenta.
- Kapenta originates in Lake Tanganyika and the popular larger-sized kapenta only grows in Lake Tanganyika.
- Kapenta has a fast reproductive cycle.

Threats (external)

- Tanzanian kapenta imported into Zambia by its districts on Lake Tanganyika being cheaper than the Zambian kapenta fished and landed on the Zambian shores of Lake Tanganyika.
- Competition from cheaper substitutes.
- High prevalence of infectious diseases, like HIV, syphilis and waterborne diseases, among lacustrine communities.
- Lack of adapted finance and insurance services.
- Low presence of banks and insurance companies around the lake.
- Limited infrastructure (roads, electricity grid...).
- Lake Tanganyika is extremely sensitive to changes in climate (especially temperatures and winds), since temperature drives the stratification of the lake (including the thermocline, nutricline and oxycline depths).

Ten-year vision for the kapenta value chain in Zambia

A shared and agreed vision for the value chain that is considered achievable and realistic was developed at the FISH4ACP inception workshop. Building on the SWOT analysis, participants developed the following vision for the kapenta VC:

"By 2032, there will be a well-managed kapenta fishery and organized, inclusive, transparent value chain with access to improved technology, services and information, supplying more, stable and better markets, contributing to improved living standards, reduced malnutrition and reduced vulnerability of women."

The vision is aligned with the National Fisheries and Aquaculture (2022 – 2026) objective to "transform the fisheries and aquaculture subsector in order to enhance sustainable fisheries and aquaculture development". FISH4ACP also supports the National Fisheries and Aquaculture Policy Implementation Plan vision for "an efficient, competitive, sustainable and export-led fisheries and aquaculture subsector", specifically Objective 1: To promote sustainable fish production and productivity; Objective 2: To strengthen fisheries and aquaculture extension service delivery; Objective 4: To enhance market linkages for fish and fish products; Objective 6: To prevent and mitigate environmental degradation; and Objective 7: To maintain cross-cutting issues in fisheries and aquaculture.

Theory of Change

The proposed upgrading strategy to achieve the vision is summarized in the Theory of Change (ToC) in Figure 7. The ToC covers the whole upgrading strategy up to the achievement of the ten-year vision: its implementation extends beyond the duration of the FISH4ACP project. The ToC was developed by the FISH4ACP team in 2023, building on contributions provided by key stakeholders, and was validated at the planning workshop held in Mpulungu in 2023. The ToC is structured around three core areas, as set out below:

1. **VC actors adopt improved practices and have better market access for kapenta products**

   A market study will identify relevant market opportunities and clarify the requirements linked to these markets (quality, price, volumes, type of processing, etc.). The results of the study will be used to develop a business and marketing strategy that sets out how to reach prospective buyers and to engage them to become customers of Lake Tanganyika's kapenta. Carefully chosen actors will receive support on how to reach the selected markets (training, improved equipment and materials, etc.). In parallel, VC actors' access to finance will be improved through adapted mechanisms, and the governance of the VC will be improved through the strengthening of its multi-stakeholder partnership MPUNSA[5].

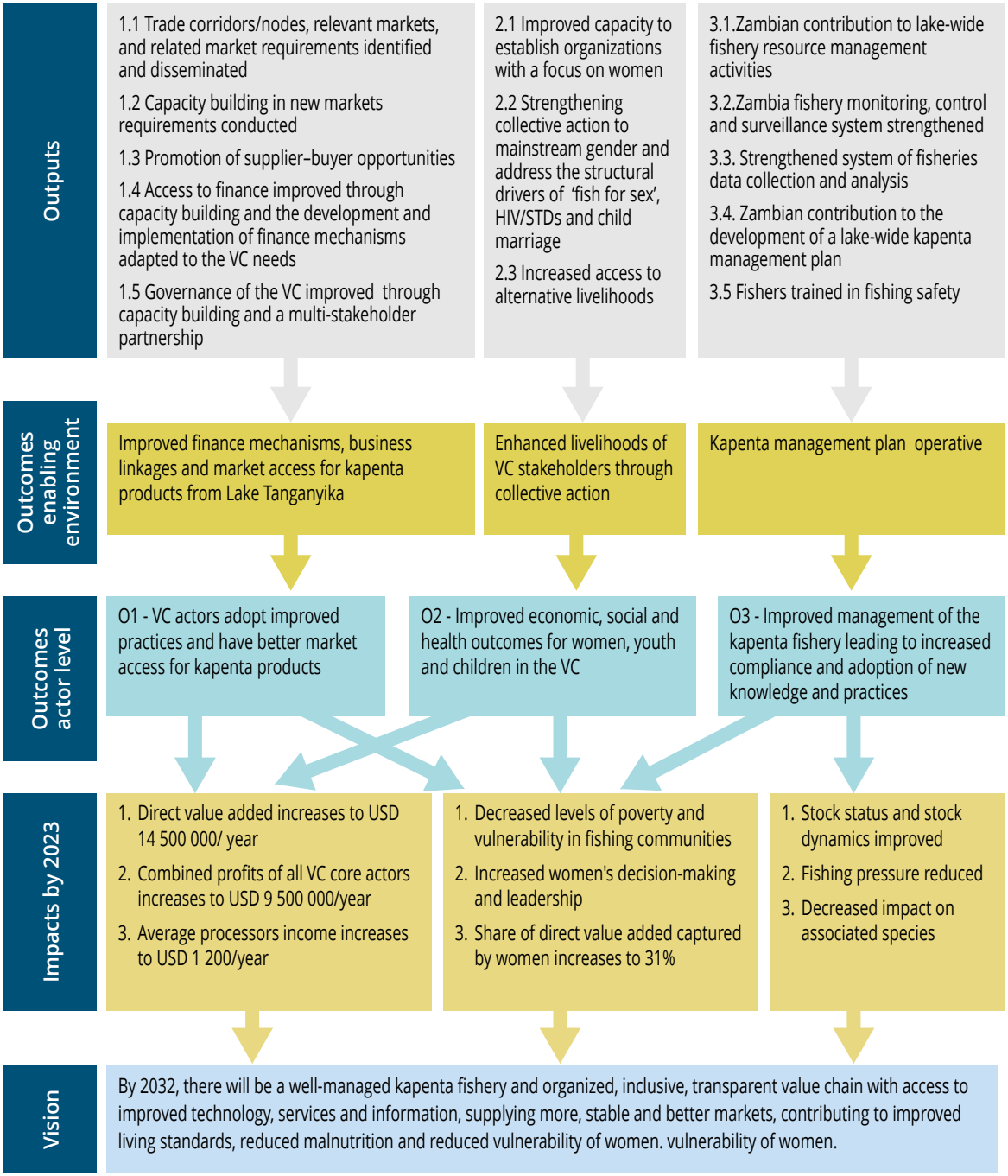
2. **Improved economic, social and health outcomes for women, youth and children in the VC**

   As described in Section 3, the most vulnerable households in the kapenta VC are those headed by single mothers and teenagers, and poverty is highest among processors, the majority of whom are women. Levels of poverty and vulnerability in fishing communities will be decreased by supporting women in establishing business organizations and saving groups. The structural drivers of 'fish for sex', HIV/STDs and child marriage will be identified,

[5] MPUNSA was created in 2022 with the support of FISH4ACP. Its members represent all levels of the kapenta VC and both of Lake Tanganyika's districts: Nsama and Mpulungu.

and collective action will be strengthened to address those by engaging with community leaders and communities through radio clubs, peer educator programmes and community theatre. At the same time, VC actors will be offered training and support (equipment and materials) to engage in alternative livelihoods with the aim of decreasing their over-reliance on kapenta as their primary source of income.

Figure 7. Theory of change for kapenta value chain



3. **Improved management of the kapenta fishery leading to increased compliance and adoption of new knowledge and practices**
   VC actors consistently report being concerned by the observed decrease in the volumes of kapenta captured. The lack of a formal kapenta stock assessment hinders gaining an understanding of the status and trend of the stocks. To increase the sustainability of the kapenta stocks, a kapenta management plan is to be created and implemented. In parallel, the monitoring, control and surveillance (MCS) system and the fisheries data collection and analysis system are to be strengthened. Finally, Zambia is to contribute to the lake-wide kapenta resource management activities, led by the Lake Tanganyika Authority (LTA), by performing timely frame surveys and catch assessments and contributing to the kapenta stock assessment. To reduce the risk of loss of life due to storms and to increase community resilience, fishers will be supported in their access to capacity building on fishing safety.

Table 4 summarises the key economic, social and environmental impacts expected if the upgrading strategy is implemented successfully.

Table 4. Key economic, social and environmental performance indicators under current and upgraded situations (aggregated at value chain level)

Sustainability impacts of upgrading	Baseline	2025	2032
Economic indicators			
Direct value added of the VC (USD/ year)	12.5 million	13.5 million	14.5 million
Combined profits of all VC core actors (USD/year)	7.5 million	8.5 million	9.5 million
Social indicators			
Average processor income (USD/ year)	154	845	1'202
Share of direct value added captured by women (as business owners and workers)	25%	29%	31%
Environmental indicators			
Stock status	Stock status unknown	Stock assessment taking place	Stock status known

The implementation of the upgrading strategy will have a positive impact on the resilience of the VC. Redundancy will increase, as the increased profits and better finance knowledge should have a positive effect on the VC actors' ability to save. The VC diversity of value-added products, production systems and technologies will increase by, for example, avoiding the over-reliance on a single processing method that is ineffective on rainy days (drying kapenta on the ground). The levels of participation, inclusion and collaboration among VC actors will increase by the creation of new groups and the capacity building on establishing and running organisations. In addition, fishers will be trained in fishing safety: the skills learnt will improve their ability to deal with storms, the main shock affecting fishing communities around the lake.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5. Implementation plan

The proposed strategy has been designed in close coordination with national authorities, partner agencies and VC actors. This is a ten-year strategy encompassing the entire kapenta from the Lake Tanganyika VC, and it extends beyond the end of the FISH4ACP project. To achieve the expected objectives, the FISH4ACP project, partner agencies, national authorities and the private sector must combine their technical and financial efforts. Table 3 provides a list of the activities designed to achieve the outputs and outcomes proposed in the above ToC and ultimately the ten-year vision.

Table 5. Summary of upgraded activities and investments

		Funding Source	Total Costs (USD)	Type of Cost	Timing
Outputs	**Activities**				
1.1Relevant markets, and related market requirements identified and disseminated	1.1.1 Conduct a market/trade study and develop a business strategy	FISH4ACP	25 000	Studies	2023
		Government	8 600		
	1.1.2 Produce simplified guide on new market opportunities for actors.	FISH4ACP	5 000	Facilitation	2023
		MPUNSA	6 100		
		Government	1 150		
	1.1.3 Disseminate study results and guide	FISH4ACP	10 000	Facilitation	2023
		Government	2 800		
1.2 Capacity building in new market requirements conducted	1.2.1 Identification of VC actors interested in improving their business, and matching them with interventions	Donors	10 000	Facilitation	2023 - 2024
		FISH4ACP	5 000		
		Government	1 150		
	1.2.2 Development of training programme in new market opportunities and improved practices.	FISH4ACP	20 000	Training	2023 - 2024
		Donors	5 000		
		Government	1 000		
	1.2.3 Training of VC actors in new market opportunities and improved practices	FISH4ACP	50 000	Training	2024
		Donors	20 000		
	1.2.4 Support to local suppliers of improved technology and services	FISH4ACP	20 000	Facilitation	2024
	1.2.5 Support VC actors' access to technology and related skills needed to fulfil the targeted markets	Donors	100 000	Equipment	2024
		FISH4ACP	50 000		
	1.2.6 VC actors' access to equipment, infrastructure technologies and related skills needed to fulfil markets	Private sector / Donors	2 000 000	Equipment	2026 - 2032

(cont.)

Outputs	Activities	Funding Source	Total Costs (USD)	Type of Cost	Timing
1.3 Promotion of supplier–buyer opportunities	1.3.1 Development of a marketing strategy	FISH4ACP	30 000	Studies	2024
	1.3.2 Implementation of the marketing strategy	FISH4ACP	30 000	Facilitation	2024 - 2025
		Government	5 000		
	1.3.3 Support establishing Business to Business linkages between suppliers and buyers in the new targeted markets	FISH4ACP	5 000	Facilitation	2024 - 2025
		MPUNSA	2 000		
		Government	1 000		
1.4 Access to finance improved through capacity building and the development and implementation of finance mechanisms adapted to the VC needs	1.4.1 Development of capacity building programme to support actors access to finance	FISH4ACP	40 000	Training/ Facilitation	2023 - 2024
		Government	4 500		
	1.4.2 Implementation of capacity building programme to support actors access to finance	FISH4ACP	30 000	Training	2024
		Government	4 100		
	1.4.3 Formation of savings groups	FISH4ACP	30 000	Facilitation	2024
		MPUNSA	3 500		
	1.4.4 Savings group member's capacity building on medium-long business growth and diversification planning	FISH4ACP	25 000	Training	2025
		Government	4 000		
	1.4.5 Finance product development/ customization for groups and individuals	FISH4ACP	10 000	Facilitation	2024
		Government	3 000		
	1.4.6 Seminars to introduce finance products to actors	FISH4ACP	10 000	Facilitation	2024
		Government	5 000		
	1.4.7 Facilitation of linkages of actor groups to finance service providers	FISH4ACP	10 000	Facilitation	2024
		Government	4 000		

(cont.)

Outputs	Activities	Funding Source	Total Costs (USD)	Type of Cost	Timing
1.5 Governance of the VC improved through capacity building and a multi-stakeholder partnership (MSP)	1.5.1 MSP conduct quarterly meetings	FISH4ACP	20 000	Facilitation	2023 -2025
		MPUNSA	2 300		
		Government	500		
	1.5.2 MSP participate in national stakeholder meetings	FISH4ACP	10 000	Facilitation	2023 - 2025
		MPUNSA	600		
		Government	500		
	1.5.3 Mobilization of communities, traditional and civic leaders	FISH4ACP	30 000	Facilitation	2023 - 2025
		MPUNSA	10 350		
		Government	8 000		
	1.5.4 Capacity building and institutionalisation of MPUNSA MSP	FISH4ACP	15 000	Facilitation	2023 - 2025
		Government	3 000		
		MPUNSA	2 000		
	1.5.5 Develop training modules for the training centre in Nsumbu.	Donors	30 000	Training	2024 - 2025
		FISH4ACP	5 000		
	1.5.6 Ensure sustainability of training centre in Nsumbu	Donors	300 000	Training	2023 - 2032
		Government	200 000		
2.1 Improved capacity to establish organizations with a focus on women	2.1.1 Assessment of existing women groups	FISH4ACP	10 000	Studies	2023
		Government	4 830		
		Non-profit organizations	1 840		
	2.1.2 Development of a capacity building programme to improve organizational skills	FISH4ACP	7 000	Facilitation	2023
		Non-profit organizations	800		
	2.1.3 Training of trainers (ToT) on group formation and group sustainability	FISH4ACP	8 000	Training	2023
		Donors	4 000		
		Government	1 000		
	2.1.4 Training of women on group formation and group sustainability	FISH4ACP	10 000	Training	2024
		Donors	3 000		
		Government	1 725		

(cont.)

Outputs	Activities	Funding Source	Total Costs (USD)	Type of Cost	Timing
2.2 Strengthening collective action to mainstream gender and address the structural drivers of 'fish for sex', HIV/STDs and child marriage	2.2.1 Identification of structural drivers of 'fish for sex', HIV/STDs and child marriage	FISH4ACP	10 000	Studies	2023-2024
		Government	3 000		
		Non-profit organizations	2 000		
	2.2.2 Awareness raising for traditional and community leaders on HIV/STDs, 'fish for sex' and child marriage.	FISH4ACP	10 000	Facilitation	2024
		Government	3 450		
		Non-profit organizations	2 630		
	2.2.3 Development of action plans with the community leaders	FISH4ACP	10 000	Facilitation	2024
		Government	3 450		
		MPUNSA	2 400		
	2.2.4 Implementation of action plans through peer educators and change agents	FISH4ACP	80 000	Training	2024 - 2025
		Non-profit organizations	10 500		
		Government	5 750		
	2.2.5 Develop community theatre play capturing structural drivers of 'fish for sex', HIV/STDs and child marriage	FISH4ACP	21 000	Facilitation	2024
	2.2.6 Rehearsals of the theatre play by trained community volunteers	FISH4ACP	3 400	Training	2024
	2.2.7 Performing the theatre play	FISH4ACP	20 000	Facilitation	2024-2025
		Government	2 350		
	2.2.8 Forum theatre results restitution and adaptation of action plans	FISH4ACP	1 000	Facilitation	2025
	2.2.9 Creation of community radio listening clubs	FISH4ACP	30 000	Equipment	2024 - 2025
		Government	8 850		
	2.2.10 Production of radio programmes	FISH4ACP	10 000	Facilitation	2024 - 2025
		Government	3 500		
	2.2.11 Training, facilitating, coaching and monitoring DIMITRA clubs in 10 pilot fishing communities	FISH4ACP	100 000	Facilitation	2024 - 2025
		Non-profit organizations	15 000		
		Government	10 000		
	2.2.12 Technical training on gender-based constraints developed	FISH4ACP	10 000	Training	2023 - 2025
		Donors	5 000		

(cont.)

Outputs	Activities	Funding Source	Total Costs (USD)	Type of Cost	Timing
2.3 Increased access to alternative livelihoods	2.3.1 Assess the alternative livelihoods options and preparation of an action plan	Donors	20 000	Studies	2023 - 2024
		FISH4ACP	6 000		
	2.3.2 Implementation of alternative livelihoods	FISH4ACP	70 000	Equipment	2024 - 2025
		Donors	70 000		
		Government	10 000		
3.1 Zambian contribution to the lake-wide fishery resource management activities	3.1.1 Zambia contribution to lake-wide fish stock assessment	FISH4ACP	30 000	Studies	2023 - 2025
	3.1.2 Purchase equipment required for the implementation of the lake-wide fish stock assessment	LTA and member countries	180 000	Equipment	2023
	3.1.3 Conduct lake-wide (regional) fish stock assessment and finalize reports	LTA and member countries	360 000	Studies	2023 - 2032
	3.1.4 Conduct frame survey according to lake-wide approach	FISH4ACP	14 000[1]	Studies	2023
		Government	5 600		
	3.1.5 Conduct Catchment Assessment Survey according to lake-wide approach	LATAFIMA	10 000	Studies	2023
		Government	5 000		
3.2 Zambian fishery monitoring, control and surveillance system strengthened	3.2.1 Consultation meeting to review and evaluate the co-management structures of Lake Tanganyika	Donors	8 000	Facilitation	2023
		FISH4ACP	4 000		
		Government	2 000		
	3.2.2 Assess the MCS systems and propose upgrading improvements	FISH4ACP	7 000	Facilitation	2024
		Donors	5 000		
	3.2.3 Purchase, maintenance and operation of a patrol boat	Government	90 000	Equipment	2023-2032
		FISH4ACP	50 000		
	3.2.4 Training of fisheries officers and relevant stakeholders in MCS	LATAFIMA	13 000	Training	2024
		Government	3 000		
	3.2.5 Conduct MCS community communication campaigns	FISH4ACP	7 000	Facilitation	2024 - 2025
		Government	3 500		
	3.2.6 Conduct annual evaluations of the MCS system on Lake Tanganyika	FISH4ACP	7 000	Facilitation	2025-2032
		Government	3 000 (by 2025) 75 000 (2026 – 2032)		

(cont.)

Outputs	Activities	Funding Source	Total Costs (USD)	Type of Cost	Timing
3.3 Strengthened system of fisheries data collection and analysis	3.3.1 Assessment and upgrading of kapenta data collection methods, records and database system.	FISH4ACP	10 000	Facilitation	2023
		Government	1 500		
	3.3.2 Training of DoF staff on kapenta data collection, field practical methodologies and report development	FISH4ACP	10 000	Training	2023
		Government	1 150		
	3.3.3 Purchase of equipment for data collection and storage	FISH4ACP	10 000	Equipment	2024
	3.3.4 Quality assurance process set up and implemented (quarterly checks)	FISH4ACP	5 000	Facilitation	2024 - 2025
		Government	1 000		
	3.3.5 Annual review of data analysis and reporting by external specialist	FISH4ACP	5 000	Facilitation	2025- 2032
		Government	2 000 (by 2025) 49 000 (2026 – 2032)		
	3.3.6 Production of communication materials on annual data analysis through publications and website	FISH4ACP	3 000	Facilitation	2024 - 2032
		Government	2 000		
3.4 Zambian contribution to the development of a lake-wide kapenta management plan	3.4.1 Training of DoF staff, VCDCs and other relevant stakeholders in the EAF	FISH4ACP	7 000	Training	2024
		Government	2 500		
		MPUNSA	2 000		
	3.4.2 Formulation of a baseline for the kapenta fishery	FISH4ACP	12 000	Facilitation	2024
		Government	1 600		
	3.4.3 Hold consultation meeting with stakeholders to define the objectives of the management plan	FISH4ACP	20 000	Facilitation	2024
		Government	3 000		
	3.4.4 Develop draft zero of the Kapenta Management Plan	FISH4ACP	15 000	Facilitation	2024
	3.4.5 Finalization, validation and dissemination of management plan	FISH4ACP	10 000	Facilitation	2024 - 2025
		Government	2 500		
	3.4.6 Implementation of Kapenta Management Plan in Zambia	Government	250 000	Facilitation	2025 - 2032
	3.4.7 Review of the Kapenta Management Plan and its implementation in Zambia	Government	130 000	Facilitation	2026 - 2032
	3.4.8 Conduct annual communication campaigns through the kapenta day commemorations at the World Fisheries Day	FISH4ACP	20 000	Facilitation	
		Government	95 000		
		MPUNSA	5 000		

(cont.)

Outputs	Activities	Funding Source	Total Costs (USD)	Type of Cost	Timing
3.5 Fishers trained in fishing safety	3.5.1 Dedicated training programme ToT on fishing safety available online	FISH4ACP	5 000	Facilitation	2024
		Government	1 000		
	3.5.2 Development of training materials for fishers with low literacy levels	FISH4ACP	5 000	Facilitation	2024
		Government	2 500		
	3.5.3 ToT on fishing safety for fishers (5d)	FISH4ACP	20 000	Training	2024
		Government	3 500		
	3.5.4 Improving the safety equipment for fishing	FISH4ACP	10 000	Equipment	2024
	3.5.5 Training fishing communities in fishing safety and DIY pumps	FISH4ACP	20 000	Training	2024 - 2025
		Government	5 500		

Activities financed by:

FISH4ACP | Non-profit organizations | Government | LTA and member countries

MPUNSA | LATAFIMA | Donors | Private sector

Outcomes	Budget total
Outcome 1 – VC actors adopt improved practices and have better market access	3 234 150
Outcome 2 – Improved economic, social and health outcomes for women, youth and children in the VC	611 475
Outcome 3 – Improved management of the kapenta fishery leading to increased compliance and adoption of new knowledge and practices	1 629 850
Overall Total	**5 475 475**

Drawing on the information provided above, the investment table (Table 4) below provides an overview of the investments needed to realize the vision and how these investments are expected to be financed. The investments identified in Table 4 are indicative and will need to be confirmed by the various parties involved.

(cont.)

Table 6. Value chain upgrading investment table

	Financing Sources (in USD)								
Type of Investment	FISH4ACP	Government	LTA and member states	MPUNSA	Donors	Private sector - donors	Non-Profit Organizations	LATAFIMA	Totals by Type of Investment
Studies	125 000	27 030	360 000	0	20 000	0	3 840	10 000	545 870
Facilitation	524 000	682 450	0	34 250	23 000	0	18 430	0	1 282 130
Training	298 400	233 225	0	2 000	367 000	0	10 500	13 000	924 125
Equipment	220 000	108 850	180 000	0	170 000	2 000 000	0	0	2 678 850
Training and facilitation	40 000	4 500	0	0	0	0	0	0	44 500
Totals by source of funding	1 207 400	1 056 055	540 000	36 250	580 000	2 000 000	32 770	23 000	5 475 475

A total investment of USD 5.4 million is estimated to be required to achieve the ten-year vision, for equipment, facilitation, studies and training. Around USD 2.5 million of the investment would support the modernization of the equipment used by the value chain. A significant proportion of this should be financed by the private sector within the VC, in some cases with donor support. FISH4ACP will provide USD 1.2 million towards the budget.

On Table 7, several **risks to the successful implementation of the upgrading strategy** have been identified and assessed for their likelihood and potential impact.

Table 7. Risks associated with the upgrading strategy

Risk description	Likelihood (1-5)	Impact (1-5)	Overall Risk (1-25)	Mitigation
Political interference during activity implementation	4	4	**16**	Continued sensitizations of traditional and civic leaders prior to activity implementation. Strong collaboration between government departments.
The recently implemented seasonal closure of the lake to fishing efforts causes unpredictable changes in the functionality of the VC	4	4	**16**	Follow up the closure impacts closely. Adapt the upgrading strategy when needed.
Lack of regional resources and capacity to ensure lake wide management approach is adopted	4	4	**16**	Strong collaboration between member countries and governments in the fish stock assessment and monitoring, control and surveillance activities
The recently implemented seasonal closure of the lake to fishing efforts causes social unrest and/or hostilities against the DoF and/or FAO.	2	5	**10**	Follow up the closure impacts closely. Increased outreach to communities through MPUNSA multi-stakeholder partnership.

(cont.)

Difficult access to VC actors due to geographical barriers and poor infrastructure	4	3	**12**	Increased outreach to communities through MPUNSA multi-stakeholder partnership.
Limited adoption of new proposed technologies because of cultural beliefs, language barrier and low literacy level	4	3	**12**	Promotion of women groups for improved business strategy development through collaborative training. Engage with community leaders. Increased outreach to communities through MPUNSA multi-stakeholder partnership.

6. References

Arruda, P. & Dubois, L. 2018. *A brief history of Zambia's Social Cash Transfer Programme*

FAO. 2014. *Developing sustainable food value chains - guiding principles*. Rome. https://www.fao.org/3/i3953e/i3953e.pdf

IUCN. 2023. The IUCN Red List of Threatened Species

Kolding, J., van Zwieten, P., Marttin, F., Funge-Smith, S. & Poulain, F. 2019. *Freshwater small pelagic fish and their fisheries in the major African lakes and reservoirs in relation to food security and nutrition*. https://doi.org/10.4060/ca0843en

Lake Tanganyika Authority. 2021. *Regional charter of the member states of the Lake Tangayika Authority providing for measures for the sustainable management of fisheris in Lake Tanganyika and its basin*

LTA. 2020. Framework fisheries management plan II for the transboundary fishery resrouces of lake Tanganyika (FFMP II). (Ffmp Ii).

Ministry of Agriculture and Ministry of Fisheries and Livestock. 2016. *Republic of Zambia second national agricultural policy*. https://www.infodesign.org.br/infodesign/article/view/355%0Ahttp://www.abergo.org.br/revista/index.php/ae/article/view/731%0Ahttp://www.abergo.org.br/revista/index.php/ae/article/view/269%0Ahttp://www.abergo.org.br/revista/index.php/ae/article/view/106

Ministry of Fisheries and Livestock of Zambia. 2019. *Fish4ACP Value Chain Proposal: Zambia*

Mussa, H., Kaunda, E., Chimatiro, S., Kakwasha, K., Banda, L., Nankwenya, B. & Nyengere, J. 2017. Assessment of Informal Cross-Border Fish Trade in the Southern Africa Region: A Case of Malawi and Zambia. *Journal of Agricultural Science and Technology B*, 7(5). https://doi.org/10.17265/2161-6264/2017.05.009

Petit, P. & Shipton, T. 2012. IUU Fishing on Lake Tanganyika. *Smart Fish (IOC)*(SF/2012/15): 61. https://www.fao.org/documents/card/en/c/5e24c4d4-db34-4269-9d99-903096725e20/

Phiri, H. & Shirakihara, K. 1999. Distribution and seasonal movement of pelagic fish in southern Lake Tanganyika. *Fisheries Research*, 41(1): 63–71. https://doi.org/10.1016/S0165-7836(99)00008-9

del Rio Poza, A., Phiri, M., Blanc, P.-P., Duong, G., Kapaipi, M., Vasta, A., Ward, A. & Holvoet, K. 2023. *The Lake Tanganyika sprat and sardine value chain in Zambia: analysis and design report*. Rome, FAO.

The World Bank. 2020. Poverty & Equity Brief, Zambia. https://databankfiles.worldbank.org/public/ddpext_download/poverty/987B9C90-CB9F-4D93-AE8C-750588BF00QA/current/Global_POVEQ_ZMB.pdf

This report presents the results of the value chain analysis of the Lake Tanganyika sprat, sardine and perch value chain in Zambia conducted by the value chain development programme FISH4ACP in 2022-2023. This report contains a functional analysis of the value chain, assesses its sustainability and resilience, develops an upgrading strategy and an implementation plan to which FISH4ACP will contribute.

FISH4ACP is an initiative of the Organisation of African, Caribbean and Pacific States (OACPS) aimed at making fisheries and aquaculture value chains in twelve OACPS member countries more sustainable. It contributes to food and nutrition security, economic prosperity and job creation by ensuring the economic, social and environmental sustainability of fisheries and aquaculture in Africa, the Caribbean and the Pacific.

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