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Market Assessment for farmed fish in Uganda

(with a focus on practical distribution requirements & buyer relationships)

PESCA MAOPE Activity 3.1.1.1

UGANDA

FINAL REPORT

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Agrotec spa

In Association with

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Disclaimer

Acronyms & Abbreviations

AfDB	African Development Bank
AFIPEK	Association of Fish Processors & Exporters Kenya
BMZ	Bundesministerium für Entwicklung und Zusammenarbeit
CAR	Central African Republic
CGIAR	Consultative Group on International Agricultural Research
DAMD	Department of Aquaculture Management & Development
DiFR	Directorate of Fisheries Resources
DRC	Democratic Republic of Congo
DSIP	Agriculture Sector Development Strategy and Investment Plan
EAIFFPA	East Africa Industrial Fishing and Fish Processing Association
EDF	European Development Fund (e.g. 11th EDF)
EU	European Union
FAO	Food and Agriculture Organization (of the United Nations)
FTI	Fisheries Training Institute
GoU	Government of Uganda
GDP	Gross Domestic Product
GIFT	Genetically-improved farmed tilapia
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GmbH)
IUCN	International Union for Conservation of Nature
IUU	Illegal, Unreported, and Unregulated Fishing
JFFA	Jinja Fish Farmers Association
KARDC	Kajjansi Aquaculture Development Research Centre
Km^2	Square Kilometres
MAAIF	Ministry of Agriculture, Animal Industry & Fisheries
MAOPE	Multi-annual operational programme estimate under the EU PESCA project
MoU	Memorandum of Understanding
Mukene	Local name in Uganda for silver cyprinid (*Rastrineobola argentea*)
NAO	National Authorising Officer
NARO	National Agricultural Research Organisation
PESCA	Promoting Environmentally Sustainable Commercial Aquaculture in Uganda Project
SON	Source of the Nile Fish Farm
Mt	Metric tonnes (1,000 kg)
TIFPA	Tanzania Industrial Fishing and Processors Association
UCFFA	Uganda Commercial Fish Farmers Association
UFPEA	Uganda Fish Processors and Exporters Association
UN	United Nations
VAT	Value-added tax
WAFICOS	Walimi Fish Farmers' Cooperative Society

EXECUTIVE SUMMARY

This market assessment for farmed fish in Uganda is part of the Promoting Environmentally Sustainable Commercial Aquaculturein Uganda Project (PESCA) under Result 3: Activity 3.1.1.1. The study commenced with one consultant (STE) and then continued with another for its final completion in July 2019.

The overall intention of this study, despite providing background on current market conditions for farmed fish in Uganda, is to focus on defining practical interventions that PESCA can provide also under Result 3, where distribution infrastructure in selected locations is the key output together with understanding the investors categories that might be attracted to these recommended interventions. The title of the study outlines this clearly: "…*with a focus on practical distribution requirements & buyer relationships".*

The results and recommendations herein focus, therefore, on such proposed interventions. How these investments are realised is subject to further activties under Result 3, where detailed feasibility studies and business planning studies will be developed before deciding on the final activities to be pursued with the Project's funds.

These recommendations are formulated with an extensive analysis of the current and expanding situation in Uganda for aquaculture and importantly in the region, where neighbouring countries are also attempting to expand their sub-sectors. Generally, with expanding populations in the country, as well as in the region, and with an environment conducive to producing farmed fish, it sets the context for this study well.

Potential demand in Uganda can only be calculated with estimated per capita cnsumption, which according to Government estiamtes is 8.6 Kg per year per person. With an approximate population of 45 Million, this equals consumption of fish of 387,000 t. This figure is for farmed fish, captured fish and imported fish. Capture fisheries estimate 480,000 t. Export statistics indicate that about 20,000 t are exported, but it is thought to be a larger volume that this. Meanwhile production from fish farming is recorded as approxiamtely 110,000 t. To interpolate demand/ potental consumption from these figures is not possible with any accuracy, but with population growth and assumed continued ability to buy fish as a protein source, expansion of farmed fish is to be the source of future consumption. As reported herein, the production figures for farmed fish are not clear and based on estimates, which are potentially overstated.

A potential challenge within this scenario is that the most popular and suitable fish species for expansion are Nile tilapia and African catfish, also the focus of neighbouring country aquaculture development strategies, with few other options being considered seriously at this time. This establishes confirmation for these species as suitable, but competitively has some cause for concern given competition will be aggressive from all countries that are also potential markets for Uganda farmed fish.

PESCA comes at a time and has been formulated based on a sub-sector that is undeveloped in terms of its sophistication and also one facing many challenges. Largely these are related to how the sector has

developed with wide-spread small-scale producers, who generally are not doing very good business due to a lack of understanding of th technical aspects of the industry and lacked appreciation of market challenges during their investment decision process. Additionally the structural and input development statusw of the value chains for farmed fish are poorly developed and generally causing the sector to lag behind expectations. In this context the market side focused on farm fish is hardly shaped at all.

Also within this context, as an aggressive private sector emphasis, the Project is hoping to attract investors to various value chain activities; clearly there is a mismatch between between the sector's development status and so investor interest that has to be nurtured and encouraged well.

Attracting larger investors to Uganda is a focus from MAAIF, but with this potential success may also come changes the market structure and dynamics, as the larger investors will be more organised, business-like and experienced, thus potentially upsetting the current small-scale structure of the sub-sector, not least on price competition through more efficient economies of scale and thus ability to compete on price and therefore profit potential for the smaller producers. Importantly investment scenarios are presented in the recommendations sections, with the idea of private sector involvement and business sustainability being a key criteria for final recommendations; this will be confirmed with more detailed feasibiltiy analysis before final decisions are made.

A sense of urgency is also driving this partcular study, as PESCA, funded by the EU through EDF 11, has critical timelines, where if not met means that the impact will be less as some activities will possibly not be realised in the short-term, as had been hoped. At time of writing, PESCA EU deadilnes present the challenge of just 5 months before all recommendations have to be agreed and next steps taken to initiate the various interventions. This contracting (commitment of funds) deadline is 15th December 2019. This has forced recommendations to be as practical as possible, to ease the ability of the Project to achieve them int eh timeframes.

After the lengthy process of completing this report a validation meeting was held with relevant stakeholders, with a focus on private sector actors, who are already cognisant of the market situation in Uganda and regionally. This validation meeting came up with a number of ideas that are captured in this report to support the consultant's work. Annex XI lists validation meeting comments received.

In addition, PESCA is addressing a number of issues to support improvement of the existing sub-sector, including developing improved quality and availability of high quality, cost-effective feed, seed (broodstock development and distribution processses), and various support to Producer Organisations (POs) in their structure and management to enable them to bring together the various small-scale and larger scale producers that are currently in place. Government support areas, such as Extension Services to ensure knowledge dissemination, establishment of structures (e.g. a 1-stop-shop) to improve investment processes, and a wider ranging sector survey to establish exactly what is present in the sector at this time; currently data is not complete and not well-understood. Together with this is the establishment of a Digital Marketing Platform, which although a smaller activity under PESCA is intended

to open up opportunities for connecting buyers and sellers for fish, fish products and key inputs such as feed and seed.

With the dearth of data available for this study, access to detailed information on markets is impossible to achieve. Coincidentally other robust regional studies, which are recently completed, were available to improve this situation and complement the existing projections and assessments of consumption and demand available from the Government. Despite this, clear extrapolation of regional consumption remains unclear, but logical projection of population and general income knowledge, has allowed for some useful estimations in this regard. Currently Government statistics report that consumption in Uganda averages 8.6kg per capita for fish. Other studies question this and provide other estimates. Whatever the exact average per capita value, overall consumption is expected to increase mostly based on projected population for Uganda. Such data collection and analysis is not ever difinitive as it is impossible to achieve accuracy with confidence. Studies such as this assume approximate data, assess various opinions, and use estimates and intuitive/ experiential assumptions to establish a approximate and workable situational analysis; equally, such approaches are generally kept conservative to reduce risk.

The recommendations for Project interventions are summarised here, with detail provided in the relevant sections of the report; as indicated above, practicality and focused, targeted market support have been the key decision criteria for these recommendations.

1. BUSIA – improved infrastructure on the border with Kenya, as a key route to a key market for farmed fish at this time.
2. GULU – as a key population centre and with access from the Apac AquaPark location, as well as other producers routing through to South Sudan and West Nile as well.
3. MASAKA – as a key hub connecting the Kalangala AquaPark to regional routes, as well as direct efficient routes through to Kampala and other centres.
4. KAMPALA – as the largest population centre, with various established outlets and diverse opportunities for expanding various value-added products.

It is always difficult to understand what the future might bring, so investments recommended are deemed appropriate for this stage in the development of the sector and have a shorter – medium term view. The items referenced for Masaka and Gulu relate strongly to the other key PESCA output, aquaclture parks (AquaParks). These are being developed in Kalangala (with product routing through Masaka) and Apac and its proximity to Gulu / Lira as large population centres in the country. Other areas as listed on the recommendations section of report to remain, but as alternative options for futrue development; again remembering the dynamic nature of the sector and the various things that may develop in the medium term that could also affect these recommendations.

These recommendations come from examples in different countries that have worked, as well as the logical analysis of the current situation in Uganda. In this report, the author outlines what these investments might look like in terms of what will be put on the ground and their recommended scale. Confirmation through detailed feasibility analysis and business planning will follow, with the next activities

under PESCA expecting to attract investors to these interventions. Additionally, given project timeframes and the need for further study on these recommendations, the list is prioritised and kept to a workable limit, as agreed in the validation meeting of 27th June 2019.

Promotion as a general marketing requirement is specifically addressed in this report and is one of the most important interventions that needs to commence to complement the other activities being undertaken; mostly in terms of positioning farmed fish in the minds of potential buyers. This needs to be aligned with the development of the recommendations from this report once agreed. PESCA can contribute to this, but as with all activities, a sustainable continuation of promotion for farmed fish is required and needs to come from others, notably private sector actors, producer organisations and with the support of MAAIF for the overall sector. It is recommended that this should include the following:

- The benefits of eating fish and especially farmed fish, with farmed fish being a smart option related to wild fish based on availability year-round
- Consumption of smaller fish, which is critical as smaller fish allow for using less feed to grow the fish on the farm and therefore allow for better profitability
- Direct product promotion to institutions, government offices, hospitals, army barracks, mining camps, etc. where there is a focus of population and regular purchases possible. Promoting product to new places of economic development e.g. Bunyoro near Lake Albert where there shall be a new oil and gas industry rush for instance.
- New product choices, with value addition driving this process
- Fish festivals every year in various districts e.g. annual fish day, fish trade event, fish at agro-based food festivals
- Product certification as a backdrop to verify quality to the buyers and force producers to up their quality to be competitive. EcoMark labelling and similar branding opportunities should be considered.

The **report structure** that follows has various background, data and analysis logically presented in the main text component, with detailed data sections, which allow for expanded investigations by the reader, provided in Annex for easy reference.

A. Study Objectives & Methodology

A.1 Objective of the study

The purpose of this study is to help define market related requirements to support the expected expansion of commercial aquaculture in Uganda. The country is at a stage when commercial aquaculture is just showing its face, but not showing fast growth; the potential is there and is expected to be realised in the coming years. Currently, some larger investors are showing interest, some more serious than others, including those from Zambia, Hungary and China for instance.

This report from the PESCA Project comes at a time when the government is working towards increasing fish production and productivity and also supporting the development of sustainable markets for farmed fish products domestically and internationally. The country's National Fisheries and Aquaculture Policy of 2017,

aims at creating an enabling policy and legal environment, thus addressing barriers to increased fish production. With regards to market access, the government strives "…to guarantee quality, wholesomeness and safety of fish and fish products for human consumption and market access. Additionally, government shall ensure quality seed and safety of fish feeds for sustainable development of aquaculture. Government shall register and promote all actors along the fisheries and aquaculture value chain and link them to regional and international markets…". Other strategic efforts in support to farmed fish marketing would include; promotion of diversification in fish products for domestic and international markets; regulation of imports and exports of fish and fisheries product; strengthening infrastructure for domestic, regional and international trade; and collaborating with other government agencies e.g. standards bodies to regulate fish quality and safety issues.

The EU funded Promoting Environmentally Sustainable Commercial Aquaculture in Uganda (PESCA) Project funded by the EU under EDF 11, has objectives focused on preparing the ground for such future growth by addressing basic legislative, structural and technical factors to support the expected sub-sector growth, identify needs and initiate activities in that regard. The basic project Result structure is based on a value chain approach, with *result 1* focused on legislation/ policy areas to support the value chains; *result 2* focused on technical production issues, including attracting investors; and, *result 3* focused on the post-harvest /market steps in the value chains by connecting producers to buyers and identifying and implementing distribution and logistical support initiatives for farmed fish also with investors from private sector being key.

The project has an important and significant output, which is to establish two Aquaculture Parks (AquaParks) in Uganda, which under *result 2* of the project focus on demonstrating production techniques that are modern, have professional management and come with a community, small-holder and environmental perspective and strategy for sustainable growth of production. Through these *demonstration* fish farming models, the project hopes to stimulate further interest in commercial fish farming from serious investors, who might follow a similar AquaPark model, as well as more traditional management models, to produce fish at a commercial scale in Uganda. The strategy is based well on the need to include small-scale producers in the process, acting as out-growers to core investors/operators. This will help harness the already burgeoning small producers' energy by linking small producers to larger value chain capability through core investors and producers involved in the AquaPark structures. These intended AquaParks are focused on the production of two of the most farmed fish species in the region, Nile tilapia and African catfish.

Competitively, tilapia and catfish species, as with a few other farmed fish species (salmon, prawn for example) are global commodities. A *commodity* level market must compete by providing consistency of supply and importantly with a price that matches others, the assumption being that commodity products are generally more ubiquitously available. To join such a marketing environment, farmed fish must align a number of factors if price competitiveness is to be achieved. This entails breed selection processes, to ensure faster growing fish are used for production, and high feed quality and superior feed conversion ratios (FCRs). Feed costs, are the largest direct cost for a fish farmer, so efficiency of feed usage directly affects competitiveness and profitability. At the early stages of market development, such as with aquaculture in Uganda, there is a period of time where the market has not stabilised and opportunities exist for quicker and

higher profits; Unfortunately, this is temporary and will naturally converge economically to equalise the economic rent (profit) that is possible. Also, such market environments trend towards larger, more integrated producers, who recognise continued success is related to economies of scale. Cost reduction and cost efficiency are key components of such a competitive market environment, which with fish farming means growing fish to market size as fast as possible for the least possible cost; larger scale operations, as well as vertically integrated structures, achieve this more easily and therefor remain competitive in the longer term.

These factors, together with superior operational efficiencies, technology and economies of scale during production and distribution are the key success factors for these markets and the sustainable success of the fish producers. Volume production and low margins dictate success in these commodity-based production systems and needs to be borne in mind for such a sector growth strategy facing farmed fish in Uganda. Additionally, value addition and careful distribution and logistics allows for potential increase in prices for particular segments of the markets to complement the overall market portfolio.

Currently, Uganda is not part of this system, as it lacks many of the factors described above. A particular constraint at this early stage in commercial fish farming is the high cost of appropriate fish feed mixes for particular growth stages of the fish, which has forced most serious players to seek feed from outside the country, based on quality reliability and delivered cost. Even with a higher quality imported feed, costs are relatively high due to complications of importing from places such as Mauritius, or Brazil, involving sea transportation to ports, then onward land transportation to reach Uganda from the coast, is a significant cost addition.

This assignment is specifically under Activity 3.1 of the multi-annual operational PE (MAOPE), which is intended to provide an assessment of the farmed fish market in Uganda and link technically to informing the next activities under Result 3 of the project (3.2 & 3.3), which will recommend requirements for improved logistics, distribution facilities and equipment that focus on farmed fish and hopefully attract private sector investors to operate such facilities that the project installs. This activity also relates to the AquaParks component of the project, as it will be developed in tandem with these facilities and therefore would be expected to link to their potential production for market distribution/ logistics. At this juncture, and remembering project timeframes, we would expect AquaPark production to perhaps commence sometime in 2021, depending on the speed of construction and start-up of those operations.

This study is also to focus on the farmed fishes' supply and demand dynamics, as well as distribution systems, including providing direct and pertinent information about potential buyers for farmed fish products from Uganda and also assisting to support trade linkages between Ugandan fish farmers and national and regional buyers. This links to the private sector focus of the project and will likely result in missions to develop such relationships, again linking to various distribution channels that already exist for capture fisheries but can also be developed for farm fish products. The Project will utilise other funds to promote connections between producers and buyers regionally, as a result of this study's recommendations.

Feedback received from fish farms suggests that markets for their products are not obvious and not readily available, as might be expected, thus offering various challenges to their development. Traditional distribution networks are complicated, mostly informal and difficult to join, especially when products are not the same as the capture fishery products that these current marketing systems and customers have been based on.

Specific context and activities

The commercial fish farming sector in Uganda is in an early development state, with various issues of competition from imports that are significantly cheaper than local products, as well as competing in an existing marketing and distribution sector well-established for capture fisheries of the same species, primarily tilapia, but also relevant to this study wild caught catfish and some farmed catfish. In addition, continued competition from other sources of protein needs consideration, such as chicken, beef and pork often being closer to consumers physically, as well as closer to their household budgets (willingness/ability to pay). This is a key strategic challenge that this study has to address, where perhaps surprisingly in a country with so much water, fish is not the most consumed protein.

A study (Uganda Aquaculture Value Chains: Strategic Planning Mission Report; WorldFish, 2012) suggested that the aquaculture value chain in Uganda and the East African region is currently disjointed and ineffective; and goes on to state that "… some would argue that there is no value chain at all, only temporal spot markets that occasionally link a very small number of actors, who generally operate in inefficient ways". The author concurs with this general assessment, but recognises that many activities are evolving related to production interest, as well as potential market development. Specifically, value chains, mean value is added throughout the distribution from source to final consumer, so we can agree that really value addition for farmed fish is not common, as most often we see whole fish as the preferred product. Even frozen fish is rare, but there are some small drying and smoking activities evident, but in small volumes when it comes to farm-sourced fish.

The same report (WorldFish, 2012), highlights that although Ugandans like fish there are various segments to the market, such as urban centres, where they are used to buying large, wild tilapia of 500+ g. Fish farms generally produce smaller sized tilapia and increasingly produce catfish regionally, but farmed African catfish is only occasionally found at the markets in Uganda.

In generally, any fish will find a market in areas not currently supplied with fish, that is, in communities away from the main lakes and rivers. There is also seasonality in fish supplies because of closed seasons in the wild fishery and regional preferences; catfish seems to be most appreciated in northern and eastern Uganda, but not in the south-west or central areas. This means that there are fluctuations in the market price that can be potentially exploited by fish farms according to location and season and offer opportunity as a result.

When it comes to farmed tilapia competing with captured tilapia from the Lakes, it is also "a different product", and the perceptions and realities of this are affecting the speed of uptake. Competition is also experienced directly at actual fish markets, whether in towns or at landing sites, in terms of how the markets are set-up, when they are open (hours) and the control by existing operators on what gets sold and for what

price. This can be assessed as some sort of resistance to the farmed fish entering as a competing product, and protecting the capture fishery value chains relationships as they stand today. This is a challenge to be addressed as the sector develops, although some natural transition from capture fish to farmed fish will occur based on availability, which also relates to fisheries management issues, where good control of over fishing, increases capture fish on the market, which is not good for farmed fish, whereas over fishing would equally benefit farmed fish, due to limiting supply of fish on the market. How this situation trends and unfolds is not predictable, but we must assume that capture fisheries will be maintained at least at current levels. At this time fish process for capture fishes are reduced based on successful fisheries management help to bring up supply.

Faced with this context, the objective of this study is therefore to understand markets specifically for farmed fish that will in the future be produced in the planned AquaParks and from other emerging and existing commercial farmers, through establishing a better reality to the understanding of current and potential aquaculture supply chains and the development of value chains specific to farmed fish in Uganda. Doing so, it is expected to identify potential gaps in linking farm products to markets, as well as opportunities to overcome trade bottlenecks and competitive perceptions and realities (promotional activities to support this are envisaged).

As the scope for this study was very broad and with limited time available to the consultant (see Annex I: ToRs), the overall priority given by the project team is to identify and justify opportunities for investments in the value chain distribution activities that would result in better market access of farmed fish products and be placed to grow as the production subsector grows. Being commercially oriented, this assumes a reasonably large and constant volume of product that has to reach markets. The scope of this study is not to solve all the marketing issues in the country, but to provide some practical and realistic activities that PESCA can pursue to open up channels for farmed fish, and not least focus on the AquaPark investments that the project is supporting.

Each of the proposed AquaParks for instance will be targeting in the region of 2,000 t + of fish production to start and hoping to grow from that level. It is hoped that more investments will come to Uganda and commercial production will grow fast in the coming years. Distribution functions therefore must also be demonstration points for the sector to show how farmed fish can successfully enter the protein supply sector competitively.

In summary, *the market analysis for Ugandan farmed fish and fish products is to be developed for helping direct and establish the marketing and sales of Uganda's farmed fish in the future.* It is not intended to be the panacea of all possible options, but a starting point for a sector that is on the verge of expanding, which will in turn attract investors to the potential distribution chains and wide potential recognised in future value chains as they develop.

A.2 Methodology

The work herein is based on extensive desk-based literature reviews and on-the-ground data collection and analysis approaches. It has involved the review and analysis of production and trade statistics, policies,

scientific data, reports and other information available. Key to the process has also been the recognition that there is significant expertise and knowledge available in Uganda and the broader region, and as noted in the above section, neighbouring and regional countries are also currently pursuing aquaculture expansion strategies and thus provide similar and supporting ideas from their work. Similarly, the PESCA project is occurring as other regional aquaculture projects are being developed, which provides connectivity to similar value chain visions and analyses as well as many study reports. The TrueFish project is about to commence and has a related aquaculture component for instance that PESCA will link with, it also has a specific trade development component that links well with this marketing component under PESCA result 3.

Throughout this study, various references are listed to particular studies and inputs, which are not exhaustive, but coupled with expertise inside the project and from the experts involved in this study, allows for a solid and logical understanding and recommendations of a way forward. As is to be expected, data is in many cases not accurate, or out of date, and therefore unreliable and demands analysis and consideration of what is real, what is false and what is possible; this is a key challenge for such studies and will be well-appreciated as this report is reviewed.

Various field missions have been carried out by those involved in this study;

- Firstly, in November 2018, where key stakeholders in the capture and farmed fish value chains were interviewed using a snow-ball system, by which information in one interview helped to identify additional interviewees. Interviews were carried out using semi-structured questionnaires.
- A second mission in January 2019, utilised focused questionnaires developed by the consultant and involved mobilising personnel from the Department of Aquaculture Management & Development (DAMD) to execute some focused field data collection exercises intended to fill some key information and data gaps. This was partly due to the recognition that the study was very wide in its requirements and days limited to achieve everything without a team effort being employed. This much appreciated support from DAMD provided some interesting data collected with these questionnaires. The questionnaires are included in Annex II and contribute to the overall analysis. Data gleaned from the questionnaires is under separate cover due to its file sizes, however a brief report is provided in Annex III, resulting from the questionnaire (prepared by DAMD).
- The Technical Assistance Team (TAT) also contributed to further focused data collection exercises as it was realised that the market situation for farmed fish in Uganda is very much a mystery and much confusion and inaccuracy, as well as opinions on the situation existed. It was recognised early that to achieve the basic objectives of this study, an as realistic as possible situation analysis was required, which could only be achieved with direct visits and discussions with those involved in fish production and trade. This included a visit to the DRC supported through a visit by KE2 of the TAT (February 2019), as well as a mission to Zambia to understand market dynamics and be able to provide some comparison to Uganda in the context of this study; as Zambia is showing particular development progress at this time, and in fact the main producer in Zambia is looking at investing in Uganda.

Some delays in implementation affecting the contract for the first consultant (Urs Baumgartner), resulted in a change of his availability, therefore a new consultant was brought onboard to continue and complete the study. After the new consultant's CV was approved by the EU, which took approximately 6 weeks, this consultant was able to commence work in May 2019. Recognising that this had delayed the output, the TAT renewed focus on supporting this STE to complete the report inside the remaining days of the contract as fast as possible. Further missions were implemented at this stage as follows:

- National data collection exercises to key borders (Mpondwe, Busia), as well as detailed interviews with key traders and producers in various market centres throughout Uganda (April 2019)
- National investigative mission focused for catfish markets to northern and eastern Uganda specifically
- A regional mission to Nairobi, Kenya and Rwanda (markets and borders with DRC) (May 2019)

The current author of the report commenced in early May 2019 with an immediate mission commencing May 8th including the regional mission indicated above to Kenya and Rwanda. Due to timing and what had been accomplished so far, as well as available days, a new approach to the work was undertaken, where the TAT significantly contributed to the data collection, as well as report writing components of the work. This was based on a decision by the TAT Team Leader, recognising that overall Project schedules needed to be maintained. Additionally, as the study evolved, it was clear that there were emerging unknowns and lack of accurate data, so a more robust review of the Uganda market to ensure objectivity and usefulness of study results was needed. Particular gaps regarding the catfish market were needing a better understanding and key outputs to recommend distribution and other support initiatives was to be achieved in a short timeframe.

Throughout the study, cognisance of the development of AquaParks under the project was maintained, with the logic that the timing of the project's activities that will come from this study, will also align with the intended operational start-up of the two AquaPark production units. This is not negating the overall connectivity to markets in Uganda required of this study, but it provides some specific focus.

Geographically, it is quite convenient, as the two AquaParks locations are well spaced and logically serve particular areas of the country, so supporting other farms in those areas as well. With improving transportation systems in the country, it fits together well as an overall sector study with a focus on farmed fish distribution and market development strategy.

A.2.1 Understanding strategic marketing

As fish markets and marketing are the central objective of this study, *the marketing mix*, as elaborated through the 4Ps strategy technique, serves as a base assessment and reporting approach for this study. This is particularly relevant with this study as we are starting to look at what is perceived by many as a new product and its entry strategy into the market. We cannot assume that it will simply follow the capture fisheries approach, which has developed over time based on specific market expectations, supply dynamics and products. Although traditional markets, auctions, etc. near to the lake are there, this cannot necessarily be the approach for a future farmed fish supply chain development.

The marketing mix concept follows directly from the very nature of marketing. The concept is inherent to any marketing situation without any exception, irrespective of its peculiarities – even if this is more obvious in some situations than others. In other words, the mix concept is quintessential to marketing (van Waterschoot and De Haes, 2008).

This recognition as a structure that fits well the 4Ps assessment & strategy is a widely recognized concept (see also van Waterschoot & van den Bulte, 1992), which identifies **product, price, place and promotion** as important factors driving access to markets and hence demand. The structure serves well in this situation where a marketing picture and understanding is needed at a strategic, as well as a micro level, from a starting point that is complicated by inaccurate data and preconceived judgments. It gives us a "back to basics" objective view to aid the development of recommendations and a way forward for the sub-sector in Uganda. In summary, the 4Ps mean;

- **Product**: an item produced to satisfy the needs of a certain group of people. Sellers must have the right product for their markets. In the context of farmed fish, as a visible product group, competition from capture fisheries, and key current perceptions, essentially put farmed fish into a "new product" category.

  Changing markets together with demand dynamics, means that marketers must reinvent their products to stimulate more demand especially in the face of current and increasing competition, which is inevitable. This might include modifying a product's presentation, appearance, taste, size, shape, packaging, etc. to ensure the product is always of interest and remains in demand. Generally, marketers must ask themselves the question; "What can I do to offer a better product, *a better choice* to this group of people than my competitors?"

- **Price:** the amount that a customer is *willing to pay* to enjoy a product. Price is a very important component of the marketing mix as it determines a seller's profit and therefore survival. Adjusting the price of the product has a big impact on the entire marketing strategy, as well as greatly affecting the sales and demand of the product. Farmed fish being supplied from a fish farming operation have a cost structure that determines price and margins potential. The cost structure differs from capture fisheries and thus pricing competitively with capture fisheries and taking into account cost structures and markets complicate the process significantly. Two fish, from different sources (capture & farming) may look similar – they are both fishes, but how can they be priced competitively (and profitably) with such a different production environment?

  If a company is new to the market and has not yet made a name for themselves, it is unlikely that their target market will be willing to pay a high price. Although they may be willing in the future to hand over large sums of money, it is inevitably harder to get them to do so during the early stages. Pricing always helps shape the perception of a product in consumers eyes; a low price usually means an inferior good in the consumers eyes, as they compare the product to a competitor's product. Conversely, elevated prices will make the costs outweigh the benefits in customers eyes and they will therefore value their money over the product. Competitors' pricing clearly must be taken into account in this process.

- **Place**: Placement *or distribution* is a very important part of the product mix. Products need to be positioned and distributed in a place that is accessible to potential buyers. With fish being a perishable good, the specific handling of fish from the harvest point to the final consumer is integrally involved. Perceptions of quality, related to freshness therefore come into play, which further affects how the consumer might consume the product, which is often time-sensitive. Understanding target markets inside out will enable marketers to identify the most efficient positioning and distribution channels/ and related logistics required.

  Distribution / logistics are a key component and intended output of this study and therefore its relationship with the other "P's" of the marketing mix must be considered carefully. Fish destined for areas where consumers do not have cold storage (fridges/ electricity) means different product forms, consumption expectations and sizes must adjust to support that reality. Fresh fish needs to be consumed quickly, dried and smoked fish can last a number of days. This clearly also affects distances for delivery and how a product is presented to a consumer.

- **Promotion**: Various methods of promotion can be used, with the basic idea of describing and letting people know the product exists and why they might consider buying it. Advertising typically covers communication methods that are paid for like television advertisements, radio commercials, print media, and internet advertisements. A shift in focus from traditional media to the online world is becoming more popular and suitable for certain types of products. Public relations are a form of communication that are typically not paid for. This includes press releases, exhibitions, sponsorship deals, seminars, conferences, and events. Word of mouth is another type of product promotion. Informal in its nature, this form of communication promotes products by satisfied customers sharing their experiences with others. The sales staff plays a very important role in public relations and word of mouth. It is important to not take this literally, as word of mouth can also circulate on the internet. Harnessed effectively, it has the potential to be one of the most valuable assets actors have in boosting their profits online. An extremely good example of this is online social media and a firm's online social media presence.

Throughout this report, various aspects of the 4Ps structure will be discussed, so as to better appreciate a proposed way forward through the lens of this "marketing mix". This is included in the methodology structure, as seeing a big picture context to the overall market situation for farmed fish is particularly relevant based on the significant change that is occurring in fish marketing due to the potential growth of farmed fish. Farmed fish are currently struggling as they integrate with the traditional and accepted capture fisheries value chains and distribution structures in Uganda, but also in the context of many regional countries pursuing a similar market challenge, including protecting their own emerging aquaculture sector in the process.

With the backdrop of the marketing mix, a strategic market positioning assessment is undertaken using a simple SWOT analysis approach, to provide situational / marketing environment data, to feed the discussion, analysis and outcomes of the study. Strategy relates to plans that before they can be implemented need resources in place. The *strengths* and *weaknesses* of a SWOT analysis relate to these resource endowments, or lack of such resources, structures and capacities, so are critical for informed decision making at this level.

The *opportunities* and *threats* highlight serious potential (positive and negative) that are then aligned realistically with resources and capabilities to provide a strategic view of the situation and inform a plan and way forward that is realistic.

B. Sector Background

Fish is one of the priority commodities that the Ministry of Agriculture, Animal Industry & Fisheries (MAAIF) has identified within the Agriculture Sector Development Strategy and Investment Plan (DSIP) 2010/11 – 2014/15. Preliminary discussions on the new Agriculture Sector Support Plan 2015/16 – 2020/21 confirm that fish will continue to be a priority commodity for the government of Uganda. As part of fisheries resources, aquaculture is seen by the government as a vital sub-sector, aiming to improve livelihoods, provide jobs and improve food and nutrition security for its people. Given the availability of lakes in particular, as well as regional position for access to markets, the potential is seen as robust for the sub-sector to develop.

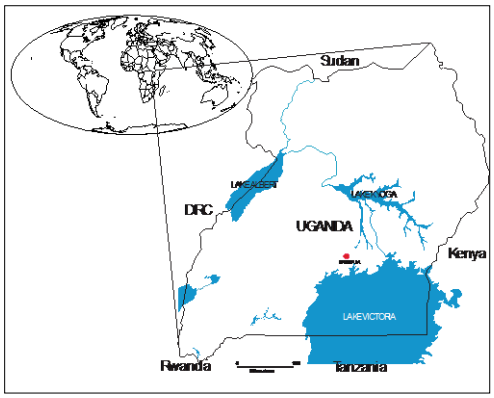


Figure 1 Uganda location context

It is also recognised that as a commercial industry, aquaculture remains underdeveloped in Uganda. Yet, many stakeholders believe that aquaculture has significant potential for development into a viable subsector. This notion is interpolated to indicate that the subsector could produce critical volumes of fish to fill the growing gap in national fish supply, as wild fish catches have shown continued declined or future levelling based on better management, rather than growth. This is further contextualised with the population growing and demand for raw material destined for fish value addition will continue.

The role of imported fish, which can and does make a valuable contribution to the overall food security and nutrition requirement for the country, is challenged by the observation that it can have a negative effect on aquaculture development, if not carefully organised. Tilapia and other low-price species are said to have a negative effect on the business development of fish farming in Uganda, as well as in the region. This being largely related to imports of frozen tilapia from China, which competes on price when compared to the cost structure of current fish farming enterprises, thus constraining willingness for investment in fish farming in Uganda and the region. Trade limitations on tilapia imports are being implemented, but still this fish is entering the regional and Ugandan markets. Not only is such fish competing on price, but on its availability and consistency of volumes available, particularly when moving through to the DRC.

It is a widely observed trend that countries tend to export high value fish products and import cheaper fish, thus satisfying the need for foreign currency, whilst maintaining a focus on national food and nutrition security. It becomes obvious, that a balance needs to be struck with national production and imported food,

to cater for the various layers and segmentation of markets, which are largely determined by willingness and ability to pay. In this regard, there is a pace for such lower priced imports that should not be totally ignored.

Within the context of this project 'Promoting Environmentally Sustainable Commercial Aquaculture in Uganda (PESCA)', various project documents indicate the potential and aspiration of Uganda for developing aquaculture from small volume production systems into larger commercial scale production operations using both cages and land-based systems. A small number of commercial farms have indeed emerged in Uganda however, these enterprises have remained relatively small in relation to the aspirations in the past and established visions for the coming years. Neighbouring countries, such as Kenya (Victory Farms) and Zambia (Yalelo), seem to be showing that growth is possible, under specific approaches and business structures. Both these examples seem to have captured a marketing approach that is more successful than currently being seen in Uganda.

PESCA emphasises and recognises that the future commercial aquaculture sub-sector will be dominated by and operated by the private sector, with profit and return on investment as the driving catalyst for this to happen. For the sector to grow, not only production (fish farming), but also the respective value chains need development, requiring support in key inputs (seed, feed, capital and related supply chains), marketing (post-harvest, distribution, logistics), and critical support from the government, with key mechanisms such as the legal framework, policies and regulatory structures promoting and supporting expansion of the sector through an enabling and structured environment. The various value chain activities that will emerge are part of the process that PESCA envisions to address, be they private sector or government driven.

PESCA also needs to be understood in the context of global trends within the fisheries and aquaculture sectors; some of the recent and ongoing trends include:

- Markets in the EU, the USA and Japan are getting lots of attention as these countries/economic areas are deemed to have a large population willing to pay high prices for fish. As a consequence, competition in these markets is high, with requirements in terms of food safety, traceability and certification continuing to increase in sophistication and cost.
- Production of food fish from aquaculture over-taking production from capture fisheries on a global scale, which in turn means that many countries globally are focused on expanding the aquaculture sector and thus the structure of global competition is changing fast. This is particularly relevant to Uganda as its neighbours are all on the same track to expand aquaculture fast.
- A significant increase in regional trade in developing countries, which is due on the one hand, to the high product quality and acceptance requirements in the more sophisticated markets mentioned above. On the other hand, increasing demand from regional markets and currently lower expectations in terms of import requirements and quality standards, make the latter more attractive for producers. Shorter distances make management and distribution less complicated as well. This situation, however, is likely to change over time, as more technical barriers to trade (TBTs) develop between regional trading partners (already being experience with Rwanda).

From a regional perspective, Uganda is surrounded by some countries with large and growing populations that are worthy of consideration when developing a fish marketing strategy. Within the wider region, the Middle East should be considered, given historic interest in capture fisheries products from the Lakes region in East Africa. One example of previous success is the well-documented case of Nile perch from Lake Victoria. For years, exports of Nile perch fillets to Europe provided significant revenue to Uganda, as well as Kenya and Tanzania, and for a while was a great success for the region. However, exports have significantly decreased, among others due to competition from other products and countries and also due to decreasing catches. Many fish factories have closed down their operations or are operating at very low capacity and profit levels. The legacy of this dwindling Nile perch export sector is, however, a well-established processing sector, with knowledge and infrastructure (landing sites, processing facilities, transportation, and laboratories) able to meet a range of quality standards in Europe and potentially other markets.

In the above context, neighbouring and other regional countries are also in the same situation and a focus on similar strategies to expand aquaculture are being considered, meaning that as Uganda expands fish farming, so does Kenya, Rwanda, Tanzania, Zambia, Malawi, etc. Such an emerging regional competitive environment needs to be carefully considered in the context of a future strategic market focus and will be addressed in this report.

B.1 Production & trade statistics

B.1.1 Production

Endowed with plenty of water, fisheries have played an important role in Uganda. The country has an estimated 42,383 km^2 of water bodies and swamps, with fishing activities taking place in all the major lakes and streams. Most importantly are Lake Victoria and other large lakes, including Lake George, Lake Edward, Lake Albert, and Lake Kyoga, along with the Nile River. In addition, a great variety of swamps and streams contribute substantially to the annual national catch.

The fish sector contributed an estimated 1.12% to the overall GDP of Uganda and 5.04% to the agricultural GDP of Uganda in 2017 (MAAIF, 2018). Although this is significantly less than in earlier years or estimates, the sector is expected to employ up to 1.3 million people. From the two sub-sectors, capture fisheries and aquaculture, capture fisheries are still largely dominating both in terms of employment and in total revenues compared to aquaculture. Total annual production from wild capture fisheries rose from 165,000 t in the 1980s to 220,000 t in 2000 and 414,000t in 2010. In recent years it has been somewhat stable around 400,000t with a reported annual catch of 396,000t in 2015 and 389,000t in 2016 respectively. In terms of volumes, the most important species are silver cyprinid (*Rastrineobola argentea*) referred to as 'mukene' in the local language, Nile perch (*Lates niloticus*), nurse tetra (*Brycinus nurse*), tilapias (*Oreochromis spp.*), and African lungfishes (*Protopterus spp*.).

Although the aquaculture sector is still poorly developed, attempts to farm fish have a rather long history. Research on fish breeding and farming date back to the 1940s, with fisheries authorities promoting small-scale pond culture with a focus on enhancing rural communities' diets in the 1960s. Small-scale aquaculture had almost entirely disappeared by the end of the 1980s as a consequence of long economic turmoil and civil

unrest, which led to a collapse of infrastructure and public services. In recent years, the focus of aquaculture development changed with the Directorate of Fisheries Resources (DiFR), stressing the need for commercial aquaculture rather than subsistence farming. According to official statistics, total annual aquaculture production has increased significantly in the past 15 years, from a low 820t in 2000 to 10,800t in 2005. According to the records at the Directorate of Fisheries Resources (DiFR), there are two key species cultured in Uganda contributing over 90% of the total aquaculture production in the country. The table below gives the production data with the key species of tilapia and African catfish highlighted in bold.

QUANTITY In Mt								
SCIENTIFIC NAME	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Cyprinus carpio	120	127	171	731	304	347	189	210
Oreochromis niloticus	**31,500**	**28,101**	**52,303**	**47,824**	**53,093**	**57,329**	**74,654**	**74,924**
Tilapia zillii	170	80						
Clarias gariepinus	**63,000**	**57,300**	**43,586**	**49,491**	**57,626**	**59,914**	**43,186**	**37,194**
Osteichthyes	158	98					21	15
TOTAL	95,000	85,712	95,906	98,063	111,023	117,590	118,051	112,343

Figure 2 DiFR Fisheries Stats 2010 - 2017

The latest production figures suggest that current annual production is around 118,000t (FAO, 2018). However, according to local information, various expert opinions, and personal comms., with existing farmers, these figures are likely inaccurate based on assumptions and largely based on possible production, rather than real production from a large number of small-scale operations. At least 50% of the reported production in Uganda is likely attributed to this assumption. A recent and extensive market study using various on-the-ground observations, estimates commercial production volumes to be less than 10,000 Mt for instance, (Msingi, 2017). Notwithstanding the accuracy of small-scale production figures throughout the country, the availability of such production to reach markets consistently and in an organised fashion is a more important reality to understand. It is hoped through pending activities under PESCA a more accurate picture of production will become available, importantly to aid policy and planning activities.

Most of this production comes from the two main farmed species African catfish (*Clarias gariepinus*) and Nile tilapia (*Oreochromis niloticus*). In addition, smaller quantities of common carp (*Cyprinus carpio*) are produced, while the farming of redbelly tilapia (*Tilapia zillii*), a native species that has been produced in small quantities up until the early 2010s, has been abandoned. According to Kiritu, Wanyingi, & Gathii (2018), also giant river prawn (*Macrobrochuim rosenbergii*) and red swamp crawfish (*Procambarus clarkii*) are farmed. However, feedback from interviews carried out during the present market study suggest that production of these two species is limited to shallower water bodies in Western Uganda and that the sub-sector is not really thriving as there are no domestic hatcheries for giant river prawn whereas swamp crawfish is wild capture production from established populations rather than aquaculture.

Based on the experience of the EU study on commercial aquaculture in 2011, there is no reliable source of aquaculture production statistics in Uganda and the official figures bear no relationship to reality. The EU study concluded that in 2010/11 there was only one large-scale commercial fish farm, perhaps 50-100 small and medium scale commercial farms, many of which are currently operating well below their capacity and perhaps many thousands of small-holder ponds that are largely unproductive (Dickson & Macfadyen, 2011). Although this data is from 2010/11 and changes have occurred in the last 8 years, the situation of accurate data and reality remains complex. Statistics reported for 2010, using an online FAO FishStat query suggested the following for farmed fish in Uganda, support the table above as of 2010. Where we see the majority of farmed fish are indicated as African catfish. Catfish currently are reported as a lessor production from aquaculture, so a reduction of about 25,000 t of catfish has occurred over the past approximately 7 years and tilapia has increase from 31,000 t to over 70,000 t. This data seems to reflect a methodology of estimating, rather than verified production data.

	2005	2006	2007	2008	2009	2010
Mainly African catfish	6,535	20,955	34,145	35,050	55,005	63,208
Tilapias and other cichlids	4,239	11,388	16,891	17,130	21,573	31,670
TOTAL	10,774	32,343	51,136	52,180	76,578	94,878

Figure 3 FAO Fish STAT Uganda Production 2005 to 2010

In terms of estimating production in Uganda the following approach is taken:

- Small-scale ponds in Uganda: 20,000 averaging 500m^2;
- Small-scale (subsistence) production based on an average of 1,500 kg per ha.
- 500 m^2. One twentieth (1/20) of a hectare (10,000/500 = 20). This equates to a total of 20 ha. at 1.5 t per ha. = 30 t
- Commercial ponds: 15,000 kg / ha – number unknown
- Cages number 3,000 with different sizes and estimates based on 12m diameter cages producing 10 t per year and 6 x 6 square cages producing 7 t per ha/ year.
- Assuming 7 t average per cage = 21,000 t per year.

Given that all ponds are not active, and all cages are not producing as require, or not in use taking the averages above, the estimates of approximately 110,000 t production of farmed fish per year is reported. However, lack of access to real data and accuracy of estimates, were not possible to confirm during this study. The opinion of the consultant is that this is a high estimate, which could in reality be significantly lower. The missing data is how many commercial sized ponds, which estimate 15 t /ha/ year

B.1.2 Exports

In 2017, Uganda exported food grade fish worth 136 million USD. Most important export products were fresh Nile perch fillets accounting for nearly half of the exports (46%), preserved fish heads, tails and maws of unspecified species (28%), and frozen Nile perch fillets (21%). Most likely, the major share of 'heads, tails and maws' are by-products from Nile perch processing. It can therefore be assumed that more than 90% of exports are from the Nile perch industries (blue-coloured fields in Figure 1), while tilapia and other species

only account for a very small share of total exports, (Source Fish exports Uganda in 2017 Intracen, 2018). Main export partners were the EU (64.0 million USD), Hong Kong (36.6 million), and the United Arab Emirates (9.7 million). Within the EU, Netherlands had the biggest share (25 million), followed by Belgium (15.7 million) and Portugal (7.3 million). Trade within the region is also significant. Kenya is the biggest importer in Africa buying fish worth 2.1 million in 2017, followed by the two other neighbours Rwanda (1.4 million) and DRC (1.2 million).

B.1.3 Imports

In 2017, the value of fish imports totalled 4.65 million USD. Major products included unspecified frozen tuna (6.0 million USD), frozen mackerel (5.5 million USD), and frozen tilapia (1.62 million USD). The main trade partners were Tanzania (2.7 million) and Kenya (2.7 million). Imports from the EU amounted to 91,000 USD.

Import of Chinese tilapia, as mentioned above, has caused various reactions in the region, seen with issues of potential contaminants on the one hand, but also as a threat to the developing aquaculture sector in terms of competitive prices. Uganda has officially now banned imports from China, but fish products do continue to be found in supermarkets (such as Shoprite), where frozen whole tilapia are sold). Kenya had a similar ban, but has recently reinstated the imports from China for their own strategic reasons. This of course does have an effect regionally, as such imports move sometimes through Uganda and compete with Ugandan fish on their way to Rwanda and DRC.

In addition to food grade fish, small amounts of fish oil (2Mt) and fishmeal (3Mt) were imported from China and Egypt respectively. This study also confirmed that catfish and mackerel were being significantly imported to the region also from China and have a significant influence over border activities particularly in Rwanda at the DRC borders. From this study's perspective, therefore, both tilapia and catfish imports from China are part of the strategy equation.

The following figures reflect these import and export trends:

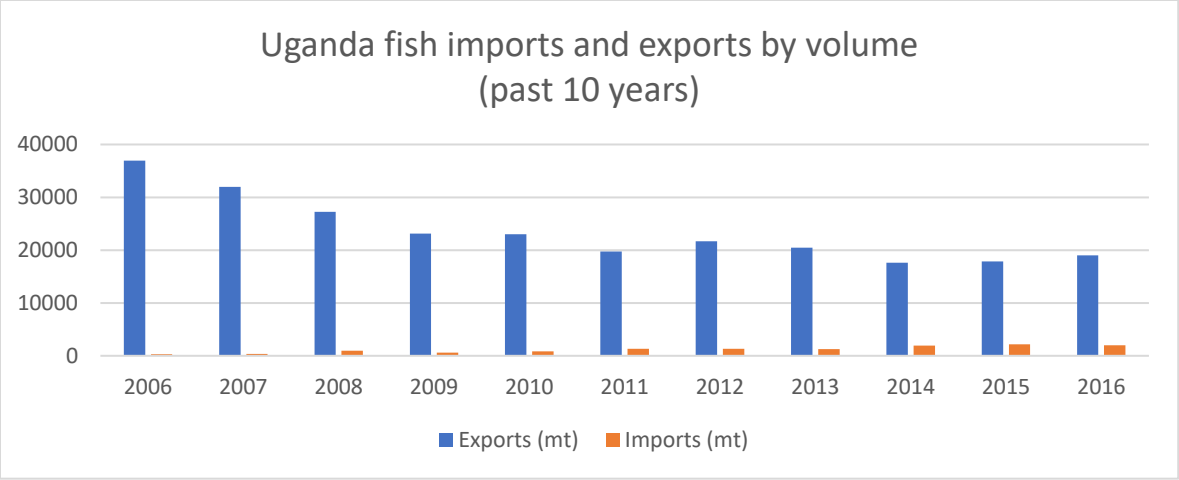


Figure 4 Uganda fish imports & exports (Mt) to 2016 (Source FAO, 2018)

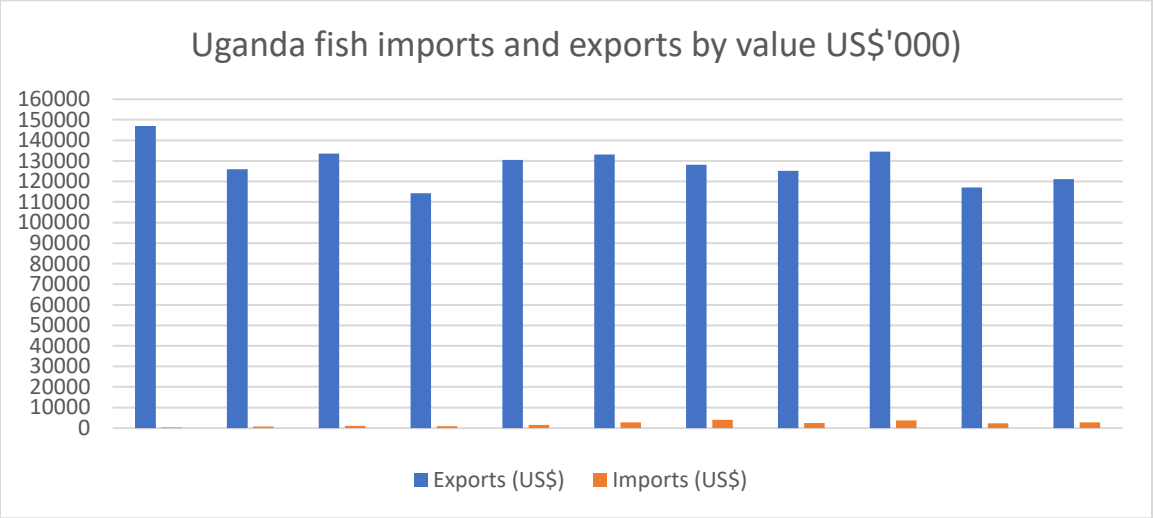


Figure 5 Uganda fish imports & exports (USD) to 2016 (Source FAO, 2018)

	Population (2019)	Capture production (Mt)	Aquaculture (Mt)	Total (Mt)	Imports (Mt)	Exports (Mt)	Consumption rate (kg/capita)
DRC	84 million	240,000	4,000	244,000	>130,000	< 100	5.6
Kenya	51 million	180,000	20,000	200,000	>23,000	< 7.000	5.9
Rwanda	12.5 million	25,000	2,000	27,000	>30000	< 2.000	4.1
South Sudan	13 million	35,000	50	35,050	>200	No record	1.7

Figure 6 Regional fish production, trade & consumption, (Source FAO)

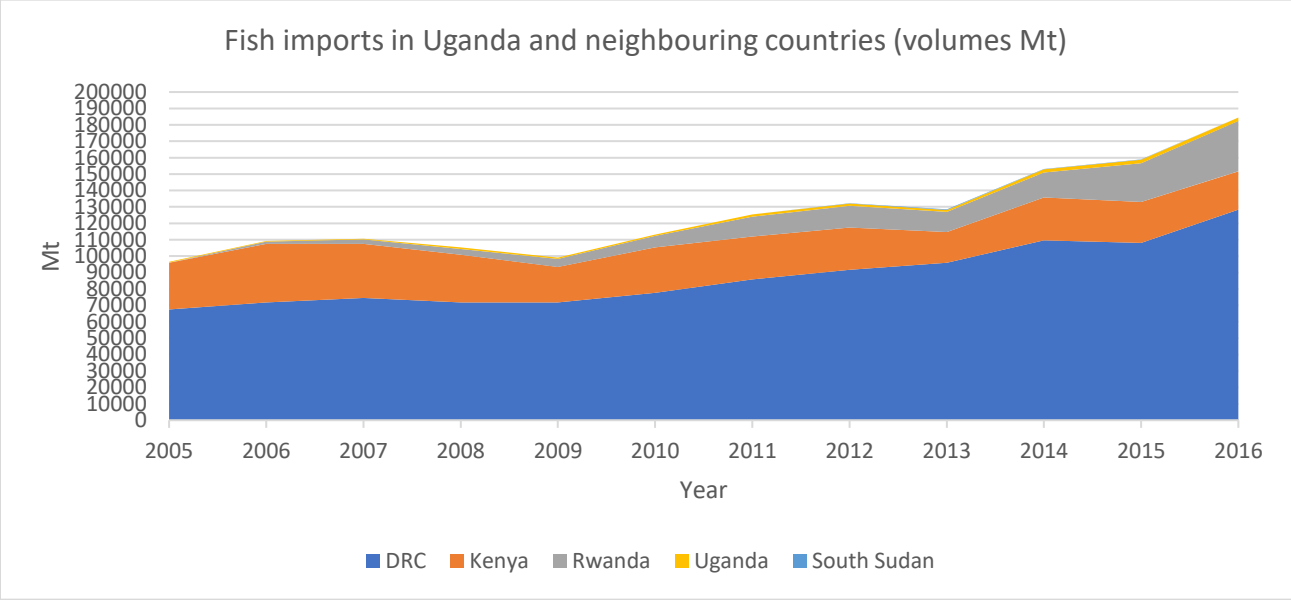
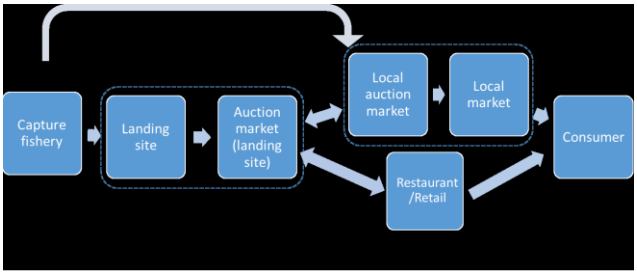


Figure 7 Imports by Uganda & neighbouring countries (Mt)

B.2 Wild capture fisheries value chain

In order to understand aquaculture value chains in Uganda, one needs to look at fisheries value chains first. Given a strong tradition with fisheries products, wild caught fish has substantially shaped local culture, as well as business opportunities within the sector. Fish exports are largely dominated by Nile perch from capture fisheries. The rest of the species, including tilapia and lungfishes are consumed in domestic markets. While traditionally used as ingredient for animal feeds, also 'mukene' (silver cyprinid) is increasingly consumed as human food.



A typical value chain for lake tilapia is illustrated in Figure 4. Fishers (or a fisher representing several other fishers) bring the catch to a landing site at the shore of Lake Victoria. For example, in Kampala, there are four major landing sites where fishers typically land their fish. At the time of landing, the fish is often still alive, or if not, very fresh. All landed fish is whole and ungutted, and mostly traded in this form along the value chains, which is an important factor to consider (see following chapters).

Figure 8 Simplified description of lake tilapia value chain

At the landing site, the fish is brought to an auction stall (Figure 5), where a member of the landing site or auction market sells the fish to interested buyers. Tilapia are typically sold by piece and auctioned in 'bundles' of ten or more pieces.

Many restaurants and small retail shops typically buy directly in auction markets where they get better prices and fresh products. Alternatively, market people who purchase the products at auction markets, bring them to their stalls located in local wet markets where they sell them by the piece to private households.

Figure 9 Tilapia being sold at an auction market

An alternative sales channel goes through traders that buy fish from landing sites and bring them to auction markets that are not attached to a landing site. This is the case for all larger markets that have no direct access to Lake Victoria or other lakes and water bodies.

Since fisheries have a long tradition and the respective value chains and distribution channels have established over decades, it is the strong link of fisheries products to the local market that shapes the value chains for farmed products (see e.g. Jagger & Pender, 2000). It is also documented well that post-harvest activities such as processing, transportation and retailing can benefit from farmed production when wild production is not sufficient to ensure full capacity. This can happen because of seasonality and variability of wild catches, or just a low level of wild production (e.g. due to overfishing), (FAO 2016). In the Uganda context a well-developed marketing and processing sector for Nile Perch provides such a backdrop for integration with an expending aquaculture sub-sector. Whilst this would seem a logical connectivity of the value chains, it has yet to show impact, largely due to low production of farmed fish and as yet poor integration into value chains in the country. This is something that will likely develop as production volumes increase and methods of collection are able to connection these value chain actors. Potential prices of final products are currently preventing this development, as competition with capture fisheries and traditional product forms remains the limiting factor.

B.3 Farmed fish value chains

The value chain comprising various core actors (producers, suppliers, processors, etc.), as well as institutional stakeholders and actors are summarised in Annex IV. Summaries pertinent to the study objectives are provided in this main report section. Annex V provides an overview of the various key interviews undertaken, although many conversations are not included in this list.

Tilapia

Given their rather late entry into well-established distribution networks, tilapia producers have been challenged with finding entry points into traditional tilapia value chains. Representatives of commercial farms

reported that they had bad experiences with trying to sell in auction markets, the only places where bigger volumes can be sold within a reasonable timeframe in the domestic markets at this time.

According to their description, what they have experienced is that the people in charge of auctioning their fish had formed an alliance with the buyers in order to lower sales prices. Since the producers had no other choice than to sell the products at the best price offered, the eventual sales price was near or below production costs and hence the products were sold at a loss for the farm. Many of them therefore avoid auction markets, if possible and say that these are not place for farmed fish to be sold at a fair price. A *fair price* means a price that includes a reasonable profit to the producer.

A large number of interviewees observed that the strong linkage of tilapia value chains to wild capture products was a **major obstacle** for tilapia producers getting better access in domestic markets. It is therefore that, at this time, most commercial level farms prefer to sell to traders that are linked to regional markets (see Figure 6).

Such traders typically buy larger volumes (enough to fill a small truck) directly from the farm, a practice that enables producers to negotiate and agree on a price before harvesting an entire pond. Similar to wild products, farmed fish is sold right after harvest and thus very fresh or even still alive. However, in contrast to auction markets, farm gate prices are set by weight and not by piece.

It is clear that this sales channel carries much less exposure and reduced risks for producers and is therefore the preferred point of sales at this time, which due to general cost dynamics for distribution is likely to remain as a key selling point for smaller farmers especially. Most commercial tilapia farms contacted, estimated to sell between 70% and 95% of their entire production through this channel into regional markets. For example, one of the largest producers explained that whereas the domestic market was only able to absorb about 500kg of their weekly production, in the same timeframe, sales to Kenya amount to 15t. The largest share seems to go to DRC, and purchased at the farm gate by DRC traders. This is followed by Kenya.

The high dependency of larger fish farms on regional buyers has its own challenge: a sudden change in trade dynamics or restricted access due to policy changes can be detrimental. One example brought forward by all producers, is the current trade restriction recently passed by the Rwandan government: apparently based on SPS measures under WTO rules, Rwanda does no longer allow whole, ungutted fish to pass their borders. Therefore, the trade route for whole, ungutted fish through Rwanda appears to be obstructed and has left a big vacuum in demand for farmed tilapia from Uganda.

Some of the commercial producers and farmer associations have set up retail outlets for farmed fish in Kampala and in Nairobi, Kenya. These shops are directly operated by the producers or the respective producers' association and sell fresh, chilled fish to consumers or traders. Some outlets are a combination of restaurant and shop, selling live tilapia, chilled whole fish, and chilled fillets or serving fish on the premises, but this is a rare example at this time, with perhaps the best example being Go Fish Uganda. They have three outlets in Kampala where fish is sold and also a restaurant services a fish focused menu. Fish are presented live to customers in aquarium tanks for their choice. Fresh fish prices at this retail level are for 1 – 10 Kg, UGX 16,000/kg; for 11 – 50 Kg, UGX 14,000/kg; for orders greater than 51 kg, UGX 13,000/kg. Frozen fish are sold

at UGX 12,000/ kg (http://www.gofish.co.ug/fish-prices/). This is an example of proactive marketing for solely farmed fish and has received much hype in its short development and offers potential for further development by others. Similarly, other enterprises have established outlets, including Kati farms, and WAFICOS (further described below), also in the Kampala area. These businesses are continuing, although profitability/performance information is not available and must be carefully considered.

The key to these outlets is that they are focused on farmed fish, so promote farmed fish as opposed to capture fishes. This is a small but innovative step towards what seems to be seriously lacking at this time in Uganda, (focused farmed fish promotion) and is addressed further in the recommendations section of this report.

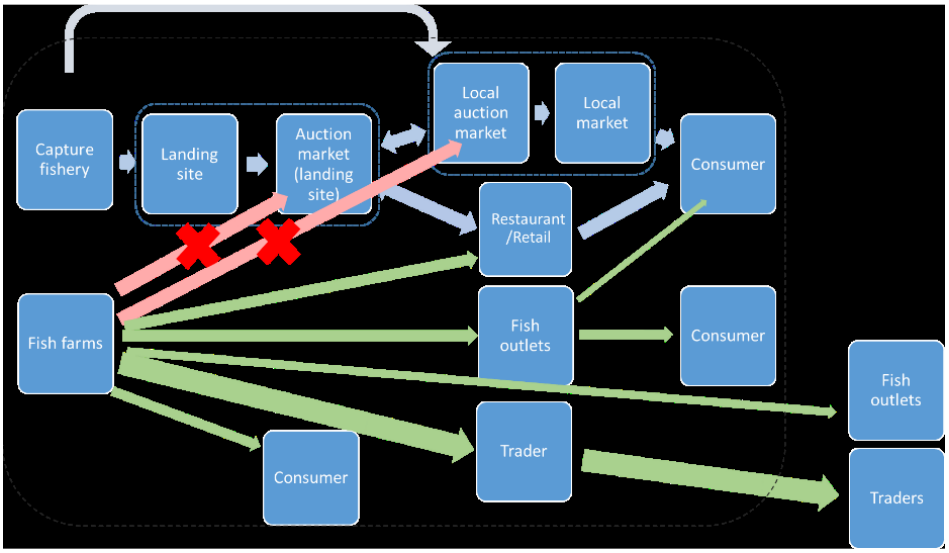


Figure 10 Description of current value chains for farmed tilapia in Uganda

Another distribution channel for farmed fish is supermarkets, where fish is sold, usually in frozen form. Discussions with shop owners and managers have indicated that very little if any locally farmed tilapia that is being sold through these channels at this time. Some challenges with the larger super markets relate to payment arrangements, such as payment on invoice after a period of time that is not conducive, especially for smaller producers who lack the credit capacity for such arrangements.

Similar to supermarkets, with the exception of those fish outlets mentioned above, few restaurants or outlets focus on fish only. While fish can be found on the menu in some restaurants, particularly in the lake areas, there are no restaurants specialized in fish as can be found in many other countries. Feedback from restaurants suggest that they buy fish predominantly 'whole, ungutted', with preference for wild capture products. Tourism and local diners drive the demand for whole fried fish, a local favourite, which tends to focus on particularly larger fish (1Kg +); which is not a product usually considered by fish farmers due to cost of production and related price expectations.

Fish markets

- In Kampala, prices for tilapia in wet markets are between 12,000 UGX for small pieces of 1kg up to 15,000 UGX for larger fish that weight 1.3kg or more. In the wet market at the Jinja central market, shops charged 6,000 UGX for sizes up to 800g, 7,000 UGX for fish between 800g to 1.1kg, and 8,000 UGX for fish that weight more than 1.1kg. In the same market, smoked tilapia sold for around 1,000 to 2,000 UGX more per piece. However, only one shop sold smoked tilapia.

Fish outlets

- In November 2018, GoFish in Kampala charged 16,000 UGX/kg for live tilapia, 12,000 UGX/kg for chilled whole fish, and 30,000/kg for chilled fillets. At Farmers Choice in Entebbe, frozen tilapia fillets sold at 34,000 UGX/kg.

Supermarkets

- At the same time, Shoprite sold frozen whole tilapia from China in 900g bags at 16,700 UGX (approximately 4 pieces), whereas frozen fillets also from China were charged at 38,900 UGX/kg. Shoprite also sells many other frozen fish products, predominantly from imports. Nile perch fillets as the only domestic product were priced at 27,900 UGX/kg.

For smaller farms, the option of selling to regional markets is generally obstructed, since traders with access to regional markets do not want to (or simply can't - for logistical reasons) spend time driving from farm to farm to fill a truck. As smaller farms still prefer to sell at the farm gate, their products frequently end up in very local markets – either through traders that operate in the areas around farms, or they are consumed by households that directly buy from the farm. Given high transport costs (that increase with distance to the farm), the small batches of fish that smallholders can produce and harvest at a time, hardly travel far, unless farmers are organized in farmers' associations.

Finally, it should be mentioned that not only smaller farms but also some of the commercial farms sell part of their harvests directly to local households and consumers. On-farm outlets for local consumers assist in dealing with the inconsistencies of size that can be found when harvesting a particular pond or cage and so provides a useful and efficient method of sales, but usually at lower or more flexible prices.

Catfish

"Catfish farmers" are both grow-out farmers and hatchery producers. Interviews revealed that 80% of them started fish farming after the year 2000. Most of the farms (90%) use earthen ponds to culture catfish. All hatcheries practise tank-based fingerling production. Monoculture and polyculture are practised by approximately equal proportions of farmers i.e. 46% and 56% respectively. Polyculture with catfish maximises tilapia production for these farmers as it controls the prolific breeding of tilapia in ponds (Isyagi 2007). Most farms have a production cycle of six to eight months, in which period the catfish under good management is expected to weigh approximately 0.8 to 1 kilogram (Isyagi et al., 2009a). The produced fish goes through the intermediary channels of marketing involving other actors or farmers themselves. The

processing and marketing section of the industry involves middlemen (local collectors, wholesalers), and fish farmers' groups whose chief aim is sales to the best bargain buyer.

The middlemen collect the live catfish from farms and distribute it. Live fish is pooled from different farms in case one farmer cannot raise the required volume. Processors and local market retailers get farmed catfish from these middlemen. There are both artisanal processors; processing less than 100 kilograms of live catfish per day; and industrial processors with the capacity to process over one ton of farmed catfish per day. Processed products of catfish on market are fillets, smoked whole fish and in 2009 a local food company started producing catfish sausages. Lastly, the grow-out catfish ends with the local and regional consumer while the hatchery products are utilised for stocking ponds and bait for Nile perch.

In fact, catfish fingerlings are mainly used for bait in Nile perch sector (Ssebisubi 2011), and bait has driven the catfish hatchery business in Uganda for many years, rather than the fish out-growing at the farm level. Markets for catfish for human consumption is something less understood, but areas of northern Uganda are known to be offering potential. This is particularly of interest with the planned piloting of catfish farming in ponds at the Apac AquaPark under this project.

Generally, it is not common to find catfish farmers with only catfish production; usually catfish are part of a polyculture system with land-based tilapia farming. In northern and eastern Uganda, where catfish is more popular and dominant it is also cultured together with tilapia.

An estimated production of 37,000 tonnes of catfish was reported by FAO-FishStat (2017). The catfish grown by commercial producers (43%) goes through the chain as follows. The grow-out farmers harvest live catfish for orders placed by customers. Due to lack of cold chains transactions are done with live fish within the shortest time (less than 10 hrs). Interviews with a farmers' marketing group revealed that registered members took turns to sell their fish, which they have to transport to the head office in tanks with oxygen.

Information from the questionnaire surveys of various districts undertaken by DAMD on behalf of the consultant during January 2019 revealed data that was not well structured so difficult to determine exact catfish production. Reported production figures from MAAIF and others see a trend towards more tilapia production in the country, based, it is believed, on more emphasis with commercial cage farming over the last decade and an easier market access for tilapia than catfish, and therefore attracting new investors.

WAFICOS reportedly (from June 2008 to October 2009), sold 25 tonnes of African catfish (*Clarias gariepinus*) and Nile tilapia (*Oreochromis* niloticus) worth 48,227,200 UGX, with over 80 % of the sales being catfish, worth 39,000,000 UGX and the remainder being Nile tilapia at that time. Some Ugandan consumers prefer catfish because of its size (usually more than 1 kg), and because it is a lower price than tilapia.

Annex VII and **Annex VIII** include details from various visits to markets and regions in Uganda, which is moved from the main text for purposes of efficiency. It is however, vital data that has contributed to this analysis and suggested as important to the interested reader.

C. Demand for Farmed Fish

C.1 Domestic demand

Feedback from the interviews carried out in during this study, including visits to various markets and producers, suggests that current demand for fish in Uganda is very much influenced by **product** and **price**, whereas **promotion** and **place** have been rather neglected factors.

In terms of products, the strong historic link of fish value chains to capture fisheries shapes not only product distribution, but also consumer preference. There appears to exist certain stigma and misconceptions regarding aquaculture products, such as "they don't taste good", "they are often small and hence immature fish", which makes it difficult to promote aquaculture products in existing local markets.

Our observations suggest that price is likely the most important factor influencing consumption and demand for fish in Uganda. A large proportion of Uganda's population is very poor and cannot afford fish on a regular basis; when they do, they prefer to buy large fish that they can share among many family members, (Kiritu, et al 2018), or if available, smaller fish that fit within the budget available.

The current market for fish consumption (current and potential consumption), estimated through household surveys (Msingi, 2018) is estimated at 245,998 t. Potential consumption, which is assessed in response to the question "if it was available and affordable", rather than actual. This represents approximately an average 4.85 Kg per capita consumption based on a national population of approximately 44,270,000 (UN, 2018).

This estimate includes all fish, including Mukene at about 44% of this total. Although estimated from a statistical sampling approach, it provides some indication of present consumption and is also compared to other protein sources, such as beef and chicken, which are consumed in significantly higher volumes in Uganda. With the significant fisheries and water resources in the country, Uganda is not mainly a fish-eating nation, not due to its dislike of fish, but due to fish availability through fish price compared to other sources of protein. Although fish is not something completely foreign, high pricing and unavailability (access through distance and cost to point of purchase) are the key barriers to fish consumption in Uganda.

It is clear that although people like to eat fish and would buy it regularly, many people cannot afford to buy it and so it becomes a rarer periodic purchase, as compared to cheaper forms of protein. Relatedly, a significant proportion of the population consider plant proteins as the most important source of protein for the household. This notwithstanding, fish is also considered as the most favourite type of meat by about a third of households, followed closely by beef a quarter of households. Again, pricing and availability remain the key factors considered by households when choosing meat types to consume.

Fish consumers in Uganda are mainly purchasing and consuming tilapia and Nile perch fish varieties, but increasingly Mukene. Dried fish and fresh fish forms are most common for consumption. The choice of dried over fresh is driven by price, but also by the ability of dried fish to be stored for a longer period, given refrigeration not being available to a large proportion of the population. A large proportion of households do

not have access to electricity, with even smaller proportions (5% or less) having access to refrigeration and appropriate storage to preserve fresh fish, which influences fish forms purchased.

Fresh fish once cooked, is eaten, as if left overnight would no longer be considered good to eat. A key concern for fish consumers is the fact that it is highly perishable and could get spoilt, and the handling of fish during purchase as it could be a source of food-borne diseases.

In terms of products, dried 'mukene' and whole, ungutted tilapia from wild capture fisheries clearly dominate local sales. Other important species include African lungfishes and Nile perch. Processed fish only accounts for a very small share of the overall market. Restaurants and households pointed out that they prefer to buy whole fish that they process on their own. They typically fillet the fish to freeze extra fillets and use off-cuts to make fish broth. Apparently, there is not yet a market with significant demand for processed fish.

Likewise, farmed fish cannot yet count on well-established distribution channels. Our study suggests that currently, the best place to sell farmed fish is in fish outlets. GoFish sell about 1.2 tons of live and 200kg of fresh, chilled tilapia per week in all three outlets in Kampala together. Of these amounts, an estimated 40% is directly consumed in the restaurant while the rest is sold over the counter.

SoN estimated their sales of chilled tilapia at 500kg /week in one shop in Kampala that has only been operating for a very short period of time and is therefore not very well-known yet. Out of this 500kg, 150kg/week are channelled to niche markets (hotel, international schools, embassies, expats from India and Japan) through one single buyer. Total demand appears to be much lower for frozen products in retail shops. Farmers Choice in Entebbe estimated their tilapia sales at only 2kg daily while they were not able to say whether the sold products supplied from farms or from fisheries.

Kiritu, et al 2018, conducted taste tests in Uganda to look at perceptions about wild fish, farmed fish and imported fish, and only a small proportion perceived they can tell the difference between wild fish and farmed fish (21%) or between local and imported (8%). When prompted to do so through a fish tasting exercise, however, almost all could perceive there were some differences in the wild, farmed and imported fish samples presented. However, to most it does not matter whether fish is farmed, wild, local or imported, so given the choice of fish being available and at a suitable price the reaction was that it would form a larger component of their diet.

What we are seeing here is a situation of basic market segmentation based on price primarily, and to some extent accessibility, price being the key driver at point of sale for the choice of protein. Fish (whether wild or farmed) is seen as a more expensive choice of protein and for many is not a regular consideration. Farmed fish (in fact all fish) must compete price-wise with other sources of protein, and given the traditional perception of capture fishes being preferred over farmed fish, (traditional tastes rather than significant product differences), farmed fish will need to distinguish itself in the markets to be a primary rather than a secondary choice.

It is concluded that farmed fishes and captured fishes, are essentially the same product, but with some differences, which ultimately do not affect consumer demand, but do affect immediate buying choices. With this in mind, farmed fish can find customers, if it can be available consistently and provide value for money.

Product quality, availability and prices that match the consumers' needs and ability to pay suggest that price will certainly have to be competitive, but as low as possible if a large proportion of the population is to benefit from aquaculture products. Alternatively, a pricing strategy that targets a more affluent consumer group is also possible, but limits sales volumes.

How can farmed fish be presented at an acceptable **price** and a welcomed choice of **product** and where should it be available (**place**)? These are the key questions to be considered by this study to feed ideas about distribution requirements.

In this discussion we recognise that fish size, price and form, as would be expected, will drive the final outcome. A business model for farmed fish is complicated by costs of production, primarily costs of feed taking up a large proportion of the cost structure and dictating a minimum price to achieve reasonable profits, in a situation where comparable fish products are competing on price in the first place.

The business model to provide the largest size of fish for the least amount of feed is how fish farming makes money. What, therefore is the minimum fish size that will sell, based on price, to a population who mostly would buy fish if only it were in their price range. A maximum selling price established to be competitive and then calculated back to determine input costs and therefore ultimately size of fish within that price ceiling is key in this process.

Catfish

Production of farmed catfish for consumption seems to be low in Uganda, despite previously being a larger contributor to production figures. It is understood that catfish farmers are there, but many using catfish together with tilapia (polyculture), as reported through questionnaires and visits (DAMD, January 2019). The main focus on catfish remains for small catfish used as bait for Nile perch fishing and some fish farms supplying to these fishers in Uganda, rather than larger focused catfish farms for human consumption. The reported over 37,000 Mt for farmed catfish production is not clearly evident in markets or through discussions with various markets and traders.

There is a reality of a lack of information/on recent demand and supply chains for catfish in Uganda, despite some catfish farm production, the supply/demand dynamics seem to be largely skewed to wild catfish, which is readily available especially in Northern and western parts of the country. The profitability of farming catfish on a small commercial scale is also questionable. There is a minimal supply chain, but not a value chain in the true sense.

Demand for catfish noted in the north of the country, which relates well to AquaPark development in Apac region and suggests a good geographical area for distribution investments. It is one region where catfish is recognised as a delicacy in the whole country, with a well-known restaurant (called ERAB) located along the Soroti-Mbale highway. Special dishes are prepared there and fresh catfish is served with Atapa (millet bread). All the catfish sold are however sourced from the wild. Market development, especially from larger farmed fish volumes being consolidated from a specific location such as Apac would include promotion and more outlets being established in the region. The current market for catfish is difficult to understand due to unclear production data and market confirmations, but with promotional efforts may be expected to grow quite

quickly. Concern is raised here as to target volumes for the proposed AquaPark in Apac, where a conservative start-up together with aggressive marketing for catfish would be important before committing to production schedules that might not sell so quickly. Market testing is required as part of the production development approach.

On the regional export front, Mpondwe border is said to be famous for the cross-border movement of dried fish products, including catfish where Congolese traders buys dried/salted fish and take it deep in their country. Mpondwe is reachable by roads, and the product form becomes important for this particular market focus and distances involved. Catfish can also be moved live quite easily, but this is not considered appropriate for DRC at this time. From the commercial farming perspective, there is need to assess the implication of production cost vs price to sell smoked products as smoking/drying would mean product shrinks/loses weight and therefore higher prices per kg. With the cost structure for farmed fish, this means that smoked farmed products may be less competitive compared to wild catch in such situations.

In Rwanda a good demand for catfish, is noted as a key distributer states that they obtain farmed catfish from Uganda, but not regularly, and as fresh on ice. They also get some frozen catfish regularly from China for both Rwanda and DRC markets.

On the value-added products front, the catfish sausage value chain has been developed and tested in Uganda with some good successes in the beginning, and restaurants mainly in urban Kampala although management of the supply chain and maintaining the production is currently a challenge. Development of this sort of value-added product is certainly possible in the medium term, but requires other investors to set-up the required facilities to prepare such products, which are needing cold storage, various specialist machinery and facilities for the work.

C.2 Regional markets farmed fish value chains

Distribution from farms to consumers, with cost driven strategies to maintain profit means that geography and location of farms is critically important to developing markets. For instance, farms in the Jinja area, SoN, for instance, would logically see markets from Kampala on the one hand, and through to Kenya, being relatively close to the Busia border east of Jinja. Similarly, a farm in Apac, such as the intended land-based AquaPark would see potential not only in Kampala, with fairly good road connections, but also to the north to Gulu / Lira (two of the largest population centres in the country) and even South Sudan as logical options. Connectivity via road systems in Uganda are key to trade development for farmed fish and as roads improve this will also encourage expansion of production. With fish being perishable, speed of delivery for fresh fish is a critical factor, as distances are extended either geographically distance or time distance due to poor connections, product forms must also change, such as dried and smoked, or frozen for instance as land routings into the DRC interior markets are considered, or even long waits in traffic or at borders.

A major regional study was undertaken (East Africa Fish Market Assessment Report; Msingi; H. Kiritu, et al, 2018), which goes into detail for the markets in Kenya, Tanzania, Rwanda and Uganda. In terms of scale and detail, it was significantly larger study than this present one. As this Msingi study is the most recent in terms of available data, key items have been extracted from that report to support this current PESCA study in

Uganda as they relate to key markets for fish from Uganda, as well as Uganda itself. The study had similar objectives in terms of defining market potential and opportunities and challenges for farmed fish distribution. It also includes consumer surveys comprising 600 – 1000 interviews in each country that split the surveys between rural and urban targeted samples, taste tests and other assessments, which are beyond the scope of this current study. Some of the key results are highlighted here below and consolidated with others from this consultant's visits and experience. The key neighbouring countries are considered here.

Rwanda

Rwanda, bordering Uganda to the South-west of the country is accessed by good roads, with reasonable easy road access where a trip from Kampala via Masaka and Kabale can reach Kigali in approximately 10 – 12 hours. From Masaka through to Kigali would reduce that trip to 6 – 7 hours by road. With the intended AquaPark in Kalangala district this indicates a routing that might take 12 hours including ferry stops, for chilled fish from the island.

Rwanda, being the key route for fish through to the Democratic Republic of Congo, and traditionally traders then take the fish over to borders at Goma (3 hours from Kigali) and towards Bukavu (5-6 hours from Kigali), where population centres are located and traders take the fish through to the DRC.

The East African newspaper (July 2018) also reported that Rwanda, with its struggling domestic fisheries, has found difficulty in raising the required quantities to satisfy the DR Congo fish demand; export data from the National Agricultural Export Development Board (NAEDB) shows that from July 2017 to March 2018, Rwanda's fish export volumes increased to seven million Kgs, from 6.5 million Kgs reported over the same period in 2016 – 2017, a 54.98 % growth in earnings. However, most of the fish was imported from Uganda and Tanzania, then re-exported to DRC. DR Congo is Rwanda's leading regional fish market, accounting for 99.91% of the exports. "The big quantities of fish have their origin in Uganda and Tanzania and re-exported to DRC," according to NAEDB trading statistics.

Currently, trade barriers with Rwanda have been mentioned by most stakeholders as a key challenge for current aquaculture development in Uganda. Rwandan fish value chains have been described as not very complex compared to other countries (Rothuis et al., 2014). However, the Rwandan fish market appears to become increasingly challenging from a Ugandan perspective. Although trade has reportedly been hampered due to trade restrictions in the form of SPS measures applied to whole, ungutted fish, some interviewees believe that this justification hides the real motive for this measure. Instead, they believe that the action targets the protection of an emerging domestic aquaculture sector, while others claim that imports of tilapia from Uganda have decreased as a consequence of Rwandan traders increasingly importing cheaper tilapia from China, which they thaw and then re-sell to traders or consumers in DRC claiming they are fresh products.

DRC also receives catfish and mackerel frozen from China that is transported through Rwanda to borders such as Gisenyi. The need for processed fish in Rwanda, under the current rule, means extra costs for Uganda fish farmers/traders to prepare the fish for such a market. All these opinions are part of the complex picture at the present time.

Others have reported that current and potential fish consumption in Rwanda is estimated at about 49,000 t, and that fish is currently consumed by 87% of the population interviewed in Rwanda. High pricing and unavailability are some of the main barriers to fish consumption in Rwanda., whilst fish is consumed by most households suggests it is only considered as the most important source of protein for the household by 12% (Msingi, 2018). Additionally, beef is considered as the most favourite type of meat by half of the households, followed by fish (37%). Quality is maintained as a key attribute for consumption.

Fish consumers in Rwanda are mainly purchasing and consuming tilapia among other fish varieties including Dagaa (Mukene). Storage (refrigeration) for meat products at the household level is low and reported at less than 10% of households, which influences fish forms purchased. Consequently, over 80% of most fish forms are purchased and consumed within the same day; fresh fish therefore, is the most common form consumed and preferred, with an average of 2.3kgs of fish in a month, with consumption observed to be higher in the urban areas.

Additionally, most consumers believe that the fish they purchase and consume is wild fish from local sources. However, based on taste testing most could perceive there were differences in the wild, farmed and imported fish samples presented (Msingi, 2018). To most consumers it did not matter whether fish is farmed, wild, local or imported, because most of them believe all fish is the same.

Key concerns that fish consumers have is that fish is highly perishable and could get spoilt, and that it is not well handled and could pass food borne diseases. Although fish is well-liked in Rwanda choices of meat protein remain based on price and availability, together with household preference.

Democratic Republic of Congo (DRC)

DRC is a huge market for fish, with the eastern part, north and southern Kivu, apparently consuming approximately 100,000 Mt annually *(The East* African newspaper 31 July 2018). DRC is an attractive destination for farmed fish from Uganda. Many of the larger producers sell part of their produce to DRC through traders operating from Rwanda. Some reported that DRC even provides for the largest share of their sales.

With a large population and access through well-recognised and accessible borders, relationships with traders to link to the potential has always been of interest to those selling fish. Fish is enjoyed and there is a seemingly insatiable appetite for fish products of various forms.

A challenge seems to be establishing relationships that can be trusted and at a profitable margin for Ugandan producers. Exact markets are unclear in terms of preferred sizes, quality standards, etc. and price seems to be a major driver at the expense of other attributes. Price, however is also largely dictated by traders, however it is well-known that eastern DRC is generally an area of low-income populations, so traders drive down prices so as to maximise margins once fish is transported into DRC.

Due to security concerns and lack of direct access into the country, trade to DRC predominantly goes through DRC traders/ middlemen and makes producers dependant on their cooperation. Export of farmed fish from Uganda to DRC has been negatively affected based on current trade restrictions, together with security issues

(mentioned by most Ugandan traders as the main reason why they do not operate directly in DRC, but deal with DRC traders as a further step in the distribution chain). Furthermore, recent warnings and travel restrictions due to reports on Ebola outbreaks in DRC close to the border areas with Rwanda and Uganda have further aggravated the problem. The border at Mpondwe between Uganda and DRC is a traditional routing for various goods, with a large border post in place. This is used for fish exports and is equally available to farmed fish, especially with current restrictions through Rwanda. This direct route to the DRC is achievable with the most direct routing through Fort Portal and Kasese, which takes approximately 7 – 8 hours from Kampala. Alternative a route goes through Masaka as well, and keeping in mind the Kalangala AquaPark it brings this particular DRC border with Uganda as a realistic option for expanded marketing of farmed fish. Comments from the validation meetings suggested caution when considering Mpondwe as a potential investment site, as it is known to have well-established cartels/ trader groups, as well as security risks associated with it.

Monthly fish export data for 2018 was collected from Mpondwe border (fish destined for DRC from Uganda). This comprised over 80 pages listing transactions for official border crossings. Data included; date, seller name, origin, fish species and product form, as well as weight (kg) presumably gleaned from export paperwork at the border. The data is not well-recorded, as it only covers a few months and is not standardised in terms of species names, etc. However, it does give some indication of volumes and types of fish being exported, which likely include both farmed and capture fisheries, although this is not discernible from the lists; statistics indicate the majority is most likely from capture fisheries. Approximate percentages for key species are as follows:

Fish group	%
Catfish	11%
Nile Perch	66%
Lung fish	3%
Mackerel	1%
Mukene	7%
Tilapia	12%

The data records selected full months only; including, **March 2018, 675 t** of exports, **April 2018, 1,116 t** and **May 2018, 912 t** and **December 2018, 961 t** exported through this border between Uganda and DRC. Other total months are missing, but partial months for **November 2018, 420 t** and **January 2019, 512 t** are included.

Nile perch dominates in various forms (fresh, smoked, by-products (heads, frames, etc.), and then tilapia and catfish and lessor volumes of lungfish, mukene/silverfish and some mackerel. As mentioned, it is possible that some of the tilapia and catfish might be farmed, but it is not recorded. Indications are that some local farmers in the Kasese area for instance are exporting fish through Mpondwe, mostly this is related to traders visiting the farms and consolidating fish to take to the border. There is a need for better collection and transportation to the border, which also does not have good logistics facilities. Data collection, if improved, would help to understand farmed fish distribution and potential.

Kenya

The total amount of fish produced in Kenya in 2014 is estimated at 206,647 tonnes. Freshwater capture fisheries accounts for 182,792 tonnes and farmed fish 23,855 tonnes. Lake Victoria contributed about 90 percent to capture fisheries. Freshwater fish consumption in 2014 is estimated at 195,206 tonnes, taking into account post-harvest food losses and a negative trade balance. The average per capita consumption is estimated at 4.5 kg in 2014 (FAO country analysis: http://www.fao.org/fishery/facp/KEN/en). Although data conflicts in exact reported numbers between FAO and state statistics, it is reported that the main types of fish currently farmed are tilapia, catfish, carp and trout. In 2015 an estimated 27,125 tonnes of farmed fish was produced in Kenya, with tilapia representing about 75% of total production, followed by catfish (17%), carp (6%) and trout (<1%). The following table summarises the situation:

Species/item	2008	2009	2010	2011	2012	2013	2014	2015
Tilapia (FAO)	3,113	3,424	9,115	16,602	16,115	17,626	18,072	No data
Tilapia (Min.)	3,113	3,424	9,115	14,689	16,115	No data	No data	No data
Catfish (FAO)	935	1,047	2,188	3,984	3,869	4,230	4,337	No data
Catfish (Min.)	935	1,047	2,188	3,525	3,868	No data	No data	No data
Common Carp (FAO)	355	373	729	1,328	1,289	1,410	1,446	No data
Carp (Min. stat)	355	373	729	1,175	1,289	No data	No data	No data
Trout (Min. stat)	49	51	122	186	214	No data	No data	No data
Total (FAO stat)	4,403	4,844	12,032	21,914	21,273	23,266	23,855	No data
Total (Min. stat)	4,452	4,895	12,154	19,575	21,486	23,501	24,096*	27,125

Figure 11 Aquaculture production 2008-2015: Farmed fish production in Kenya (2005 - 2014) Mt

Source: FAO & State Department of Fisheries + * Source: Gap analysis report on aquaculture 2016

Projecting farmed fish from Kenya by extrapolating the trends between 2008 and 2014, the total volume of farmed fish produced will be approximately 52,000 tonnes by 2024. Kenya, however, has far greater capacity for fish farming, with some estimates suggesting a production capacity of over 11 million t per year (FAO Fishery and Aquaculture Country Profiles 2015, The Republic of Kenya). According to official statistics, the total amount of fish imported in 2014 was 5,853 tonnes.

The majority of Kenyan fish imports originate from Uganda's portion of Lake Victoria, these may however not be fully represented in official statistics. The balance of imports is from aquaculture and wild catch

producers across Africa, Europe and China. Excluding imports from Uganda, frozen mackerel and frozen herring, respectively, represented the largest quantities of imports prior to 2014.

In 2014 frozen tilapia imports, the majority of which are from China, surpassed frozen herring imports to represent 30.8% of all imports, trailing mackerel imports which stood at 45.4%.

Consumption trends are estimated from what data is available and follow a simple logic of ((national production - post-harvest losses + imports – exports)/ population). For 2014 data this is calculated to be approximately 4.3 Kg per capita. Assuming a similar per capita consumption population estimates for 2025 suggest a total consumption increase of 50,000 t of fish required for a total of 245,000 t. It is likely that Kenyan farmed production will grow, and adjustments to imports would also compensate for requirements. An extra 50,000 t of fish in 5 years is a significant growth, also current trends do suggest that aquaculture would be able to achieve this in Kenya.

Kenya is a major export country that has been pointed out by several interviewees in Uganda. Unlike in Rwanda and DRC, export processes and institutions appear to be more transparent and accessible to Ugandan traders and therefore, some tilapia producers directly export fish themselves with one producer serving three different markets including Nairobi, Nakuru and Eldoret, where they operate fish outlets or sell to local markets.

Many tilapia producers we interviewed reported that Kenya is currently their preferred export destination. Despite of overall volumes sold to Kenya being inferior to those destined for Rwanda/DRC, Kenya is attractive for its relative ease of export and ability of Ugandan traders to remain in control and connected to the distribution up until the final customer. Significantly, the distance and road access are supportive of reduced costs and speed of delivery. Nairobi is approximately 10 – 11 hours from Jinja, whereas the border at Busia is under 3 hours away, opening up export opportunities and also currently largely dealing with farmed fish. Oher pertinent information gleaned from a selection of secondary sources indicates:

The current market for fish consumption (current and potential consumption) in Kenya is estimated at 367,506 t and fish is enjoyed by 75% of households, but whilst fish is consumed by this significantly high number of households, only 16% consider it as at the most important source of protein for the household. Plant proteins are considered as the most important source of protein by most households

This notwithstanding, fish is considered as the most favourite type of meat followed closely by beef. Pricing and availability are some of the key factors considered by households when choosing meat types to consume. Similar to other countries, and based in part of the large proportion of lower income families and generally high cost of fish as compared to other protein sources. Fish consumers in Kenya are mainly purchasing and consuming tilapia and Nile perch fish varieties. Most consumers (70%) are also purchasing fish in the deep-fried form, and Omena (dried and fresh).

Fresh fish although generally preferred, although a significantly higher proportion of households (60%) have access to electricity, small proportions have access to refrigeration, which influences fish forms purchased. Logically, consumption observed to be higher in the urban areas, based on access to markets and income/ price choices.

Expenditure on fish and fish products shows variation across the country and monthly household income bands affect purchase choices, as would be expected. Small proportions of households consume fish outside the household, more so, in the urban areas, though, consumption in the households is generally higher. Comparably to Rwanda, most could discern differences between wild fish and farmed fish or between local and imported varieties.

Key concerns for fish consumers include the handling of fish during purchase, as it could be a source of food-borne diseases, and that it could get spoilt since it is highly perishable. As observed in Uganda and recorded in Rwanda as well, overwhelmingly the key factors cited for dictated choice of meat protein is price and availability.

Tanzania

Due to distances to Tanzania urban centres from Uganda and competition from marine fisheries in Dar es Salaam and other centres, Tanzania is not often considered as a main target for farmed fish from Uganda. However, it is estimated that the current market for fish consumption (current and potential consumption) is approximately at 630,000 t and fish is currently consumed by 87% of the population in Tanzania. High pricing and unavailability are some of the main barriers to fish consumption in Tanzania, as in other countries reviewed for this study.

Fish consumers in Tanzania are mainly purchasing and consuming Nile Perch, Tilapia, and the Indian Mackerel fish varieties, as well as the local Dagaa. Again, based on similar issues of electricity, transportation and access to appropriate storage at the household level, consumption of fresh fish is reported to be higher than other fish forms. Generally, fish-consumption is reported as quite high with an average of 5.8kgs of fish in a month at the household level, with urban areas being the main consumption areas based on market access and likely influenced by income levels.

South Sudan

It has been pointed out by several interviewees that South Sudan was an interesting trade partner for fish from Uganda in the past and although going through continued civil unrest this continues, although not exploited for farmed fish so far. Looking ahead optimistically, it should be kept in mind that fish marketing efforts can continue and with reasonable road access and border procedures for fish movement well-established, farmed fish can be a suitable option.

Fish travels to South Sudan north from Gulu by road, and offers potential for continued growth for farmed fish. Gulu is just 5 hours from Juba (notwithstanding border formalities), the capital of South Sudan, via the border with Uganda at Nimule. Juba has a population of approximately 450,000 with fish markets in Juba able to handle fish supplies generated locally as well as from such imports. Markets in Juba are also undergoing upgrades through funding from the UN and others, so infrastructure is in place to handle fish arriving from Uganda. The Konyo Konyo Fish Market, in Juba for instance, was inaugurated in May 2018 and was constructed to house 126 stalls – 73 for processed fish and 53 for fresh fish – with individual storage

spaces, a borehole, water storage and water taps, office space, communal storage, toilets and generators for power supply. The market opened for operations in May 2018. Traders have also been provided fish trading tools including; aprons, gloves, knives, chopping boards, wash basins, cool boxes and stools to improve the quality of fish sold at the new market. In additional to the construction of the facility, resident fish sellers also partook in various training courses addressing standard sanitary operating procedures and fish handling. (source UNIDO https://ss.one.un.org/).

Figure 12 Konyo Konyo Fish market Juba, South Sudan

C.3 International Markets

Although Uganda already has established market access for fish and fishery products in the European Union, for most of the past years, the fish exports to the EU have been fish captured from the lakes. The access of fish products from capture sources to the EU market came after a rigorous process that prepared the operations in the fish value chains to comply with stringent food safety requirements applied in the EU markets. The Competent Authority for fish and fish products was equally prepared to fully guarantee the safety of capture fish produced in Uganda to the markets.

As the aquaculture production is growing, similar efforts are required to prepare the operators in the aquaculture chain to comply with the stringent requirements of the EU market. It should be noted that due to the nature of production processes, aquaculture fish is exposed to more food hazards than capture fish, which also attract strict food safety requirements by the markets. Already, some work has been done to improve the operations of both the aquaculture operators and the Competent Authority to meet the requirements of the EU market.

As such in June 2010, through a European Commission Decision, Uganda's EU food safety harmonization dossier for aquaculture sector was accepted, and since then Uganda has been listed among the countries authorized to export fish of aquaculture origin to the EU. However, this position will be maintained if Uganda continues to positively comply with the relevant EC legislation, which requires preparation and implementation of annual drugs and chemical residue monitoring plans for aquaculture products. The implementation of residue monitoring plans can enable Uganda demonstrate the safety and quality of the aquaculture fish, which will have a ripple effect of increasing demand in local and regional markets. It will also facilitate Uganda to tap market opportunities for aquaculture fish farther afield; this is seen as a possibility for longer-term market development. Similarly, UAE, has shown interest in fish from the Lakes region, with requests for tilapia farmers from places, such as Dubai. The potential here is great, but until farms can have more consistent volumes and distribution can be better organised, it remains distance.

Larger producers can certainly consider these markets if the consistency of volumes and harvesting can be achieved. Similarly, processing and value-added products would fit well with both the EU and Middle East

interest, and use of existing processing facilities for Nile perch, would seem like a logical route for this to occur. Such facilities, not only have the equipment, capacity, expertise to prepare appropriate products, but also have the depth of experience for exporting to more distant markets, whether fresh by air, or frozen by container load. This is likely to be prevalent once production volumes expand in Uganda and individual companies or group organisations can contract, or partner with the processing facilities to align their marketing efforts.

C.4 Demand for fish and growth potential for aquaculture products

Various studies have aimed at defining domestic and regional demand for fish and aquaculture products in the form of total consumption volumes. For example, Kasozi et al. (2017) estimated that Uganda's annual per capita fish consumption was 11.5 kg and thus higher compared to India.

Another study found that 85% of all households in Uganda consume fish, with an average monthly consumption of 3.4kg, whereas a third of all interviewed households claimed fish to be their most favourite source of animal protein (Kiritu et al., 2018).

In contract, the World Bank (2013) projected that per capita consumption of fish in Sub-Saharan Africa will decrease over the coming years, from 7.5kg in 2006, to 6.1kg in 2020, and 5.7kg in 2030. However, this reduction of per capita consumption will be compensated by significant population growth. Overall fish demand in the region is therefore still projected to increase by 29.7% between 2010 and 2030.

For the sake of indicative requirements for fish consumption, using population growth (source UN, 2018) for Uganda and its immediate neighbours over the next 10 years, the following is calculated assuming an average 4kg per capita consumption of fish, this indicates Uganda alone will require approx. 64,000 t of fish extra to what is currently available. Extended to the region the example shows a massive nearly 360,000 t required in the next 10 years assuming this consumption average is maintained; clearly even at 50% of this number the number is still very high and likely beyond what can be delivered efficiently given current farmed fish supply chains and collection and distribution options.

Country	Pop. 2018	Pop. 2023	Pop. 2028	10-year Pop. growth	Increase in fish supply to 2028 (t)
Uganda	44,270,563	51,822,128	60,239,885	15,969,322	**63,877**
Burundi	11,216,450	13,049,303	14,985,535	3,769,085	15,076
DR Congo	84,004,989	98,160,404	113,770,328	29,765,339	119,061
Kenya	50,950,879	57,395,145	64,166,647	13,215,768	**52,863**
Rwanda	12,501,156	13,960,532	15,427,633	2,926,477	11,706
South Sudan	12,919,053	14,671,974	16,502,233	3,583,180	14,333
Tanzania	59,091,392	68,591,196	79,155,997	20,064,605	80,258
TOTALs	274,954,482	317,650,682	364,248,258	89,293,776	**357,175**

Figure 13 indicative fish consumption increases over the next 10 years

Fish will either not be available and consumption will be reduced, or it will come from fish farming, or imports and importantly reductions of post-harvest losses, which currently represent a large potential volume if well-managed and not wasted. Clearly fish farming has potential to contribute and importantly regionally, individual countries have the potential to dominate the production, inputs' supply chains and distribution systems depending on how the sector is managed and supported for each country. Uganda is in a position to dominate.

In this analysis, a distinction has to be borne in mind during such discussions, as to what is demand vs. what is consumption? Demand would be "how much fish would you consume if you were able to afford it and it was available", as opposed to consumption which is "how much fish you currently consume". Averages per capita are simple calculations based on total population. Consumption is easier to calculate, as it equates to total production minus (-) wastage *minus* (-) exports *plus* (+) imports. Such data is not accurate to start the process of accurate calculation, importantly the production part of the equation. This of course includes farmed and capture production. Data was not available to the consultant during the study period.

Often due to ability-to-pay and supply dynamics, demand is much higher than actual consumption, (demand is not able to be satisfied and consumption is what is actually achieved and also easier to calculate). In the context of volumes required and potential demand, the contributions of imports are critical, but often maligned as competitive to the local industry. Importing fish should be balanced with local production, but is definitely necessary in large quantities to serve segments of the market as the population grows.

While all above figures suggest that domestic and regional consumption for fish should increase in the coming years and can accommodate increasing aquaculture outputs in the light of future population growth and stagnating or even stable production from capture fisheries, a detailed assessment adds nuance and reveals a more differentiated picture. Annex VI provides national data for key population centres, as well as data for neighbouring countries to give some perspective.

From an overall sub-sector perspective, at this time, growth of farmed fish production at the national level in Uganda, together with how the sector develops in terms of inputs and distribution systems, offers significant potential. Uganda, being central in the east African region, and with high demand from the surrounding countries and their related estimated population growth, can become a significant player in the region for both production and input supply. Inputs in the regard also relate to expertise in research and training. Regionally Uganda as population centres, but also dynamic expanding districts, which are not easily capture in such studies. Arua District for instance has had upheavals, but is expanding and has over a million people in a small area and thus represents potential development.

D. Competitive positioning for farmed fish in Uganda

D.1 SWOT

Overview

As a preliminary step towards defining a way forward and seeking tangible, practical recommendations for developing the marketing functions for the sector at this stage in its development, a SWOT (*Strengths, Weaknesses, Opportunities, Threats*) analysis is well suited to set out the competitive landscape that fish farming currently has to deal with and defining a route forward to help establish farmed fish as a sustainable and preferred choice for consumers. SWOT analysis is recognised as a traditional view of competitive analysis, and serves well at this key stage in the sub-sector's development in Uganda, as it highlights the main issues, which if not addressed overtime, will have negative impacts on the situation.

A long-term perspective is the goal of this work, as opposed to short-term successes, which often confuse market reactions, as well as policy inputs. This is particularly important when the PESCA project is attempting to support legislation, regulations and guidelines and establish an environment of long-term private sector involvement. This being said, interventions recommended at this stage of the Project are hoped to be short-medium term demonstrations of a wider long-term approach to improving access to farmed fish.

Reviews of neighbouring countries in the region, where each are also looking strategically at their own aquaculture sector's development, we see many similarities of process in terms of project development (regional & national aquaculture development projects), market assessments (regional, Kenya, Zambia), ideas about developing AquaParks (Zambia, Malawi), various sector experiences and interventions, based on some initial commercial success (Zambia, Zimbabwe, Ghana). Essentially there is a "buzz" in the region focused on aquaculture potential as an important growth area, which in addition to attracting development partners, is also attracting various investors in the aquaculture value chain (production & feed in particular).

This "buzz" is also driving expectations, which unless considered carefully could result in some disappointment, as developing the aquaculture sector has not proven easy globally, with many examples of initial failures, disease issues, extended government support requirements and unforeseen market crashes for example. If we remember the excitement of Lake Harvest in Zimbabwe, over a decade ago, where fast growth, funding support and exports of tilapia fillets to Europe, it seemed like an incredible future for the region, we now see the same company struggling with changes to the competitive environment, which have caused them to turn away from European exports and focus regionally, with then further exciting growth into Uganda and Zambia by the same company. Even today, however, this same company is not showing significant progress, and this is in part due to a market development strategy that is not working as well as expected. This being said, others, such as Yalelo in Zambia (a recent success) are impressing with fast growth in production, strategic partnerships with reputed feed suppliers, and aggressive, seemingly proactive marketing approaches and now further concrete actions towards becoming established in Uganda with large production envisaged.

Although the future is never predictable and perfect information is never available for the management decision process, there is significant experience and understanding of what might happen that allows for approaches that can be flexible and agile to such potential changes. This is the challenge of any marketing process, especially when newer products are the topic.

Currently in Uganda, uncertainty of markets drives the sector's performance and potential changes of the investment playing field also can cause overnight upsets, or overnight redirection that would not ordinarily be foreseen. A common line when discussing fish farming in the region is that many small-scale farmers see exciting potential, but do not have the business skills or market understanding. It is precisely this lack of clear planning and knowledge that is causing many to jump into production, with ponds and cages and purchases of fingerlings and feed, and then within a year or two, the realisation that profits are not materialising.

Related to this is often a keen production-oriented business approach, without a market driven understanding, resulting in farmers producing fish, usually poorly, but then struggling to sell them. This is also exactly what has driven some countries, and other sectors to develop nucleus farms, now being considered as part of the potential AquaPark strategy, as it is a methodology/ strategy to ensure that small - scale producers can connect with the more sophisticated aspects of the supply and value chains (in the case of fish farming, seed, feed, management /technical knowledge and marketing and market access). The entry of larger players in Uganda should encourage these out-grower relationships as well and thus help grow the small farmer component of the sector, with hopefully smaller farmers becoming bigger over time.

The following SWOT review structure for Uganda, is intended to capture some key issues related to marketing and comprehensively help establish a picture of the current and upcoming reality, which is analysed to then direct options for a way-forward. There are no correct answers in this process, but it provides the opportunity for an informed approach, based on what is known, what has been experienced elsewhere and what can be therefore foreseen.

Based on data collected in this study, together with many discussions and interviews with sector actors and stakeholders, a summary of strategic marketing-focused issues is made in tabular form, using the SWOT structure as guidance. An overall SWOT analysis was undertaken, then a more focused version based on the 4Ps of marketing to drill down on key issues. Annex IX provides these raw analyses. Conclusions and discussions follow below.

D.2 SWOT Analysis

Strategic Analysis

Given the summaries in the SWOT analysis matrices, which captures various Issues facing the aquaculture sub-sector and its market development in Uganda, we now look carefully at these issues to formulate a ***strategic response*** and thus an ***action list*** that fits within the Project's mandate (and budget). The specifics to the 4Ps, above, were confirmed during a validation meeting in Uganda for this report to expand on what was originally presented.

This study, together with inputs from other studies, has revealed a number of challenges facing the competitive positioning of farmed fish products in Uganda and regionally at this time. With a focus on marketing and distribution, these are further detailed here using the 4P's marketing mix approach to summarise and focus key marketing issues to be addressed.

This 4P's approach is a simplified way of clarifying actions within a complex environment. It is recognised that all components of the mix need to work together for a strategy to start working. A **strategy is only as good as the structures / resources in place to support that strategy**, so this has implications for the support from this project initially, but from others, not least the GoU into the future. This is a commitment that has to be made if longer-term success is to be achieved; short-term answers are not intended here. Resources in place and available to feed the strategy are the Strengths and Weakness component of the SWOT analysis, where an honest appraisal is essential if good decisions are to be made.

Suggested actions outside the Project budgets are therefore also considered and included in recommendations, as the Project's actions will only be a small starting contribution that will need more input as the sector grows. The following discusses the 4Ps as understood from the SWOT analysis process.

Product

- Fish farming development has been limited to the two species, Nile tilapia and African catfish, with the latter not primarily been farmed for food fish at this time, although some market development has been recognised in Uganda and regionally, as it is recognised as a fish that is easy to grow and favoured by some markets. Statistics suggest that there is indeed a large production of catfish in Uganda, but this is not evidenced from the various field missions undertaken. These species are the focus of this study, because they are the main products produced in Uganda, are low-priced products, recognised globally at a generally *commodity* level product, rather than a specialty high priced product. This has long-term implications for profitability for the sector and puts pressure on improving costs across the board, as well as finding ways to maximise price. In the short-term, higher prices are possible with careful targeting marketing and specific value-addition.
- Given the increasing demand for fish as a result of the growth of human populations, food adaptations for better health, together with a general uncontrolled global overexploitation of wild stocks, most countries in the region will have to develop fish farming if fish is to remain an option for protein for human consumption. The two species *Oreochromis niloticus* and *Clarias gariepinus*, which are African endemic species (among the best in the world for fish culture) are very much the regional focus for inland fish farming at this time, and will remain so for the foreseeable future. With this in mind, all neighbouring countries (Kenya, Burundi, Rwanda, Tanzania, South Sudan, as well as Egypt, Zambia, Zimbabwe, Malawi and others) are and /or will be focused on the same species (products). The region is developing aquaculture together to produce the same products, logically and by default increasing competition between each other at the same time!
- Notwithstanding the already established production from capture fisheries throughout the region, (of the same or similar products). Competitively, and looking to the future, this presents a negative environment, which needs to rely strongly on population growth and a diminishing capture fishery, to help drive its

success and ultimately will diminish profits based on company growth and economies of scale and vertical integrated structures, which provide internal benefits for input prices; this is a natural economic process and well-documented for many industries. This is likely, in the short term, to push prices downward, rather than upwards, and also push border controls to reduce competition through various tariff restrictions to protect national fish farm development strategies in the region. This has recently been experienced on the borders between Uganda and Rwanda.

- With these key species involved, this indicates a requirement for segmented marketing approaches that will maximise prices based on product forms, value-addition, and differentiation based on quality and consistency. Taking advantage of spatial demand distribution due to availability is also an opportunity. This is where farmed fish have an advantage over capture fisheries, especially when it comes to consistency and volumes of graded sizes, as well as opportunity for live presentations, in addition to more familiar whole and fillet presentations.
- Some mention is made here to diverge from tilapia and catfish as a future consideration for the sector, but this is not the focus on this study. Without marine coast, Uganda is limited in choices for such product expansion, although some species may be considered.

Price

- Tilapia and catfish trade are mainly price driven; price is a factor in protein choices for the region given a large proportion of lower-income consumers. As long as markets are only approached through pricing strategy, farmed fish will not compete as well with wild products. Price competition is never a long-term successful approach. This is best illustrated in the conflict that tilapia farmers face when being offered a price per fish rather than per weight. Many interviewees pointed out that optically, farmed Nile tilapia of similar weight looks smaller than wild tilapia due to a slightly different physiology (overall shorter yet rounder body, more fat, etc.). Although this factor is understood by consumers and in market situations, it did not seem obvious to many that this also implies that farmed fish products might need a different marketing approach than wild fish.
- The strong price focus may explain why 'the cheap imports from China' are perceived as a significant risk and constraint for growth of the sector by a variety of local stakeholders. However, these cheaper imports are only perceived as cheap, whereas high earning consumers, prefer a local fish and are willing to pay more. Chinese fish (frozen whole) currently available in Shoprite Entebbe, are selling at 16,700 for 900g. This is for 4 small tilapias (225g average each). This equates to approx. UGX 18,500 per kg. This is not cheaper than current farm gate fresh fish selling at UGX 8,000 per kg, but at the borders given low delivery costs, prices can be very competitive, whilst bringing much larger margins to traders; consequently, Chinese fish are dominating at the borders with DRC in Uganda and in Rwanda.
- Additionally, a smaller fish grown on a farm would provide opportunities for a better feed cost/ price ratio and thus potentially more profit. The question therefore is if Chinese importers, via Shoprite, offer small fish at a higher price, why can't Ugandan fish farmers achieve a better price also with smaller fish? It would be interesting to see local farmed fish, frozen, at a lower price sitting next to these fish on the shelf to see the results, together with promotion of "locally grown"; a potential niche market to look into.

- Not sensitive to market segmentation, many actors in fish trade seem to believe that there is only one market entrance for all; this is the current situation. Appreciating the idea of market segmentation and placing farmed products accordingly in areas that have less access to traditional capture fish markets, they might find that the price situation will be less of an issue, at least in the short – medium term. This approach, together with proactive marketing and promotion would provide a better opportunity to ensure farmed fish is purchased at a fair price.
- Considering the general stagnation in global wild capture fisheries and the fast growth of the aquaculture sector, it is reasonable to expect that productivity improvements in aquaculture will lead to a reduction in the costs of production. If the two products (farmed and wild fish) are close substitutes, farmed fish will win market share from wild fish overtime. If demand is not perfectly elastic, the price will decline, as will the incomes of fishers. However, if the two goods are not close substitutes, there are no market effects, and the increase in the supply of farmed fish will only lead to a price decrease for farmed fish (Asche and Bjørndal, 2011). The former is expected in the long-term, especially as commercial and vertically integrated farms become more common.
- Farmed fish are similar, but can be managed for size and other product attributes, which allows them to be available to specific markets as required – a consistent choice of sizes and volumes is a critical marketing factor that fish farming can provide easily, as well as with production from groups of smaller farms, if organised well and production/ collection and distribution are also coordinated. This would allow for price control, as targeted markets and consistency can negotiate a favourable price point.
- Similarly, seasonality is not an issue with farmed fish, as again, constant volumes can be supplied throughout the year and on demand thus taking advantage of price variation related to supply dynamics at various times and in fact taking advantage of seasonal supply variation from capture fisheries.
- A large number of interviewees reported that there are significant seasonal variations in fish prices. Due to high fish landings from wild capture fisheries during the months with strong rainfalls (September to December), fish prices are low, whereas they tend to be higher in other months. June and July appear to be the months with lowest fish landings from capture fisheries, and thus the months with the highest market prices for fish. Bukenya (2017) made similar observations analysing farmgate catfish prices in Uganda over a period of ten years.
- Prices for farmed fish are therefore strongly influenced by wild fish trade. During season of high landings of wild capture products, farmed tilapia is sold at farm gate prices of 8,000 UGX (1.90 EUR) to 8,200 UGX (1.93 EUR), whereas the same products can fetch 9,000 UGX (2.10 EUR) during months with poor supply. As producers believe that they require a minimum of 9,000 UGX to cover their production costs, those being members of UCFFA tried to agree on a minimum farm gate price of 9,000 UGX (2.10 EUR) per kg of farmed tilapia, but apparently not all members stick to the rule and undermine the agreement by selling at 8,000 UGX (1.90 EUR) per kg. Recent additional information from a large producer in Uganda indicates that prices seem to be trending down at this time and UGX 8,000/ kg is even a little high.
- Our findings further revealed that lake tilapia, which is almost exclusively consumed locally, is traded by pieces rather than weight. At the time of interviewing (lake) tilapia was auctioned for approximately 8,000 UGX (1.90 EUR) per piece for fish of 1kg or more at landing sites in Kampala, and at auction markets in

Busega (Kampala). While many interviewees claimed that farmed tilapia fetches slightly lower prices, this could not be confirmed on the ground.

- Due to the consistency and controlled operations of harvesting, there is opportunity to maintain a higher quality and visual presentation, with integrated operations for ice, basic processing, packaging, etc. to enable product branding opportunities ("always on time and of the highest quality at a size of your choice"), thus allowing a better price range and negotiating position. As we have seen in a few focused outlets, live fish can also be an option to develop as a niche opportunity.
- Lack of information is a clear constraint that affects stakeholders at all levels in fish value chains in Uganda. This is most apparent in the case of consumers, many of whom are only interested in price. Our study suggests that poor information and knowledge is also dominant among producers, traders, and other key actors, such as restaurants and fish shops. Most managers and employees in small shops that were interviewed did not know whether the fish they sell is farmed or comes from capture fisheries. When asked, they could not tell whether there was a difference.
- We also found that there is a misconception about smaller fish that is of importance particularly for farmed tilapia: in recent years the government has rigorously enforced measures to prevent the trading of immature wild fish, which included enforcement of minimal harvest sizes so as to prevent the poaching of immature fish. Warned by the harsh punishment that must be expected in case of infringement, many traders and processors said that they are not allowed to handle farmed fish, as latter was often too small in size to be considered mature. Although they were very aware of legal restrictions on immature fish trading, they did not know that the restrictions only apply to wild fish. This information gap is an important bottleneck for better marketing of farmed tilapia.
- Another information gap, the fact that misguided or misinformed new entrants are encouraged into aquaculture development on the expectation of returns on investment, with simple business models (pond, fish, feed, sell, make money) has already been pointed out by Dalsgaard et al. (2012).
- High production costs and elevated farm gate prices for key farmed species such as tilapia are a major constraint for growth of the sector. Many producers and traders have participated in the respective markets for years, which allowed them to establish very tight trade relationships. It will be comparatively more difficult for new entrants to access markets that already have access to international markets and are supplied with tilapia at extremely competitive prices. Although not part of this study, cost reduction in production is therefore key for further growth of the tilapia sector in Uganda and activities targeting market expansion need to include measures that help to reducing production costs.
- Similarly, although many interviewees were of the opinion that larger tilapia get better prices than smaller fish, one chairperson of an auction market pointed out that such general statements did not capture the full picture as price was all about demand. He added that on Sundays, auction market prices were typically higher due to more people including foreigners bidding for fish, and that for example customers of Asian or Indian background preferred smaller fish. Depending on demand and availability of smaller fish, their market prices could thus be more favourable compared to bigger fish.

Place

- Having defined a product to fit a market requirement and then delivering that product to that market when required is something that the capture fishery cannot do, except in limited locations. This is the essence of "place" and a huge opportunity and advantage for fish farmers. Farmed fish can be delivered in consistent volumes from farmed production batches, with fixed costs and thus consistent prices and profit margins planned; targeting specific markets on demand, is every marketer's dream.
- This above point assumes production scheduling and distribution channels are in place for farmed fish and predictable and this is not the case at the current time in Uganda. A few enterprises and associations have attempted this, which is admirable as it recognises this specific marketing strategy that is likely to have a long-term benefit to the sector.
- This focused distribution that allows farmed fish access separately from capture fisheries forms the basis for this Project's objective under Result 3, where such ideas are sought. With current distribution of fishes being sporadic and opportunistic and intrinsically connected to capture fisheries for the majority of producers (using trading networks from the capture fishery), is a reason for slow growth of farmed fish markets and related slow growth of producers. Disconnecting from the established capture fishery distribution chain is a critical step to take for the expansion of farmed fish trade nationally primarily and then regionally also.
- With current marketing channels focused on capture fisheries, fish are not available except in set places that are well known. A distribution (place) structure that brings predictability to where consumers will know where to get farmed fish and when and what size at a consistent price and quality is what is required and drives recommendations from this particular study that is focused on this distribution dilemma.
- This is the essence of "on time" delivery and will allow stability in markets and provide advantage to farmed fish sales and improve interest in the sector's development. Farmed fish need to establish their own outlets in places where capture fish are less available to exploit the larger population based in the country. This will only work well with careful production planning, strategic pricing and focused promotion (the 4 Ps working together)
- It is likely that long-term efficiencies of costs of production and delivery will mean that the national market will be the core business for fish farmers, especially with the regional competition that is growing at the same time. A focus away from regional markets in the longer term is a key recommendation of this study. Short-term and as a continuing component of farmed fish trade, regional markets can be accessed, and developed, but this will only get more competitive and be available to the larger cost-efficient producers.

Promotion

- A key to the above analysis is the assumption that consumers will want to eat farmed fish. This seems like a basic idea, but confusion and preferences currently drive choices, especially when the fish are mixed in a market and traders are protective of existing capture fishery relationships.
- A total absence of promotion for farmed fish in Uganda, which is a clear hindrance for better consumer acceptability and market access is critical. As long as consumers are not aware of the existence, availability

or benefits of farmed fish and until farmed fish is easily accessible, there will not be higher demand in domestic markets. This is all related to promotional activities.

- Generally, any actions in the growth of the sector need to go hand in hand with promotional campaigns, at a national level, local level, and general retail level to enhance understanding of farm fish being a good product or a comparable product, or a different product, depending on the context and target market.
- Whatever the project decides to do in terms of enhancing distribution cannot work without related aggressive promotion for that particular approach. Here there is a combination of Push and Pull Marketing. Pull marketing comes from the more generic background promotional activities at a national level telling of benefits and products that refers to bringing customers to the product rather than Push marketing that refers to taking the products to the customers. The push marketing occurs at the level of the product point of sale, or market, where direct face to face promotion occurs and so "pushing" the products on the customer
- Related to promotion, but on an investor scale, is the fact that the industry lacks an overall development strategy and together with that strategy a promotional aspect to not only attract, but also educate investors, especially more small-scale investors. It is observed that new entrants are attracted to the sector due to misinformation, randomly people can be asked (and this was done) about fish farming as a business and 9 times out of 10 they will respond "that is a good investment I hear" or something similar. Although aquaculture has been promoted by donors and governments as an answer to declining global fish catches, aquaculture is not a panacea. The farming of fish and marketing of fish products require a lot of sector specific knowledge, skills and expertise that cannot be acquired quickly. Likewise, and also well-recorded, none of the globally renowned success stories of aquaculture development happened overnight. Most of them only started to thrive after one or two decades of piloting and pioneering, in which stakeholders within the sector needed to develop the necessary capacity through mutual learning and knowledge exchange.
- Expecting that the Ugandan aquaculture sector can develop to a success story based on attracting new entrants into the market is a long-term proposition. Building the necessary capacity of a commercial aquaculture sector in Uganda that can withstand pressures and shocks, will among others, certainly require a clear strategy and a common vision of key stakeholders, coupled with realistic approaches to communicating and promoting the potential. Competition between regional countries who are positioning for investors to come to their country, is key, as investors look for a place to put their money and Kenya, Rwanda and others are vying for that investment, as much as Uganda is. Investors look at many factors during this site selection process, with standard business profitability being only a one of many risk factors to be assessed.

D.3 Indicative actions from the analysis

All of the 4 Ps have inputs, as indicated in the previous sections (Place, Promotion, Product and Price) need attention, but are affected strongly by the others.

- Higher production efficiency and reduced production costs in the mid- to long-term are a big opportunity for the Ugandan aquaculture sector to expand. Located in the centre of a developing 'East African

aquaculture production area', Uganda is very well-placed to contribute to and benefit from innovation within the regional sector.

- Further opportunities exist in the form of value addition. As outlined above, currently, farmed fish is almost exclusively sold unprocessed. Processing of fish will on the one hand increase market access through product diversification, while on the other hand provide employment opportunities. Processing might also be an answer to overcome the current Rwandan import restrictions of whole, ungutted fish. Uganda possesses good infrastructure (established, certified processing plants) and skills from the Nile perch export business that has suffered under Nile perch demand and supply shortages in recent years. The under-used capacities could easily be applied to processing of other fish, including farmed fish. Selected processors are already looking at investing in cage aquaculture themselves to help their plants maintain viability (e.g. Greenfields, per. comm.).
- As mentioned in the former chapters, marketing of the farmed species has almost exclusively been based in price and was shaped by price competition with fisheries products.
- In terms of place, it appears that little effort has been made to diversify the sales of farmed fish in terms of where it might be sold. The traditional market places and locations in proximity to Lake Victoria are the key focus of farms trying to sell their fish. However, as Dalsgaard et al. (2012) observed, overall fish seems to fetch higher prices in locations *farther away* from the lakes, where traditional value chains do not reach, or if so, to a lesser extent. These less-served locations could thus make an excellent entry point for aquaculture products.
- Additional focus on supporting existing regional distribution channels cannot be ignored, as structures are in pace and generally report supplies to not meet demand. At this time strategic borders between the larger buyers in Kenya and DRC are recommended, together with specific product support to meet specific demand for those areas.
- Nationally, a re-direction of fish access points to ensure availability for potential consumers. Even if demand was higher than it appears based on sales, there are not enough opportunities for consumers to buy fish, whenever they want, where it is convenient. Few places outside the traditional fish markets sell fish. It is for this reason, that some producers have set up their own fish shops or restaurants where they can bridge the gap between farms and consumers by directly outreaching to the latter. Our observations suggest that there is a very large potential to market more farmed fish by exposing consumers with available products outside of Kampala and away from lakes and capture fish markets. Better exposure of fish: for example, by setting up more sales points such as fish mongers, fish shops, fish restaurants etc. or doing so in more and more-frequented places. Important to consider is the setting up of sales infrastructure in non-traditional places as mentioned above. In other words, the focus should not only be on Kampala due to the large population living in Uganda's capital city, but on towns with large enough populations for such a business to work, but not easily accessing capture fisheries.
- Promotion of farmed fish, including more advertisement for fish in general, as well as information about farmed fish for consumers in particular (e.g. awareness creation of the difference between farmed fish and wild fish and between imports and domestic products). Big opportunities exist by harnessing the advantages of farmed fish rather than only focussing on the price, where farmed fish clearly makes second

to wild fish at this stage of development. As outlined in the table below, farmed fish has a number of benefits compared to wild fish:

Aspect	Nile tilapia from Lake Victoria	Farmed Nile tilapia
Sizes	A range of sizes up to 1.5 Kg or more	• Customised sizes possible • 225 g - 300 g (uncommon currently, but holding potential), • 450 g – 600 g (more common, but not doing well), • up to 800 g & larger (specific targeted markets, but uncommon)
Shape	Longer due to predation stress of wild fish	• Rounder than wild tilapia
Fillet size (typical)	Generally larger is traditional preference (200 g – 350 g+)	• Various options based on size; potential development through targeting and promotion
Size variability	high	• Controlled sizes possible
Harvest / Seasonality	Production varies, clear high and low seasons	• Volume as required / on demand / all year
Taste	Some consumers claim that it tastes better than farmed fish – traditional view	• More fat, sweeter than wild tilapia – some prefer, potential to develop tastes through recipes and promotion

Figure 14 Comparison of farmed and wild Nile tilapia in Uganda

- Whereas supply of wild fish is very much determined by seasonality and stock dynamics, farmed fish supply is controllable and farmed fish can be produced and harvested all year long. Farmed fish can thus serve markets, when wild fish can't. This includes the bridging of a future supply drop in wild fish or increased future demand for fish. Farmed fish can also be harvested on weekends and at any time of the day, thus allowing to serve markets with fresh products 24h a day. Another advantage is that controllable harvests of farmed fish also allow to meet markets' and consumers' preferences in terms of size. Fillet sizes of farmed tilapia are in the range of a meal size portion of fish, while fillets from wild fish tend to be too large. Farmed tilapia has more fat content and is thus perceived as sweeter than wild fish.

D.4 Continued threats to be aligned, mitigated

Apart from opportunities, there are also some risks that should be carefully considered when promoting an expansions of aquaculture development in Uganda. These risks are real and must be borne in mind as the sector moves forward.

- Aquaculture has been promoted and is being developed in many neighbouring countries. Consequently, although still relatively small, fish farming is growing fast in Zambia, Kenya, and to a lesser extent, and Rwanda. Apart from struggling with the same difficulties as Ugandan farmers, producers in the respective countries are also farming the same species and competing for the same markets. There is thus a

significant risk that markets, which have traditionally consumed an important part of farmed fish from Uganda might not do so in the future.

- Similar to Rwanda, other countries might impose trade restrictions on certain fish products, for example on whole, ungutted fish, thus reducing or wiping out current markets that have been attractive for Ugandan producers, not least as a route through to DRC.
- New investments and their effect on the sector must be considered, with indications that large land concessions are currently being negotiated with Chinese investors for instance, large-scale aquaculture development near River Katonga. Others such as Yalelo from Zambia are also starting to aggressive establish themselves in larger scale cage production in Uganda, with similar potential risks related to competition with small-holders and downward price pressure. Sudden oversupply of fish, even if momentarily, might push prices down and lead to large losses for already established businesses, particularly operators that lack large financial reserves, such as most smallholders. Although investment should be welcomed as the sector develops, the implications to existing small holders remain. This points to harnessing small-scale producers as out-growers for larger investors, such as the model being developed for the AquaParks and in many other productive sectors in Uganda.
- There has also been indicated that potential investments in the sector was linked to demands of investors to bring more competitive strains of Nile tilapia to Uganda. While based on our observations it is very likely that improved strains are part of the solution for a more competitive tilapia industry in Uganda, import of broodstock or seed also bears significant risk. Apart from genetic alteration in wild populations, hazards include biosecurity concerns, such as fears over the spread of Tilapia Lake Virus (TiLV) that has had a heavy toll on the tilapia sector in many countries and which is spreading rapidly (Jansen, Dong, & Mohan, 2018).
- A significant risk is also a misunderstanding of the capture fishery situation and trends. Although it has been claimed for many years – and was the predominant opinion when carrying out our study in Uganda – that wild stocks in Lake Victoria are collapsing, neither actual fisheries statistics nor reports from fishermen confirm such claims. According to official statistics, Nile tilapia catches have been fairly stable at around 50,000 t per year since at least 2012. As Dalsgaard et al. (2012, p.27) observed, it might be that "the vulnerability of wild fisheries may have been overstated…. This could mean that the anticipated decline in wild fisheries may take a long time to materialise." Thanks to an absence of industrial-scale fisheries operations on Lake Victoria or elsewhere in Uganda, fish stocks might recover from temporarily shocks if current efforts to enforce fisheries regulations endure. This in turn would maintain the competition from wild capture products for farmed products upright.

Mitigation of these risks has to come from policy level enforcement, as well as sector structural development, such as small-holders becoming out-growers for larger investor, or suppliers specifically to processing groups. Careful management of border rules, and proactive open trade policies to maintain regional access must all be considered.

E. Conclusions & Recommendations

E.1 Discussions

- The value chain complexity does not only depend on fish form, but also the relationship between different stakeholders and the distances between the source of fish and the point of sale. A strong trader linkage and power dynamic exists, which dominates the trade process, especially when it comes to regional trade to DRC and Kenya. Capture fisheries have historically established these various linkages, and farmed fish is very low in terms of its contribution to the value chain.
- The majority of vendors and customers expressed concerns over the increase in the price of fish alongside other basic commodities. However, this was coupled with the majority signalling a desire to protect the place of fish in diets rather than move to other alternatives where possible. Farmed fish offer a more challenging cost/profit relationship in their business model, with particularly high costs of production in relation to price, so promotion and positioning of farmed fish in the markets is a key challenge to address.
- Farmed fish production in Uganda is currently based on tilapia & emerging catfish. These are products that if they do not have superior production cost efficiencies, management protocols to ensure efficient use of inputs and cost controls, transport costs, and post-harvest handling to eliminate losses, competitive positioning will always be a significant challenge, especially as competition expands (through increased production) nationally and regionally and especially with the ongoing competition from capture fisheries and imported fish. This implies a differentiation is required in the marketing approach for farmed fish to achieve longer term success.
- There is a strong recommendation from the consultant, as well as from many discussions, that indicates concern over the dynamics of trade as the aquaculture sector develops regionally, which is happening aggressively at this time. It is felt that a focus to develop the national market in Uganda as a strong core for the future is required. The regional market can implement protectionism trade protocols (as being felt in Rwanda at this time), which compromises the Uganda farmed and capture fish markets. In tandem with this is the continued and seemingly well-established cheap imports from Asia in neighbouring countries, as well as Uganda despite general efforts to reduce such imports.
- A strong recommendation to control these imports needs to work alongside the development of fish farming in Uganda and throughout the region, not to eliminate the imports necessarily, but to ensure competitive positioning and fairness for national and regional production. Imports are also required to supply fish to the expanding population, especially when supply of farmed fish is currently not coherent or well-organised.
- The viability of smoking and/or drying the farmed fish and selling them profitably is a key potential market development, especially with regards to delivering fish to DRC and more remote areas of Uganda and regionally. There are opportunities for farmed fish to fit in the current capture fisheries value chain and accepted for these particular product forms.
- Price and accessibility are key barriers to farmed fish playing a greater role in all markets. Few informants had experienced, seen or tasted farmed fish (due to low production levels across many

regions of the country from small-scale producers), and those who had provided mixed accounts of quality, price and taste preference. Population centres in Uganda are spatially wide-ranging in their dispersion, meaning delivery systems for fish to local town markets needs to be integrated into farmed fish marketing strategies to ensure that fish reach all the potential consumers. Notwithstanding the few major centres, there are many small centres (less than 30,000 population) that offer potential. National corridors for trade, based on current and expanding transport routes (better road systems) suggest a strong focus is required initially to exploit these routes to reach areas not traditionally served from capture fisheries.

- Marketing approaches must adopt a pro-poor method of costing and promoting low-cost, high yield systems to meet demand of the lower income households – alongside traditional commercial models of production. Indications are that there is a market for smaller fish, but fish farmers are yet to establish production models to fit this market.
- Marketing campaigns on various media (radio, televisions, road shows, Facebook, twitter) to promote consumption of farmed fish from both cages and ponds would be a main contributor to spread the word about farmed fish to a wider audience. Inclusion of suggested recipes could be part of this process and reinforcement of health benefits and quality attributes from fish farms.
- Actively encouraging increased usage through product promotion, market linkages development of new business linkages is important, although this has to be coupled with a production coordination to ensure a consistent / timed volume of supply to markets and traders, which is a major barrier at this time in Uganda with many dispersed small-scale farmers making the bulk of remote production.
- The GoU, together with activities through PESCA and other projects, can strengthen aquaculture extension services so that there is an increase in production (volume and efficiency) to serve the various fish markets in the country. At the same time efforts to enforce laws is required to bring predictable structure to the market in the country and at the borders with DRC particularly, but also Rwanda and Kenya. Lack of transparency is a serious business risk for producers and traders in the country.

Key discussion points from other major studies also support these recommendations from this report; the major regional study undertaken by MSINGI (2018) suggests the following;

- Fish consumption is high in East Africa, demand can be driven up by addressing the issues of unavailability, pricing, and hygiene at various fish handling points in the value-chain.
- Further, supporting processing of fish into non-perishable forms can address consumers' concern of fish spoilage and encourage purchase of more fish for consumption.
- There is a need to create more awareness on the nutritional value of fish, which currently competes with plant and other animal proteins.
- There is a need to grow the fish farming sector to meet demand, but also rely on fish importation in the interim, whilst capture fisheries are reinforced, and whilst farmed fish production becomes better established and available. Hand in hand with this, awareness (promotion) among consumers to mitigate negative perceptions around farmed and imported fish may be necessary to encourage consumption.

- Market organization (through cooperatives and associations) is a suggested avenue to utilize, which are currently under-developed.
- Policies and regulations support are needed to encourage more players to take up business opportunities in the industry; nationally this is a competitive situation, which Uganda has to respond to.

E.2 Recommendations coming from the discussion/ analysis

Recommendations for setting up various distribution / logistic support facilities/ equipment are intrinsic to this report's objective. Market visits and analysis indicate that cold chain support particularly supporting key market outlets and border points would be a first step. Interventions should involve installation of ice plants, delivery trucks in most working distribution centres working with capture fisheries and training in product handling. Cold change, being key to fresh fish movement addresses the perception of quality that is clearly a key attribute for consumers, but siting such facilities also support the market logistic connecting Ugandan fish to target markets.

- Any intervention needs to be considered as a private sector operation and a careful risk / feasibility assessment made to check viability and potential. The success of such interventions needs to consider a growing production base in the country, which currently is not well-developed or organised in terms of collection systems from many small producers. Connecting small-holders to distribution centres therefore is a key recommendation.
- It is noted that product preferences vary with markets and ability to pay. This includes smoked/dried product forms, but also sizes of fish. Some prefer larger, others prefer, or can only afford smaller sized fish. Segmenting sales of farmed fish through size grading and production planning to suit demand is recommended.
- Increase production at small scale, medium scale and large scale so that there is consistence in supply of fish at the markets together with encouraging farmed fish distribution depots and outlets or point of sales at various strategic points in the country. A focus on catfish and tilapia needs to be considered given the preferences regionally.
- Neighbouring countries of Kenya, Rwanda, DR Congo & South Sudan are confirmed as potential markets, each with particular challenges for Ugandan fish. Demand is high, but supplies are generally not keeping up and Uganda could help with the supply situation if it could move greater volumes efficiently from coordinated farm producers for consistency of supply volume.
- Generally, prices are being achieved that seem to suggest profit is possible for Uganda farms. Kenya in particular seems to offer the easiest route to sell in Nairobi (due to demand and high population), but costs of distribution to the point of sale ned to be understood in more detail through some feasibility analysis of the opportunities.
- Business environment is well-established and ease of import and transportation to Nairobi is a positive factor. From a Uganda perspective, the idea of getting fish to Nairobi needs to be improved, so that a larger volume can move consistently to meet demand, which seems to be high. Main border crossing points can be targeted to improve handling and quality of larger volumes.

- Relationships with traders from Kenya is key to ensure easy distribution for most producers, key trade relationships need to be identified and understood in terms of commercial terms that are possible.
- Pressure from large volumes of Chinese fish being sold through Rwanda to DRC (transported from Tanzania for instance) is a critical issue as price competition for farmed fish is not realistic due to costs of production. Extremely low cost for Chinese fish mean that profits can be achieved at prices half of what would be considered low from farm producers in Uganda. Consistent volumes and quality could improve this dynamic.
- Although focused marketing in Kenya should continue aggressively, a renewed focus on Uganda as a national market, seems to be a key strategic consideration for long-term future growth, bearing in mind that Rwanda and Kenya also continue to pursue their own farmed fish development.
- Supply to regional markets aligned with demand gaps remains a strategy, to be achieved with close ties to Kenya and Rwandan traders, rather than specific individual strategies from producers. Relationships with producer organizations in Uganda to coordinate supply volumes is needed together with distribution storage logistics at key borders (ice/ cold storage/ transportation collection systems).
- Rwanda, despite current border control issues seems to be an option and the best route to DRC if that can be organised. This needs specific trade relationships with those who can navigate the system and renewed attention on value-addition to beat the current restrictions on whole fish.
- Sales to DRC are an option, but price and distribution are not clear. Borders are not well-organised, farmed fish sizes are a challenge vs. price achievable. Chinese fish going to DRC are smaller in size – so fish farmers need to compete with smaller fish and better price and quality for such markets. Due to the geography of Eastern DRC, preservation of fish is paramount, suggesting smoked/dried alternatives, such as that being addressed with capture fisheries in these markets

The various items of discussion, have to be taken into account and the nuances and details appreciated within the time context of today's farmed fish sector and how it might evolve in the next decade. Such scenarios need contextual interpretation when considering the potential for farmed fish growth, over time, together with the various regional countries pursuing similar growth and inherent competition that will come at the same time. It is easy to be swayed by the segmented nature of the market, price issues across the country, competition potentially growing, from neighbours and internal investments, but in the context of a growing population and demand for protein, can farmed fish contribute sustainably?

We must also remember that the current investment market, with costly feed, with quality and reliability concerns, the need to import feed, rather than locally produced feed, all complicate the investors choices and perhaps delay decisions or suggest better options outside Uganda. This being said, the process to improve key success factors in the investment planning model is key to the ongoing PESCA project and given the timeframes and expected outputs, suggested that in 2 – 3 years' time, there will be improved investment potential with a more structure and supported sector.

Currently existing producers are trying different approaches to markets, some of which are reasonably successful, others which are still evolving. The various fish distribution modes described, traditional auction markets, supermarkets, urban markets, and specialist fish shops as a new approach for farmed fish, all have merits, so why not support such ideas further to further test, improve as well as support promotion of, this more focused farmed fish market development. Removing farmed fish from the areas where capture fish are traditionally sold will also give it the new look that is required to enhance change.

The challenge of planning for a few years into the future in such a dynamic environment is not easy, so decisions must be based on a stability and continuation of existing systems, together with moves toward specific actions for farmed fish that are supported with significant publicity (P= Promotion). So many questions and uncertainty of farmed fish, its availability, size, shape, taste need to be addressed, whilst at the same time setting up a physical presence, as well as promoting the existing focused farmed fishing outlets.

This has to be approached as if farmed fish are a different product, with different advantages, not least quality and predictability of supply. There is no question that a challenge will always exist as a market sees something different from what they are used to, but promotional activities need to be used to ease that transition and carefully aligned with promotion events that support the benefits of farmed fish.

The project needs to define some key structures and/or equipment to boast this process of moving demand to farmed fish and facilitating its distribution and accessibility to customers. The distribution (place) “P” of the 4 P’s comprising the marketing mix means actions that allow the product to be where it needs to be, in a form it is preferred, at a time suitable (right product, right place, right time), which is the mantra of logistical performance, to which we have to add right price. Here we are looking at how to get farmed fish from various locations, not least the new AquaPark locations to suitable points of trade, not just the farm gate, but into the place where the consumers can conveniently purchase the fish of their choice at a suitable price.

May include:

- Facilities at major urban centres with rural collection and distribution approaches
- Cold storage: refrigerators, cold rooms, refrigerated trucks, ice plant, tri-cycles with cooler boxes
- Organised set-up, including, sales centres, canteen, washrooms, parking yard, etc.
- Energy systems – including standalone with 24/7 reliable power; solar should be considered for this reason.

General stakeholder involvement is recommended, but will ultimately depend on the scale of the investments. As with any truly successful value-chains, there are core actors and support actors. The support structures include POs, Government in terms of policy/ regulatory support, but also from a standards-setting and training perspective. The following table suggests examples;

STAKEHOLDER	ROLES
Private sector	- Lead implementing partner/ equity partners - Entrepreneurship/ Technology transfer, adoption
Vendors (mainly youth, women)	- Farmed fish selling & distribution
POs	- Fish production and delivery coordination - Contract farming structures and associated contracts/ training
Central Government	- Establishing markets facilities - Technical support - Enabling policy framework - Quality standards and certification - Incentives & subsides - Links to marketing platforms
Local government	- Community mobilisation & engagements - Oversee the management of the facilities - Support out grower models (through extension & technology)

The exact structure of a unit (facility) would be primarily private sector driven, with obligatory support from various stakeholders to ensure compliance and acceptance, as well as assist with promotional support.

Envisaged costs will be developed during the feasibility stage for the approved recommendations of this report, and will include usual business capital and operation costs associated with such facilities. The careful balance of these costs will ultimately define the final designs to be undertaken as they direct affect profitability.

Roles of other stakeholders as overall indirect value-chain actors include typically;

Legal actors	Contracts
Media	Marketing
Community	Support developed through CSR programmes
Financial Institutions	Financing
Academic & research institutions	Training & capacity development

F. Marketing & distribution recommended actions

Following this study's analysis of the market and marketing for farmed fish in Uganda, product distribution and connectivity to the market suggests a number of basic starting options. Keeping in mind that the market for farmed fish is Uganda, as well as regionally is not easily defined in practical terms, since it is at an early level of development, and with little or no value-addition or promotional support being recognised, except at very localised levels; essentially farmed fish marketing, in its own right, is an emerging sub-sector.

Mostly competition with capture fisheries and traditional product forms dominates the marketing process for farmed fish, with urban centre markets and areas close to lakes, fish landing sites dictating the marketing structures at the national level. Importantly, particularly at a regional level, there is also notable and growing competition from bulky, low priced imports of frozen products from China. The main competitiveness from these Chinese products is not totally about price, but importantly about consistency of volumes delivered.

Nationally, farmed fish can also be recognised as a suitable alternative with a consistent quality and availability not dictated by seasons and therefore also a stability of pricing, rather than dictated to by the traditional nuances of capture fisheries. The challenges facing Uganda farmed fish in this regard is still a developing volume consistency, due to scattered small producers, together with costs of production, limiting competitive price strategies.

In this regard, we focus on simple, practical ideas to kick-start the journey towards a more vibrant and established sector. To this end initial recommendations for the project are to promote positive attributes of farmed fish and also to supply farmed fish to areas not close to lakes associated with urban areas, where sufficient populations of potential customers are located. Urban centres such as Lira/Gulu, Arua in the Northern districts, as well as Tororo, Mbale and others in Eastern and Mbarara and other urban centres in Western Uganda are recommended. This also provides geographical connectivity with the two AquaParks sites in Apac and Kalangala for their future growth to serve.

Additionally, as demonstrated by existing farms, regional markets suggest potential for immediate larger volumes at this time, so some focus on supporting the regional distribution is recommended, at border posts, where consolidation of fish volumes and handling is an essential ingredient to successful distribution logistics.

Also, support for existing innovative initiatives in is suggested, which have shown low to medium success so far, as shown at outlets in Kampala. This sort of innovation is needed at this time to encourage farmed fish consumption, together with promotion, so that the word gets out to a focused population base. These outlets provide immediate opportunity for fresh and live farmed fish and so commences the integration of farmed fish into the mindsets of the largest market base in the country.

Primary markets – local districts, townships and villages within and on the peripheral of Kalangala and Apac shall be regarded as primary markets where a simple, farm-gate marketing system for live, fresh (sometimes chilled) whole round fish of both tilapia and catfish will be developed, fish sold to individuals or being picked up for instance by traders/vendors who come with their own ice and trucks at farm gate shops for onward distribution to this local community market and farther afield.

Secondary markets – much focus will be on this, where the fish moves through different channels to urban markets of the targeted towns in North, East and West Uganda, preferably away from Lake based areas. This, together with the border areas recommended, is where physical facilities would be installed and/or improved.

F.1 Recommended Focus

1. **Collection depots** - identification of 3 – 4 locations for establishing small collection depots (chill stores and associated transport), which will collect fish from farms and be a distribution point to targeting non-lake locations using small trucks and/or motorcycles. Target locations are all with populations above 50,000 and are growing important centres with wider District populations. The idea is to have collection centres that will consolidate production from especially small producers, including the current proposed AquaPark locations being developed.
    a. Gulu/ Lira

   b. Arua
   c. Mbarara
   d. Soroti/ Mbale
2. **Border crossing points** so as to allow a larger volume of fish to be collected, preserved and onward shipped to the targeted neighbouring countries. Promotion of farmed fish products to border distributors and support for trade development. This also entails/requires working with established cross-border distributors, who have the established trade linkages in place. Likely the investors of interest will be established operators at the borders.
   a. Ice is required, but also containerised cold storage for bulking and consolidating shipments related to specific customer demands. Locations include:
      i. Busia
      ii. Rwanda Borders and onward access to DRC, once border issues are stabilised.
      iii. Nimule border town between Uganda and South Sudan. Road connecting Gulu and Juba is reasonable and approximately 300 km via Nimule.
      iv. Mpondwe to DRC – considered but advised caution based on security issues and whether current operators can be aligned.
3. **Outlets in Kampala** – supporting existing outlets and expanding existing key markets with provision of storage, handling and distribution modalities (small trucks, motorcycles) to allow delivery and distribution to Kampala suburbs / areas distant from the central market positions where capture fish dominate.
   a. Busega market
   b. Existing outlets for GoFish (support or similar)
   c. WAFICOS (support directly or similar)

Each of the focus areas recommended above, are described in more detailed here to allow for further detailed feasibility analysis to be undertaken under separate project activities. The level of support possible through the project will come down to budget limitations and interest from investors to develop such ideas. Project funds will not be operating the new investments, so connectivity to existing structures, with existing trading relationships is deemed to be a pertinent requirement to start this process.

Maps are included here to support these recommendations and provide visual context:

1. Collection & distribution Depots

a. These will be chill/ cold stores design and built and if possible, using established market areas in the towns/cities, to provide simple, but well-organised storage for fish products, mostly whole, or gutted product forms. Some small processing is envisaged on site if this market can be developed. It will be an insulated building, with capacity of up to 50 Mt of storage. Compressors will be serviced by main grid, but supported also by solar power back-up. Collection/ delivery entrances will be in place and suitable loading area for small (5 Mt) trucks and motor cycles, which will be provided with insulated boxes for small volumes (up to 100 Kg).

b. Labour would include manager/ operator and labourers for loading, unloading, as well as designated / contracted drivers to be supported by the investor
c. Initial training provided by PESCA to ensure proper handling and quality control.
d. Approximate cost is estimated at: UGX 600,000,000 x 3
e. Map shows source of the fish as the AquaParks (Kalangala and Apac), with two main collection hubs envisaged, one at Masaka (for Kalangala AquaPark) and one at Apac itself, or in nearby Lira. Both hubs would also be important in serving locations surrounding them.
f. These hubs would also serve to be hubs for other fish farmers supplies and would be connected to depots (comprising a chill store, fish shop, delivery truck, motorcycles). Strategic locations for these depots include Mbarara, Kampala, Arua, Gulu, Lira, Soroti and Mbale. Most of these collection points or depots will serve surrounding districts through to the border townships near them.

Figure 15 Approximate distances from AquaPark locations to proposed collection centres.

Strategic Town	Distances from Apac AquaPark	Population
Arua	300 km	55,585
Gulu	150 km	146,858
Lira	150 km	119,323
Soroti	300 km	56,400
Mbale	375 km	76,493
Masaka	300 km	65,373

Strategic Town	Distance from Masaka Depot	Population
Mbarara	141 km	97,500
Entebbe	130 km	62,969
Kampala	150 km	1,353,189

Strategic in-country areas for potential investments (Gulu, Masaka, Kampala) and other centres that may require improvements on the medium to longer term (Mpondwe, Mbarara, Mbale, Soroti, Lira, Arua and Entebbe) are shown in the map that follows in Figure 16.

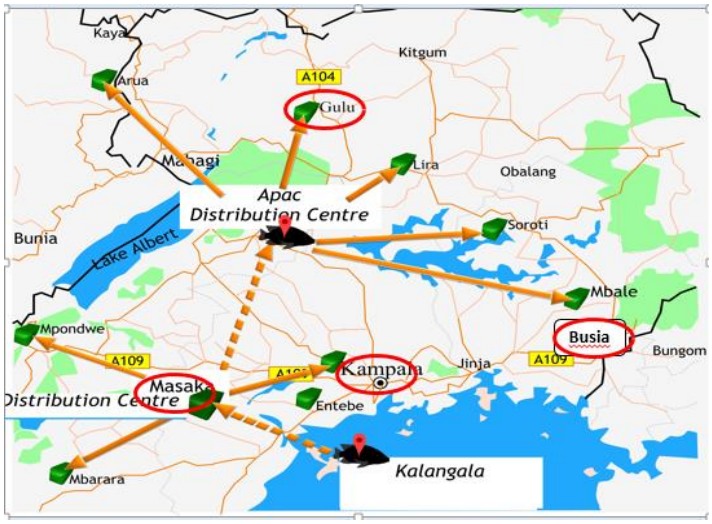


Figure 16 Locations for establishing national hubs and small collection depots

2. **Border market support**
    a. A cold storage facility in the form of a freezer container(s) (40 ft containers of capacity approx. 25 t of fish) to be located and supported by an ice plant, capacity 10 Mt per day capacity and associated ice storage. These are to be managed by the same group, already establish at the border points and with connectivity to markets and buyers in the target country. Choosing the established operators will lessen the requirement for investor searches and disruption to existing trade relationships. A short-term consideration, as success will lead to others becoming involved in similar operations.
    b. Labour would be established under existing structures and training provided to ensure quality standards and farmed fish specifically are promoted through the facility to be supported by investor
    c. Training provided by PESCA
    d. Approximate cost is estimated at: UGX 550,000,000 x 2

WESTERN EXPORT ROUTE MAP

Masaka Depot – serving all towns through to Kigali (Rwanda) / Goma (Eastern DRC) and Mpondwe (Uganda)

Key Export destination	Distance from Masaka Depot	City Population
Kigali	400 km	745,621
Rubavu/Gisenyi	450 km	83,623
Goma	460 km	+1 million
Mpondwe to DRC	310 Km	

NB: For access to the DRC market, project will aim to do business with distributors based at Gisenyi for local supplies in this town (and surrounding), as well as for onward distribution to Eastern DRC, Goma.

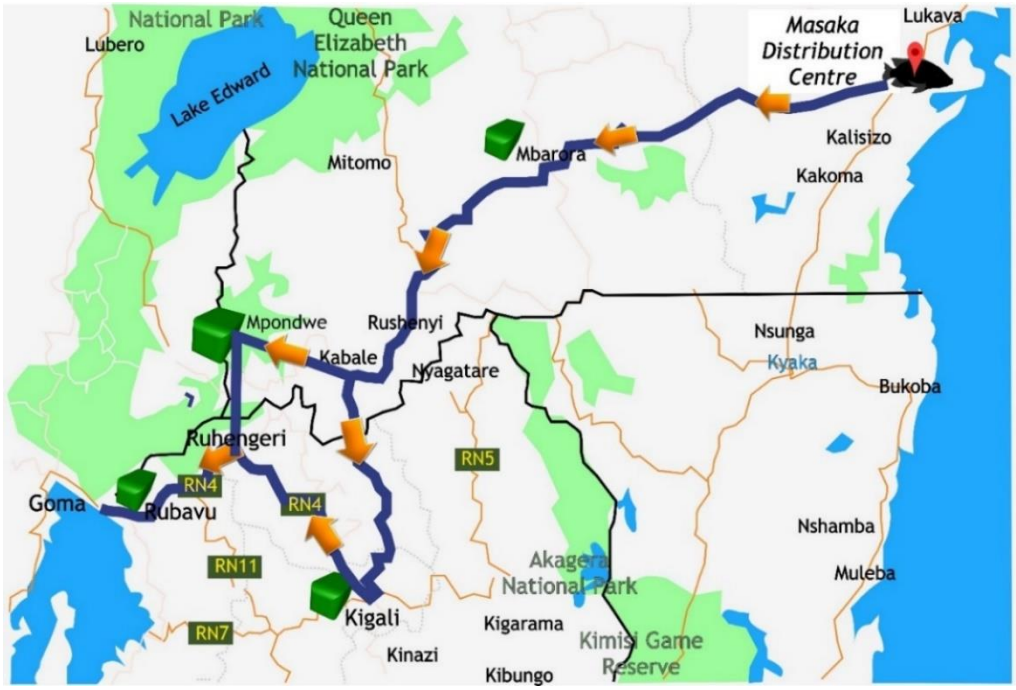


Figure 17 Western corridor Rwanda & DRC

NORTHERN EXPORT ROUTE MAP

Key Export destination	Approximate distance from Gulu or Arua Depots	City Population
Juba (South Sudan)	Direct/shortest from Gulu DC (+320km)	450,000
Yei (South Sudan)	Shortest from Arua DC (240km)	40,300

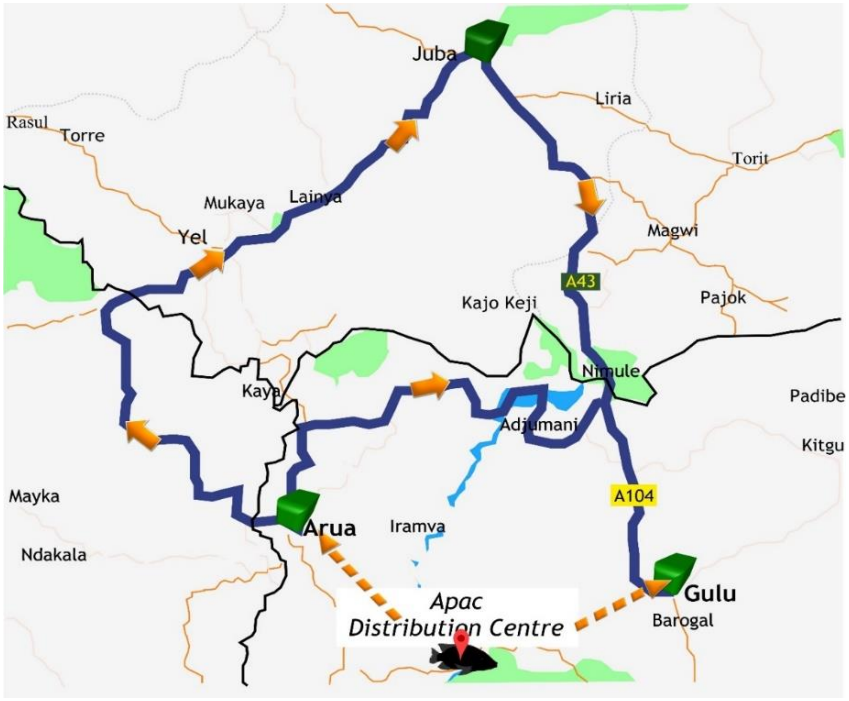


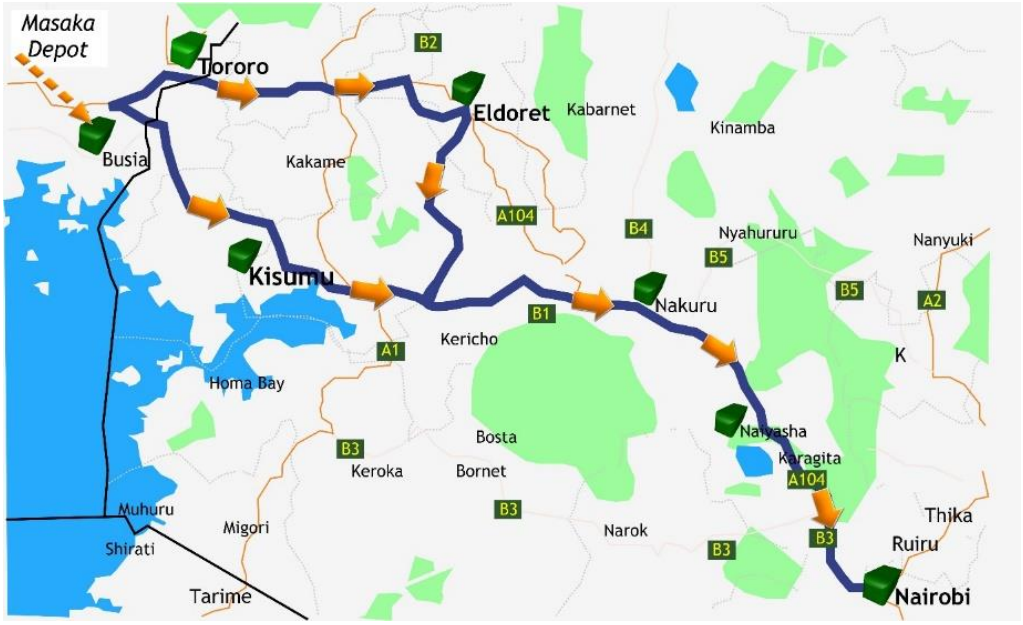
Figure 18 Gulu Distribution Centre – serving all towns through to Juba (South Sudan)

NB: For access to the South Sudan market, project will aim to do business with distributors based at strategic Sudanese border points with Uganda.

EASTERN EXPORT ROUTE MAP

Key Export destination	Approximate distance from Busia/Tororo DCs	City Population
Nairobi (Kenya)	460 km	3 million +
Kisumu (Kenya)	120 km	240,000
Eldoret (Kenya)	160 km (via Tororo)	240,000

Figure 19 Busia border/Tororo Distribution Centre –all towns through to Nairobi (Kenya)



NB: This route map has good potential, having several towns with large populations, well-developed roads and generally better ease of doing business conditions.

3. Existing Kampala Outlets

a. As a large market and growing consumer of fish, Kampala cannot be ignored as a key area for focused promotion and development of farmed fish products. Kampala also has the advantage of multiple income levels and opportunities for value-added products, some of which already exist through specific operators. Kampala with a population of over 1.3 million is segmented into various geographical areas, as well as income bands that offers potential to the savvy marketer.

b. Existing specialty stores for fish need to be upgraded, but importantly promoted better than at present. This means better shop frontage exposure for the stores and proactive communication about farmed fish products, benefits, recipes for smaller sizes and active promotion campaigns to enhance trial visits. Delivery options need to be integrated also into the overall positioning strategy. The range of value-addition products needs to be expanded also, from standard live, whole, fillet and various cooked options, to sausages and other innovative products available for purchase.

c. Shop space and frontage to be defined depending on space identified, but expansion of existing if possible, through the EU procurement process would be a good place to start.

d. Upgrades might include, tanks, freezers, display cabinets, and out-reach promotional activities to enhance popularity

e. Additional labour not required

f. Training provided by PESCA

g. Cost estimates for such improvements, UGX 200,000,000 x 2 plus promotion campaigns and training; assuming at least 2 outlets are supported, and applied to existing locations due to already established land rental and business permitting expenses.

F.2 Detailed outline of recommended actions

Fish distribution and marketing models that will work for farmed fish in Uganda, based on experience from other countries in the consultant's experience.

The most common (seven) recommended fish marketing models for the AquaParks are described below. Noteworthy is the fact that most of these models have been applied well by some commercial producers in some parts of Sub-Saharan Africa as indicated.

FISH MARKETING MODEL	WHAT IT ENTAILS	SOME CASE STUDIES (WHERE IT HAS WORKED)
1. Farm-gate sales	This is the first point of sale (direct selling) for the farmed fish, usually a kiosk or farm gate shop. The farm gate value is most instances, often lower than what buyers will then pay at retail centres further from the farm as this price may not include the costs such as (shipping, handling, storage, marketing etc)	• Common feature at most medium to large-scale tilapia/catfish producing countries
2. Establishment of fish shops in urban centres	This entails establishing own fish shops in strategic points of major towns and cities, which are easily accessible by consumers or other traders. This will be part of forward vertical integration thus the farm will be controlling all aspects of business operations with limited third parties involved. This is important for cost and efficiency management	• Zimbabwe/Zambia/RSA (Lake Harvest Aquaculture), • Zambia (Yalelo), • Mozambique, (Chicoa) • Malawi (Maldeco) • Kenya (Victory farms) • Uganda (SON) • Rwanda (KTF) • Others
3. Direct sales to retail outlets including Supermarkets, Hotels and restaurants	The farm may have own distribution truck that move around the town's market points e.g. supermarkets, hotels, restaurants etc. In some large retail outlets, the farm may actually set up a "branded" refrigerated display unit for its products, thus differentiating it from others. Contract supply arrangements may be organized with some of these buyers	• Zimbabwe (Lake Harvest Aquaculture), • OK supermarkets • Malawi (Maldeco-Superior supermarkets • Uganda • South Africa (Aquaponic farms, trout farms) • Others

4. Establishment of networks of women traders and/or "Motorbike" distributors	The farm may consider working with local associations to establish a network of women traders or motorbike distributors will come collect product at outlets (in small volume units) and then distribute to nearby locations/ townships or districts. Some of these traders are often seen selling at busy intersections, busy markets, convenience stores, food markets etc	• Zambia (Yalelo Depot) • Zambia (Kariba Harvest Depot) • Ghana (Tropo Depot) • Malawi (Maldeco Depots) • Uganda (WAFICOS)
5. Direct sales/distribution to institutions that have large staff/ group consumer structures	The farm's fish delivery truck will move around targeted institutional places and drops product packed in small units – per individual's order. This may be on COD basis, where one focal person from the institution will co-ordinate the collection of cash. Institutions such as schools, hospitals, government offices, police/army barracks etc may be explored for this.	• South Africa (Karoo catch – Schools, hospitals) • Zimbabwe (Lake Harvest Aquaculture – Army barracks Botswana • Uganda (WAFICOS) • Nigeria (distribution to functions)
6. Explore the utilization of existing AquaShops (by other companies/fish traders)	The farm may wish to arrange business deal with existing fish shops in strategic centres (instead of fully establishing own outlets) for various reasons. Some of these outlets may have supply constraints and hence may welcome products	• Common feature in Africa especially whereby existing "wild-caught" fish shops are accepting farmed fish products which is supplied consistently, on regular basis
7. Connections to regional distributors	This entails doing business with well-established cross-border distributors to ship product across complex borders. Win-win business partnerships can be negotiated.	• Zambia - Yalelo (connections with DRC distributors) • Lake Harvest has set up on regional distribution centres in Malawi, Mozambique, South Africa, Zambia and elsewhere • Lesotho has connections with South Africa for the distribution of trout products

Below, in tabular form, is an elaborated outline of recommended actions, with specific items related to distribution and promotional activities that this study suggests as Project actions. This needs to be assessed with current budget limits and allowable timeframes, and align with ongoing sector budgets where required for sustained support following this project.

Seeing as specific project activities will follow this study to elaborate the recommendations, test feasibility and judge suitability, based on this report's analysis, prioritisation will be required with key input from the funding agency, as well as MAAIF and other stakeholders. Proposed interventions to address farmed fish marketing under the 4Ps, rank the level of priority for each of the proposed Interventions (Very high, High, Medium)

INTERVENTION	PRIORITY RANKING (Very high, High, Medium)
PRODUCT	
Consumer education	Very High
Branding & certification	Very High
Infrastructure development (cold chain), handling, post-harvest etc.)	Very High
Adequate research in fish & fishery products	High
Appropriate packaging & branding for different segments	High
High quality feeds and seeds	Very High
Skilling value chain actors	Very High
Promote domestic but also regional markets	Very High
Site suitability & feasibility studies	Very High
Appropriate policies on fish imports	High
Appropriate climate smart production systems	High
Skilling women & youths in the value chain including value addition	Very High
Equipping women & youth with marketing & distribution facilities	Very High
Standards for different fish & fishery products	Very High
PRICE	
Consider closed season for capture fisheries during peak aquaculture harvest (possibly June-August)	High
Incentive schemes e.g. tax holidays/waivers on aquaculture inputs, insurance schemes, selling fish at best margins to avoid diminishing returns	Very High
PLACE	
Conduct detailed feasibility and capacity needs assessment – where you may also identify new/exiting facilities, support facilities (roads, electricity, communication etc.)	Very high
Identify key players around the place (local potential investors, including border traders, women bike distributors etc.	Very high
Setup, upgrade improve cold chain facilities	Very high
Setup upgrade improve outlets	Very high
Setup upgrade improve outlets in places further from the Lakes	Very high
Recommended promotional actions	
Benefits of eating fish Farmed fish being better than its competitors & wild fish Consumption of smaller fish Value added products (new products) Certified products Promotional roadshows Direct promotion to institutions, including mining camps, hospitals, etc. Fish festivals every year together with other agro-based food festivals. Promote fish at Bunyoro region near Lake Albert where there shall be oil mining in near future	Very High

Prioritised strategic places for interventions from PESCA

There are various options available, but with a limited timeframe and budget these must be prioritised. From the analysis provided and ensuring a connectivity with AquaParks, as well as inclusion of small-holders in terms of collection services. Practicality and focused, targeted market support have been the key decision criteria for these recommendations.

1. BUSIA – improved infrastructure on the border with Kenya, as a key route to a key market for farmed fish at this time.
2. GULU – as a key population centre and with access from the Apac AquaPark location, as well as other producers routing through to South Sudan and West Nile as well.
3. MASAKA – as a key hub connecting the Kalangala AquaPark to regional routes, as well as direct efficient routes through to Kampala and other centres.
4. KAMPALA – as the largest population centre, with various established outlets and diverse opportunities for expanding various value-added products

Annex X includes a detailed breakdown of the sort of actions required to provide more guidance to the next actions under the MAOPE, which include feasibility studies and business planning studies.

G. Other Support Interventions

Other possible interventions to support the above recommendations, albeit with limited or minimal budget allocations will include the following:

G.1 Promotional activities

As indicated throughout, promotion for farmed fish is very sparse in the country. General campaigns through various media and approaches is required. After over two years of project activity, there is little or no visible communication about what the project is doing; it is suggested that the PESCA project should be the spring board for this, using available budget to commence the messaging about farmed fish to support its uptake, as well as generic project visibility. This should include:

- Overall promotion campaign for the sub-sector, targeted to commence as soon as possible, and tailored to the above interventions primarily, including the AquaParks developments.
- Estimated promotion requirement at a generic national level and focused district, city, town level would be approximately UGX 250,000,000; this would require a further annual commitment from other funding sources of UGX 150,000,000 per year for the next 5 years, where it is expected that private sector would take over and operate such promotional activity. It should be expected that MAAIF would contribute to this ongoing promotion until the private sector moves in.
- Aligned to this general promotional activity would be targeted regional events (trade events for fish farmers and outlets), where farmed fish would be promoted, with recipes, information and sampling in regional centres.
- The project can launch various activities with trade event style activities, with private sector contributing to the events in terms of presenting products and promoting benefits of farmed fish as an alternative to capture fisheries.
- This recommendation is informed not only by the responses of the respondents but also the considerable literature review done in this survey. Aquaculture has been globally misunderstood and it is up to all stakeholders to collaborate in informing and educating the population with the correct information e.g. on health benefits and production. 'Evidence suggests that consumers' perceptions may be based more on beliefs and emotion than on objective knowledge'. Some ways of doing this are advertisements, campaigns, demonstrations, use of media, integration of fish farming in school education systems.

G.2 Regional buyer connections

Although the project does not cover investments outside Ugandan borders, there shall be a process to directly and indirectly connect with buyers from the region, where supply relationships can be fostered. Such business-to-business (B2B) transactions require planning to be successful and would require management personnel to establish mutual business client relationships especially with well-established distributors. The project may consider investing in a presence at targeted regional country trade shows thus building awareness of its products. Since the project does not offer direct assistance to external modalities that will enable the movement of product (e.g. depots, other distribution facilities outside of Uganda), consideration

can be made to possibly assist in the identification and attraction of possible external investors to invest in and operate these modalities.

Strategic B2B interactions are important in the process. An early market assessment and regional visits has identified some of these willing buyers based in Kenya, Rwanda, DRC borders.

This market assessment has identified some promising regional buyers/distributors. Investment will merely be the establishment and strengthening of B2B engagements, meetings which might involve travel to distribution centres to ensure products and working with these external distributors to conduct trial shipments. Doing business with well-established distributors to ship product across complex borders especially to DRC and South Sudan is also required.

Although the traders seem to have a negative attitude towards the farmed fish, many did indicate that they were willing to trade in it if some adjustments such as improved taste, shelf life and texture were made. Moreover, if the customers' acceptance of farmed fish is improved then the existing fish traders will also begin to trade in farmed fish. Going through the associations will be the best entry to engage with the traders. Suppliers as identified in this research should also be included. One way to do this is through forums that are aimed at eliciting and addressing all the factors that are standing in the way of the traders marketing farmed fish. For instance, the quantities and frequency of supply, the price ranges and so on. A similar separate forum can be done for the farmers and then the two groups come together in a forum that will enable them to reach a mutually beneficial agreement.

G.3 Market Segmentation

It is clear from our survey that attempting to change the minds and attitudes of the top traders in the existing markets may not be easy at least in the short-term. Markets where non-traditional consumers of fish reside might be more feasible. Additionally, 'new' traders may have to be approached in the existing markets.

Targeting youth and those in their twenties with strategies that seek to increase their interest and consumption of fish in general and farmed fish in particular. Their perceptions and misconceptions are easier to address than with more mature audiences that want to be traditional.

However, the older (over 30s) can also change their consumer behaviour given the right triggers being addressed e.g. improved taste, repackaging, and especially quality and health.

Creating a market for small sized (100 - 200g) fish by consistent supply and price would seem to be something that needs specific analysis and attention. This survey confirms that there are market segments where smaller fishes would be appropriate. There seem to be growing consumer interest on small sized fish (300-500g), as experienced by SON at some of its outlets especially at Busia. This could be good news for commercial producers

G.4 Farmed product value addition opportunities and initiatives

Secondary processing/value addition will increase market access through product diversification, and provide employment growth opportunities. Investments will be made in identifying already existing processing/value addition companies where the desirable live fish will be sent to for processing/value addition – assuming the

companies have all the other necessary facilities for processing. Their unused capacities could easily be appreciated for processing of farmed tilapia. As a start, value addition of raw catfish into sausages (some companies in Uganda already doing it). Although in small volumes, the end product will follow the same distribution patterns to wherever it is required and will feature in many of the fish shops although in lesser volumes.

Apart from the more common methods of adding value e.g. frying, processes that are attractive, time saving or altogether innovative should be explored. Our survey showed that fried fish was very popular and at times was used by the traders to 'mask' fish that was slightly off. Fish farmers need to be innovative and aggressive in this e.g. sausages, coated products, marinated products and others. This recommendation blends with that of looking for new markets; new products must also be pursued in order to gain customer acceptance. So as to achieve better consumer acceptance farmers also need to improve on their production practices in order to improve on the quality, taste, shelf life and other desirable characteristics for their fish.

Farmed fish could differentiate itself from wild catch by managing harvesting and post-harvest techniques to deliver fish that is safe to eat and meets sanitary and phytosanitary measures. The Standards and Market Access Program (SMAP) is an opportunity for fish farmers to receive training in producing fish that is up to the International standards of quality. Farmed fish may now be exported to the European Union and although we have enough local demand, it may not hurt in the long-term for farmers to 'cast their nets deeper'.

Value-added product	To work with	Potential markets
Tilapia fillets	Freshcuts Ltd. (Kampala?)	Major towns (Kampala, Entebbe) Future export prospects)
Catfish sausages	Kati Farms	Major towns (Kampala, Entebbe) Future exports prospects
Catfish dishes	Soroti-ERAB RESTURANT	Soroti – possibly expanding the catfish restaurant model to other strategic towns nearby
Smoked catfish/tilapia	Mr Ataba Mathia Arua – Catfish Trader?	Northern Uganda, DRC/ South Sudan markets

Figure 20 Value-addition opportunities

G.5 Certification using the EcoMark Africa label

There are a number of incentives if the AquaPark farms are certified in order to improve competitiveness of product. The African Organization for Standardisation (ARSO) has launched EcoMark Africa (EMA) as a continental certification system, designed to enhance access for African products to international markets. EMA is comparable to the requirements of the global Aquaculture Stewardship Council (ASC) certification scheme and although still very much in early stages of promotion, the EcoMark label is eventually expected to provide an easy recognisable signal to some consumers that a product meets a certain level of performance as defined by the standard. This can improve public perception especially when dealing with competition from Chinese imports, or where consumers are wary of the origin of what they are eating. The process of certification provides some verification that a product would have been sustainably produced,

since third party audits are required. In addition to building legitimacy in the public eye, certification can provide producers with access to certain buyers (some retailers and niche segments that require some level of compliance with a minimum performance).

The first aquaculture farm to receive the EcoMark Africa label is Kamuthanga tilapia fish farm in Kenya. They received the platinum level, the highest of 4 certification levels having satisfied the conformity assessment, showing a solid reflection of how the tilapia produced at the farm for the Kenyan market is sustainable, incorporating key social and environmental aspects in the production processes.

EMA has been adopted by one farm in Uganda, SON (which will soon undergo a self-assessment and eventual audit programme for conformity), as well as WAFICOS. In order to achieve this, the AquaPark farms need to invest in the journey and processes of getting certified, which include a self-assessment process, at a minimum cost of US$5000. Standards for both tilapia and catfish have now been developed and are available. https://www.arso-oran.org/ecomarkafrica/

G.6 Policies and Legal Framework in support to trade for farmed fish products

Uganda has generally liberalized economic sectors. Demand and supply therefore determine prices in the mainstream markets, and the government directly encourages businesses to improve on efficiencies and productivity. Although the government of Uganda has put in place a set of laws and regulations (some of which have been modernized e.g. new Fisheries Act promulgated in 2013), there are still many challenges in the implementation and enforcement of such laws and regulations.

National Fisheries and Aquaculture Policy of 2017

The National Fisheries and Aquaculture Policy of 2017 (administered by MAAIF), shall become the overarching policy instrument to govern all fishery activities in the country. In addition to support production issues for fisheries and aquaculture, NFAP has taken to address fish market access issues by addressing fish quality control issues, diversification of fish products for domestic and international markets, regulation of imports and exports as well as strengthening infrastructure for domestic, regional and international trade. This will be done in collaboration with other government agencies e.g. standards body.

Trade policies and regulations

Uganda's Ministry of Trade, Industry and Cooperatives (MoTIC) is mandated to formulate, review and support policies, strategies, plans and programs that promote and ensure expansion and diversification of trade, cooperatives, environmentally sustainable industrialization, appropriate technology development and transfer to generate wealth for poverty eradication and benefit the country socially and economically.

SPS regulations

The need to comply with the SPS requirements is essential for Uganda as the country mostly trades in products that are based on own produced raw material. Uganda has an approved and functional Competent Authority within MAAIF, trained and responsible for the monitoring of SPS requirements, issuance of heath certificates for fish and fishery products, including aquaculture.

Standardisation

The Uganda National Bureau of Standards (UNBS) is a statutory body under the MoTIC established by the UNBS Act and has been mandated to the formulation and promotion of the use of standards; enforcing standards in protection of public health and safety and the environment against dangerous and sub-standard products; ensuring fairness in trade and precision in industry through reliable measurement systems; and strengthening the economy of Uganda by assuring the quality of locally manufactured products to enhance the competitiveness of exports in regional and international markets.

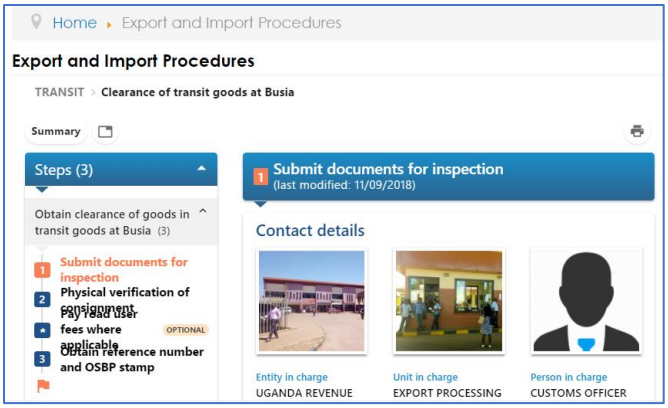
Recently, UNBS and the Directorate of Fisheries (with support from the Commonwealth Standards Network (CSN) have developed simplified guidelines for the fishing industry. Such guidelines will provide basic information on the laws, regulations, procedures and principles for addressing safety and quality of fish products. The guidelines will also be applied during handling, preparation (such as drying), processing, packaging, storage, transport and marketing of fish.

UNBS has also adopted the EcoMark ecolabel (a distinctive quality mark label) for the certification of farmed tilapia and catfish, and has begun engagements with concerned commercial aquaculture producers and their associations for its application in support to the aquaculture sector.

Import and export regulations

- A local fish health inspection certificate is required per consignment and is issued by MAAIF
- Artisanal processors and fish mongers must obtain a license from MAAIF
- Fish exporters must obtain a fish export license for every consignment of fish and fish products, issued by MAAIF
- The fish transporter is required to have a license for trucks carrying over ten tonnes. This is issued by MAAIF
- The facility where fish is processed must have a certificate of approval which is obtained from MAAIF
- A trader wishing to export fresh or dry produce must register with MAAIF for issuance of phytosanitary certificates.

As part of ease of doing business for importers and exporters of fish and fishery products, MoTIC has created an online portal with all the requisite information and procedures to guide importers and exporters of fish – an excerpt for the clearance of transit goods at Busia border.



Source: http://www.mtic.go.ug/index.php?option=com_content&view=article&id=296&Itemid=432

Links to country's agro-industrialization agenda

Uganda has adopted the concept of agro-industrialization which will aim at transforming the country into a modern and industrial country through adding value by processing and increasing exports of higher value products, especially agricultural products. This is within the country's vision 2040 which aspires to transform the country from a predominantly low-income to a competitive upper-middle income country in 20 years.

Agro-industry is broadly defined as post-harvest activities involving the transformation, preservation and preparation of agricultural production for intermediary or final consumption (Africa Development Bank, 2017)[1]. Uganda's agro-industrialization agenda is pivoted in three areas;

- Agro-processing, distribution, and farm input provision activities;
- Institutional and organizational coordination between agro-industrial firms and farms.
- Parallel changes in the farm sector, such as changes in product composition, technology, and sectoral and market structures.

Although government is busy promoting agro-industrialization, financing remains a challenge to speed up developments in the planning and implementation. There are some pilot initiatives that have demonstrated positive momentum such as the pilot irrigation schemes and distribution of inputs, setting up of agro-manufacturing industries such as the meat processing plant in Luweero and development of support marketing initiatives (Economic Policy Research Centre (EPRC), 2017).

On the aquaculture value chain front, one example is the fish agro-processing enterprise established in Kampala where farmed raw catfish is transformed into catfish sausages (thus adding value to fish products)

1 (https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/AEB_Volume_8_Issue_7_Transforming_Africa_s_Agriculture_through_Agro-Industrialization_B.pdf

for both domestic and regional markets[2] Such initiatives will strongly be promoted under the country's agro-industrialization strategy.

It is therefore recommended that as this project moves ahead, issues to do with fish processing, value addition and market access be addressed from within the agro-industrialization perspective in order to spur government supported commercial investments in the medium to long term.

H. Investors & Trade Linkages

H.1 Introduction

As indicated in the study TORs (Annex I), a key objective is to:

> *identify and categorize current potential value chain investors with a view to recommending who might be interested in developing such infrastructure as the sector develops and grows.*

This is based on the requirement to identify potential investors for recommended infrastructure for distribution that this report includes. At this stage providing final names of investors is not the intention, but some indication can be gleaned from the recommendations in terms of locations and current structures that exist at those locations. Generally, any good investment can attract investors, so it is expected that following decisions to pursue specific ideas from this report, or others and a full feasibility review of those recommendations, a positive investment result would attract investors to similar business models. As reiterated in this report and understood generally, the stage of sector development would also dictate willingness and timing for such investments.

Another key objective of the TORs is to

> *identify promising and realistic national and regional buyers for the products from Uganda, with a view to establishing potential connections with suppliers (fish farmers, or cooperatives/ association).*

This is perhaps an easier item to identify and explain, as current buyers for fish, either capture or farmed are plenty nationally and regionally. Price is key to this situation and availability of a supply of fish to that individual or organisation, preferably with consistent volumes and size, form, quality attributes.

These two key items of the TORs are addressed in this section of the study report.

H.2 Strategies for attracting investors in the fish marketing / distribution sector

One of the project's goals is to attract investors, both domestic and foreign investors to invest in the aquaculture value chain, including the fish distribution and marketing business activities.

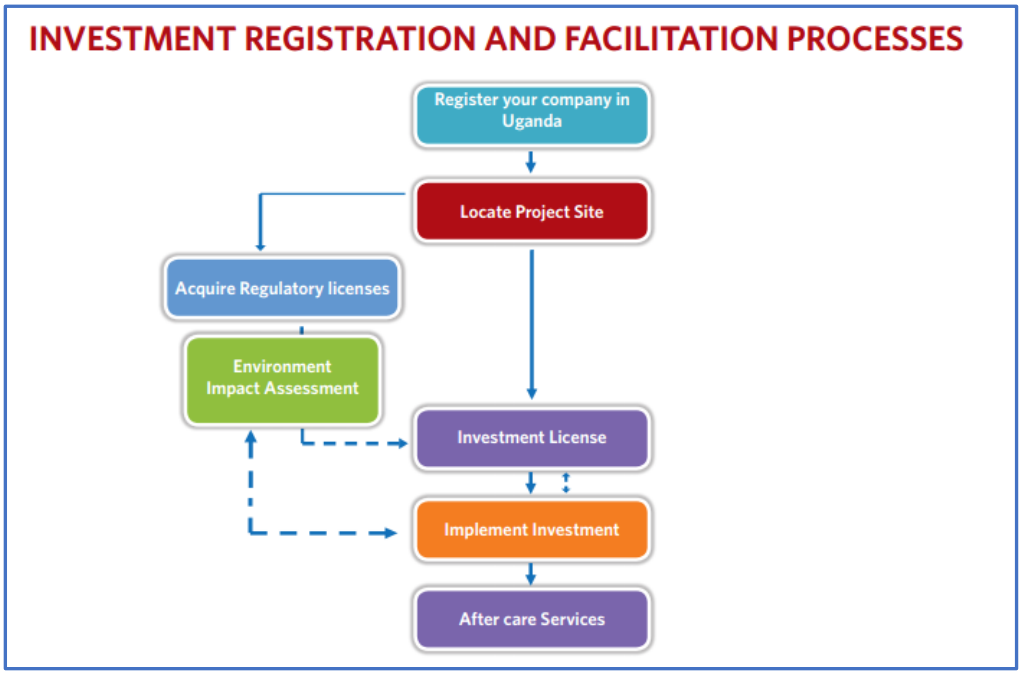
In addition to liaison with MAAIF with regards to investment opportunities available in the post-harvest value chain (some of which have been listed below), any formal investor, whether domestic or foreign wishing to

[2] https://www.ifama.org/resources/Documents/v17ib/Cadilhon-Kobusingye.pdf

do formal business in Uganda, the starting point will be Uganda Investment Authority (UIA), a government mandated agency to promote and facilitate investments in Uganda[3]. This is the first point of contact for any potential investor, where a One Stop Centre (OSC) caters for business registration, licensing, facilitation and aftercare services are provided under one roof.

UIA's main functions include:

- To promote and facilitate investments in Uganda
- Assist in the acquisition of Agricultural and Industrial land when required
- Assistance in organizing itineraries for visiting foreign business missions in the country
- Facilitate and enhance Small and Medium Enterprises to grow and link to multi- national entities for business
- Issue Investment licenses
- Review and make policy recommendations to Government about investment
- Broker joint venture partnerships
- Provides aftercare services to existing investors



According to UIA, aquaculture has broadly been identified as a priority sector for investment in Uganda, as well as its associated value addition functions, cold store, logistics etc.

[3] http://www.ugandainvest.go.ug/wp-content/uploads/2016/04/Guide-to-investing-in-Uganda.pdf

It is thus recommended that in order to enhance investments in these specific businesses for the farmed fish distribution and marketing - linked to the AquaParks the project must ensure they are included in the country's investment promotion agenda, within UIA. Such investments would include but not limited to):

- Post-harvest processing (secondary processing, including value addition)
- Fish transportation and logistics (including cross-border trading)
- Cold storage investments (ice production, depots, bulking centres, etc)
- Fish marketing (fish outlets, organized motorbike distributors, women traders etc
- Fish handling equipment supplies
- Indirect support to external investments especially at strategic depots in Rwanda, South Sudan, DRC and Kenya)
- Strategic promotional companies/agencies,

Recommendations:

- As a start, the government needs to develop a sector specific investment promotion strategy and action plan under this project.
- Government needs to ensure basic infrastructures required for fish marketing and distribution are put in place and well connected. These include developed road networks, ports, communication networks, adequate and reliable supply of energy, provision of an adequately skilled workforce/ specialised workers – thus a first step for ease of doing business in the sector
- Domestic and International promotional campaigns to inform and lure investors. The competitive advantages on doing business in aquaculture in Uganda needs to be told to potential investors. A handbook profiling some of the investment opportunities available for promoting investments in the targeted areas could be a starting point.
    - Undertake a national investment promotion event (in line with the concept of public understanding of aquaculture)
- Ensure the fish distribution and marketing sub-sectors is well included in existing and new national programmes to support the match making process between foreign and local investors, that regularly happen within other sectors
- Target quick win investors who will generate leads, and work with such investors including on policy change advocacy

H.3 Potential & interested buyers of farmed fish in Uganda

Various market centres were visited within Uganda to understand market dynamics and also check the willingness/prospects of some of these markets buying fish supplied from the Aquapark farms. Some of these market/distribution points shall become strategic entry points for promoting products as most have basic facilities and existing/functional buyer-seller networks which may be utilised. At present, most of these markets sell wild-caught fish.

1. Busega Market – Wakiso – Central Region
2. Mpondwe border – Wakiso – Central Region
3. SON Fish Farm – Buikwe in Njeru – Eastern Region

4. NAM Fish Farm – Buikwe in Mukono – Central Region
5. Busia Market – Busia – Eastern Region
6. Tororo Market – Tororo – Eastern Region
7. Soroti Market – Soroti – Eastern Region
8. Arua Market – Arua – West Nile Region
9. Walimi Fish Cooperative Society (WAFICOS) - located right in the heart of Kampala City

Other list of potential fish markets/outlets to do business with include (but not limited to):

Names	Institution	Phone Contacts/email
Mr Robert Osinde	SON Fish Farm	+256756879720
Mr Felix Ochueng	NAM Fish Farm	+256702450901
Mr F. A. Okware	Tororo- Market Master	+256772695334/ +256756668040
Miss Easter	Tororo Fish Trader	+256786922766
Miss Julie	WAFICOS	+256776984409
Mr Simon Olok	WAFICOS	+256772697629
Mr Ataba Mathia	Arua –Catfish Trader	+256772877710
Miss Immaculate Nyangoma	Soroti –Catfish Farm Manager	+256775339623
Mr Jackson Onyait	Soroti- Catfish Producer	+256789411367
Mr Enab Samson	Soroti-ERAB RESTURANT	+256785675351
Miss Faith	Soroti Fish Customer	+256772934827
Mr Okoth Eric	Chairperson-Tororo Fish Vendors	+256752660211

H.4 Potential & interested buyers of farmed fish for regional markets

Based on field missions conducted to select regional fish distribution/market points, there was a general expression of willingness to buy fish from Uganda (and thus no objection), in fact some distributers and traders have indicated that they have experience and existing supply deals with some Ugandan suppliers including fish farms. There are of course a number of factors that will come into play when the products actually became available on the market (from the fish farms) such as price negotiations, product forms, competition issues, promotional issues, country regulations etc – as highlighted in the report. Based on our engagements with some of these distributor/trader operators, we grouped these distributors/traders to HIGH/MEDIUM/LOW brackets in terms of their enthusiasm and readiness to buy product from Uganda.

- LOW – difficult markets, low interest in buying product from Uganda
- MEDIUM – who have little to no experience in sourcing fish from Uganda, but have general interest based on demand dynamics in their country markets as well as to boost capacities in their outlets especially during periods of short domestic supplies.
- HIGH - those who have experience sourcing fish from Uganda and are willing to do so at any given time subject to agreement of price, availability, products forms etc. Some have experience in sourcing fish from Uganda, including from some existing tilapia and catfish farms.

It should be noted that, although South Sudan and DRC were not directly visited by consultants, there are existing traders from within Uganda and Rwanda who have demonstrated experience in shipping product across the borders – some may even come and pick up the product directly from the fish farms and take it across the complex borders of DRC and South Sudan.

As a start, strategic B2B connections will be fostered with the following potential buyers, possibly as building blocks to access markets in these countries (but not limited to):

COUNTRY	BUSINESS NAME	TRADER DESCRIPTION	LOCATION	CONTACT	Interest expressed	Potential product forms
RWANDA	Fine Fish Ltd - Kimironko	Outlet small retail outlet close to large all-goods market	Kigali City	0784646403/ 0788915754	Medium	Fresh tilapia
RWANDA	Kivu Tilapia Farm Ltd – Nyamugogo	Retail outlet	Kigali City		Medium	Fresh tilapia
RWANDA	Women Fish traders (Co-operative Koaba, contact	Local women small scale fish distributors	Gisenyi/ Rubavu–	Emeres on 0782469033	High	Fresh/frozen tilapia
RWANDA	Gisenyi Fishing Supply, Owner/Partner	Major large-scale fish distributor – in association (Rwanda & DRC)	Gisenyi (border with DRC)	sbukeye@gmail.com +250 788537211 SYLVERE KARERA BUKEYE:	High	Fresh/frozen tilapia Fresh/frozen catfish
KENYA	Victory Farm Outlet	Established Farmed Fish Outlet located near the, Godown #33 SGR Terminus:	Nairobi	Cynthia Wambeti 0743-618-7911	Medium	Fresh tilapia
KENYA	Susan Oduor, Woman Fish Trader also representative of Awfishnet Kenya Chapter	Fish vendor with Stall at Nairobi City Market	Nairobi	+254799863564 Susanaoduor@gmail.com	Medium	Fresh tilapia Dried catfish (to a minimum)
KENYA	Zak, Indian Fish Trader	Fish seller with Stall at Nairobi City Market	Nairobi	Zak, Fish Trader nearby +254727529120	Medium	Fresh tilapia
KENYA	Samaki Express EA Ltd.	Kenya Fish Distributor	Nairobi	samakiexpress@gmail.com	Medium	Fresh/frozen tilapia
KENYA	Nor Supplies	Kenya Fish Distributor	Nairobi	norsupply2005@gmail.com	Medium	Fresh/frozen tilapia
KENYA	Susan Njeri	Fish distributor specialising in value added products – also member of Commercial Aquaculture Producers of Kenya	Nairobi - countrywide	+254 722599995	Medium	Raw catfish for production of sausages
DRC	Patricia Maisha	Women representative from AWFISHNET DRC	Kinshasa (with reps in Eastern DRC)		High	Tilapia/catfish (various forms)
DRC	SYLVERE KARERA BUKEYE	Fish Distributor based in Gisenyi Rwanda		+250 788537211	High	Fresh/frozen tilapia Fresh/frozen catfish

Annex I: Study Terms of Reference

Primarily focused on market supply / demand and distribution stakeholders, including logistical facilities to support safe handling, logistics, transportation and delivery of farmed fish and associated inputs (such as ice). Additionally, the study will provide direct and pertinent input into potential buyers for fish products from Aquaculture in Uganda and commence linkages with Ugandan fish farmers for supplies of fish.

The consultant will, through their experience, various discussions, interviews, survey techniques, questionnaires and other methods implement the following;

a) Plan and execute a Market Analysis for aquaculture value chains as indicated above, focusing on:

- Establish (from available data) current production and thereafter expected growth of farmed fish in Uganda, understanding competitive forces based on the production throughout the region and from imported fish with associated trends. Careful attention to the accuracy of information is encouraged.
- Bearing in mind the expected growth of population in the region and indicative consumption and demand requirements, but being acutely aware of the disparity of income within the region and the price forces preventing many people from buying fish regularly, if at all. In this regard, particular attention should be given to fish sizes/ product form, vs. prices / demand related to market segments nationally and regionally, as well as the dynamics associated with alternative protein sources (chicken, beef, beans, etc.), income levels and seasonal production dynamics that affect the relative demand, consumption and price of fish. The market is highly segmented in terms of price (willingness/ability to pay), and size of fish (expected market size for fish, verses optimal size for profitable aquaculture production), which is pertinent to production strategies and current expectations for the aquaculture sector. The market in Uganda is not expected to be easy to define, so a realistic and cautious approach is required as the information from this study will inform business modelling for investor decisions.
- Assessment of size of markets, potential sales volumes and related trends into the future, with regards to regional markets, the distribution chain dynamics are critical to understand, as they are particularly complicated. For instance, accessing markets in DR Congo, deemed to be a potentially very large market, requires very well-established contacts and the understanding of negotiation approaches and partnerships to provide sustainable profitable access. A cautious prioritisation of market potential that can be accessed in the near future by fish farmers is required.
- Identification and assessment of physical market and logistics structures (market outlets, cold chain facilities and equipment, storage areas, transportation modes and associated structures, handling and packaging norms, quality challenges, etc.). A national focus also should be given to the general logistics surrounding the intended AquaPark locations and their ability and potential for supplying fish nationally, regionally and internationally.

b) Review supply and demand data and dynamics, including past and future trends to allow for assessment of future requirements for handling increased volumes in the identified supply and distribution systems

c) Understand market value chain actors and their structures, behaviour and relationships as they affect the identified distribution requirements.

d) Identify and describe:

- Market actors (producers, processors, traders, consumers), this will mostly be available from secondary data and interviews with relevant institutions and other sub-sector actors.
- Procurement mechanisms and constraints including standards, expectations, volumes, quality requirements and issues of distribution and intermediaries involve in the marketing process.

- Security issues and influencers for product mobility, especially across borders and its effect on supply, quality and price.
- Policy challenges and recommended improvements should be part of the output especially with respect to attracting investors to the sub-sector in Uganda.
- Support structures for the value chain development that are in place, required, preferred.
- Primary activities for men, women and youth in the current value chains.
- Current rules and regulations (e.g. standards, laws, informal rules and norms) related to the value chain. The consultant should outline gaps to give more opportunity to current and new investors.

e) Assess the competitiveness of the value chain(s) and determine how to create competitive advantages for the targeted actors in the context of local and regional trends, having in mind the context of the large and smallholder producers and current competitive dynamics in the region including cheaper imports from Asia.

f) Recommend value chain development plan(s) that benefit both small holder producers and large-scale commercial producers.

g) Identify gaps in distribution infrastructure with a view to recommending upgrades to existing facilities or the need for new facilities and services to support the value chain development and productivity with the intended / potential growth.

h) Identify and categorize current potential value chain investors with a view to recommending who might be interested in developing such infrastructure as the sector develops and grows.

i) Identify promising and realistic national and regional buyers for the products from Uganda, with a view to establishing potential connections with suppliers (fish farmers, or cooperatives/ association). An initial understanding is that areas of potential growth for sales are in Kenya, South Sudan, DR Congo but others may be considered.

Annex II: Questionnaires

Interview fish farms

→ Make a short introduction about the study background and the project. Explain main reasons and motivation for study. Ask for consent of person prior to starting with questions and explain that the identity of the person will be kept strictly confidential if they decide to participate.

Production

1. Are you the owner or manager of this farm?

2. Since when do you work here / own this farm?

→ In case that they are farm managers, ask since when the farm is operating and since when the interviewee works there (two different dates).

3. What species of fish do you farm?

4. How big is the farm (plot size)?

5. How many grow-out ponds/cages do you have?

6. Where do you buy your fingerlings?

7. Where do you buy your feed?

8. How long is a typical growth cycle (from stocking until harvest, in months)?

9. In which month(s) do you harvest?

10. What is the size range of harvested fish?

11. What is your estimated total annual production volume (total for farm and also per species if more than one species is farmed)?

Selling of products

12. Who are your buyers: a. e.g. a single buyer or many different ones?

b. a company?

c. a shop owner?

d. private households?

e. other?

→ make sure to add all and indicate approximate share (e.g. if they sell to a company and to private households, how many % go to each of the two?)

13. Do you know where the final destination of your products is? If so, can you please explain (all destinations in case that there are more than one)

→ *Describe location and buyer (is it a store, an outlet, a factory; one buyer or many buyers…)*

14. Do you sell your fish at the farm and/or elsewhere? Please explain.

15. How do you know and contact the buyers(s) before selling products?

16. Please describe a typical selling process: a. e.g. Do you advise what day you want to harvest or are you contacted before harvest?

b. How do buyers get their products (e.g. with own truck or with rented truck; cooling truck or normal truck; with ice or no ice at all)?

c. How is the total harvest volume calculated (by piece, weight, estimate)?

d. What is the price range you sell and how is the price set (e.g. bargaining, fixed by you, fixed by buyer, other)?

e. When do buyers pay (e.g. immediately at harvest, after selling, advance, other)?

f. Do you usually harvest an entire pond/cage or do you partially harvest if demand is lower than one pond/cage size?

17. Do you have one favourite buyer, a few of them, or many?

18. For you, which factors make a good buyer (price, reliability, volumes, buying cycle, exact volumes demanded, the fact that they come to buy at farm, long-term business relationship, other…)?

Opportunities, challenges, bottle necks

19. Which are currently your main challenges?

20. What would help you to overcome these challenges?

21. Do you plan to expand or reduce your production in the future?

22. Are there other fish species that your buyers ask you for?

23. Are you a member of an association (farmer association)? If so, which one?

24. Does this membership satisfy you? Please explain why or why not.

25. How do you estimate the future demand for fish (increase, decrease, other species, size or product change)?

Personal Information

→ Explain that personal information is only required to contact the person if further questions come up. However, it will be kept strictly confidential and will not be shared with anyone nor appear in any report.

26. Name

27. Gender

28. Age

29. Contact (phone & email if available)

30. Location of farm

Interview Traders

→ Make a short introduction about the study background and the project. Explain main reasons and motivation for study. Ask for consent of person prior to starting with questions and explain that the identity of the person will be kept confidential if they decide to participate.

Purchase process

31. Where are you from?

32. Do you operate on your own or for a company?

33. Since when do you carry out your current work?

34. What kind of fish do you buy? (please explain species, product types and any other important aspects)

35. Where do you usually buy fish (location(s))?

36. How do you know and contact the producer(s) (or other parties) before buying products?

37. Please describe a typical buying process: a. e.g. Do you advise what day you want to buy or are you contacted before harvest?

b. How long does it take to drive to farm?

c. How long is the loading time?

d. How is the total volume calculated (by piece, weight, estimate)?

e. When do you pay?

f. Do you always fill your vehicle or is loading volume defined by other factors (e.g. availability, harvest volume, order size)?

38. Do you have one favourite producer, a few of them, or many?

39. For you, which factors make a good producer (price, species/products, reliability, freshness, harvest on demand, exact volumes demanded, other…)?

40. How often do you buy fish in Uganda?

41. What is your estimated total annual buying volume (total for all fish and also per product/species if more than one)?

Transport route(s) and consumer

42. Who are your buyers (e.g. a single buyer, an outlet, a company, a market)?

43. For how long have you known this contact (person or organization)?

44. Who and where is your final destination? Please mention all if more than one.

→ *Describe location and buyer (is it a store, an outlet, a factory; one buyer or many buyers…). The difference to question 12 is that we would like to know the final consumer. It might be that it is not known to the interviewee.*

45. Can you please describe your transport route in detail (location where you pick up the fish, main locations along the route, border crossings)?

→ *ask if they only have one transport route. If they have more than one, please ask them to describe all*

46. Why do you choose this route (e.g. short route, good road, low traffic volume, other)?

47. In general, are there any major obstacles/difficulties along the route (e.g. traffic jams, border crossing)?

48. Can you please describe the customs clearance or border crossing process if there is any? a. e.g. Do you have to show any documents related to the fish (health certificate, license(s))?

b. Do you need to pay a fee for bringing products over border?

c. If so, an official or unofficial fee (i.e. bribe)?

Opportunities, challenges, bottle necks

49. Do you own a vehicle, rent it or other (please describe)?

50. Do you have competitors?

51. Which are currently your main challenges?

52. What would help you to overcome these challenges?

53. Why do you buy fish in Uganda and not elsewhere (e.g. another neighbouring country)?

54. Are there other fish species or products that you (or your buyers) would buy if available?

55. Would you consider buying frozen products?

56. Would you consider buying from many smaller farms rather than one big farm? If so, what would be required?

57. How do you estimate the future demand (increase, decrease)?

Personal Information

→ Explain that this information is only required to contact the person if further questions come up. However, it will be kept strictly confidential and will not be shared with anyone nor appear in any report.

58. Name

59. Citizenship (only ask if you think it is appropriate to ask)

60. Contact (phone & email if available)

Annex III: Report on questionnaires mission - by Yusuf Kassi, DAMD

Introduction

As a contribution to the Agrotec STE (Urs Baumgartner), who has been hired to undertaken Activity 3.1.1.1 of the PESCA MAOPE, a team from DAMD undertook a mission in Uganda, tooled with questionnaires prepared by the STE, to collect basic data from fish farmers regarding their current production and marketing initiatives. This report summarises the results of the mission.

Raw Data/ Results

Data is presented in 3 Excel files, simply listing the finds from the questionnaires. Raw Data sheets remain with the DAMD team at this time. This data was sent to the STE.

Two Excel file sheets contains the raw data, as extracted from the questionnaires **(sheet 1 for Farmers and sheet 2 for Traders**). This submission is therefore raw data to be analysed by the Consultant. Additionally, fish export data for 2018 received from Mpondwe border is also attached. Additional information gathered from Fisheries staff, Fish Farmers and Traders in the Field, which is summarised below:

a) Marketing chain in Busia

i. Most of the farmers sell fish on farm to buyers who comprise of both men and women. The buyers are of three categories; there are those individual households who buy for home consumption, those who buy to take to other local markets (mostly women) and those who buy to take to the Busia fish market. Those who bring to the market buy also from other places like Jinja, Buikwe, Wakiso, Kampala, Masaka and from Western Uganda.

ii. Once the fish reaches the market, it is bought by different buyers who are mostly middle-men who buy on behalf of Kenyan traders. The fish is packed in baskets in quantities of 100 – 300 kg and ferried on bicycles across the border. When they ferry smaller quantities, they dodge the customs clearance formalities.

iii. An interview with the market chairperson revealed that a single truck of fish that arrives in the market has about 60 individuals, who derive livelihood from activities like offloading, weighing, packaging, loading and ferrying on bicycles across the border.

iv. There are two small ice plants in the district but their capacity cannot produce enough ice for all traders and farmers. It was also noted that traders prefer to bring smaller quantities because if they bring big quantities buyers bring down the price because they know that the market is flooded yet there are no preservation facilities.

v. Most traders preferred buying form cage farmers because of the good size of fish (500 g or more) and the fact that cage farmers normally have an idea on how much fish they have in their cages unlike pond farmers. They cited scenarios where a trader drives to the farms after a farmer telling him/her that he has a particular quantity but upon harvesting they find very small quantities.

b) Tororo

Most of the farmers sell on-farm to either traders or individual households. The traders pick the fish from the farms on motorcycles, bicycles, or trucks. Most farmers expressed the desire to reach markets, but they are limited with transportation to markets and lack of information on potential markets. At the Malaba border, there is no proper marketing structure, despite the fact that traders from various places bring fish which is sold through agents to Kenyan traders. Some of the fish is bought by local traders who sell in markets within Tororo. These are mostly women.

c) Bugiri

The marketing of fish in Bugiri is similar to that in Tororo. Buyers pick the fish from farmers. Buyers include individual households and traders who either sell locally within Bugiri or take to Busia market. Most of them said the reason for selling on farm is because they lack information on potential markets and the transportation to reach markets. They also expressed fears of quality losses in case they reach the market and cannot sell their fish yet they don't have any preservation methods.

d) Farmers in Busia and Bugiri said that they don't have market for catfish, unlike in Tororo where they said that the market is available. This is attributed to people's traditional preference for tilapia over catfish.

A few farmers who were growing catfish said that it has a better yield in terms of size but most of them were putting it in their ponds as a by the way, not the main cultured species. For this reason, they did not have any data on catfish.

It was also noted that there is an emerging potential market in Rwanda but most traders cannot fulfil its requirements. The market requires fish to be gutted before taking to the market but most farmers do not have the required facilities for primary processing. The project might want to think about attaching a place with the basic minimum requirements for primary processing to the proposed infrastructure.

e) Mbarara District

The DFO reported that generally farmers sell their fish in Mbarara Market, locally called Kola Nolya, market as a collection centre on Thursdays. Many bulk buyers and fish mongers buy from this central market and distribute to small centres in the region. The DFO reported that fish is usually sold fresh but there is a trend of frying as a way of processing at the farm or the market before delivering to market to increase shelf life and marketability.

f) Bushenyi District

i. The DFO reported that medium-scale farmers sell locally because of low fish supply levels to area and larger scale producers sell to Congolese buyers who take the fish to DRC or deliver themselves to border markets.

ii. He reported that supply is still below the demand because of production constraints like feeds costs and quality.

g) Kisoro District

The Assistant DFO Mr. Augustine reported that the demand for fish in DRC is high but the main challenge is some levels of insecurity in the eastern DRC. He further noted that there is an opportunity for farmed fish due to the current enforcement exercises by the Fisheries Protection Unit leading to reduction in quantities of wild fish going through the Borders.

h) Kasese District

The Fisheries Officer in charge of the border area made the following observation to the team:

i. For fresh/frozen, there is need for specialized vehicles and fast transport to avoid spoilage, there is a need for cooling systems within the market place, three phase power at border markets, special fish handling places in the market and special containers to carrying fish, which are all not available

ii. For salted fish, which is preferred by eastern Congolese in DRC, he proposed a constructed place for drying and adding salt as some fish delivered to the market is usually not properly dried and a place for salt addition.

iii. For smoking processing, one of traders who imports fresh and frozen product, reported that most of his customers may need smoked fish and therefore proposed a provision of smoke processing near bulky and border markets

iv. That Congolese prefer salted and dried Tilapia locally called **Makayabu**, this is temporarily stored in rooms at the border where the commission agents bring the Congolese buyers to buy. There is no established market, storage facilities, handling places and containers, yet the market handled large volumes from mainly the lakes and some from farms.

v. Small quantities are also exported by motor cycles to inner markets in DRC

Annex IV: Key Farm fish value chain actors in Uganda

Tilapia Farms

In broad terms, fish farms can be divided into four main groups: on the one hand there are a small number of commercial fish farms, whereas the majority of farms are smallholder fish farms. For both categories there are cage farming systems, as well as pond production systems. Throughout the country, there were an estimated 18,312 ponds and 4,814 cages registered in 2017 (MAAIF, 2018).

The most important production area for (Nile) tilapia is in and around Lake Victoria, including farms near the capital Kampala and the two towns Entebbe and Jinja, all three locations with strong historic fisheries activities. In this area, cage farms are the predominant farming system. Both smallholder and commercial fish farms are present. The species farmed is exclusively Nile tilapia.

In other areas, pond-based production is the preferred system, with smallholders dominating by numbers. A map of farm locations was not available to this study, but would be a useful addition that can be developed as part of the census activity under this project.

While smallholder facilities consist of one or only a few ponds or cages and typically produce less than 1000kg of fish per year, there are some larger operations that have significantly contributed to the development of the sector. They include:

- **Source of the Nile (SoN), Jinja**: cage-based farm in Lake Victoria with an estimated annual production of <1000t farm gate. SoN is part of Lake Harvest (Zimbabwe), which in turn is part of the African Century Foods Group (Zimbabwe, with activities in Sub-Saharan, East and Southern Africa).
- **IG Invest (U) Ltd, Buikwe District:** farming operation with Ukrainian background established in 2013 with a targeted annual output of 150-300t.
- **Pearl Aquatics, Garuga**: cage-based Nile tilapia farm in Lake Victoria with an estimated annual production of 150t.
- **Kajjansi Aquaculture Development Research Centre (KADRC):** with support from the Chinese government and previously from the African Development Bank (AfDB), the research centre has experienced a commercial uplift over recent years. While it was planned under a joint development project that the farm should become fully commercial with targeted annual outputs of 27,000 tons of fish (Dalsgaard et al., 2012), this was not the case by the time this study was carried out in

November 2018. We learned from representatives working at KADRC that although the research station did farm tilapia that were sold to interested buyers, output was limited to a few tons monthly and main buyers consisted of local households near the Centre.

- **Rock Springs Farm, Tororo:** is a pond-based farm. While better known for its hatchery operation, the farm also produces Nile tilapia for human consumption.
- **I Fish Farm, Kalangala:** cage-based farm in Lake Victoria established in 2015.

Apart from these commercial farms, there are also some farmer cooperatives such as the Masese Cage farmers (or Jinja Fish Farmers Association (JFFA)). Counting 50 members in November 2018, with each member having one cage each, the production of the cooperative is respectable. This in turn can become a problem at harvest, since market access appears to be one of the main challenges of the association. Most members are former fishermen, who were trained to build cages on their own in the context of a former development project that aimed at reducing fisheries pressure by supporting fisherman with alternative livelihoods.

Grow-out cycles in Ugandan tilapia farms typically take eight months, in which the harvested fishes reach sizes of 450 to 800g. Some larger farms target harvest sizes of 500g and explained that it is rare for them to have fish with a weight above 700g. Other interviewees mentioned that particularly smallholders sometimes need to harvest early due to financial constraints and therefore, fish sizes of 350g are not a rarity in the market and that it is even possible that fish at sizes of 80g are sold at some farms.

Catfish farms

Hatcheries

There are a few larger domestic hatcheries and some smaller ones that produce fingerlings for their own use or to sell to third-parties.

- **SoN:** is one of the larger tilapia producers with their own pond-based Nile tilapia hatchery producing fry and fingerlings for own use and also for sale to other fish farms. Son hatchery is a well-managed operation with a selective breeding program that has been going on for several years. The hatchery keeps some 60’000 breeders divided across 8 families. The farm, which is located near Jinja, has a capacity to produce around 1.2 million fingerlings per month.
- **Kajjansi Aquaculture Development Research Centre (KADRC):** established in the 1940s as the first research centre for fish breeding, KADRC looks back to more than seven decades of operation. Although a governmental research centre with the task to manage different breeding programs, main focus is on Nile tilapia. The centre produces fingerlings for grow-out on place and also to sell to third-parties on a commercial basis.
- **Rock Springs Farm, Tororo:** established in 2010, the hatchery specialises in Nile tilapia fingerlings production in different sizes thanks to nursing facilities. The hatchery has a capacity to produce more than 500,000 fingerlings per month.
- **Sabra & Sons in Gombe (Wakiso):** is a company specializing in poultry and fish. They sell Nile tilapia and African catfish fingerlings from their own hatchery.

- Ferdsult in Buikwe
- Aquafarm in Wakiso
- Tende Innovations in Garuga (Wakiso)
- Luuka Plastic in Matugga (Wakiso)
- Rivers Edge fish farm in Hoima
- **Kabeihura** Fish Farm in Bushenyi
- Sanya Fish Farm in Lwengo
- Salaama Integrated FishFarm in Busia
- Kikota Fish Farm in Serere/Lira

Feed mills

Since the lack of quality feed had been identified as a key bottle neck for better performance of the aquaculture sector in Uganda, various efforts have been made to fill this gap over the last decade.

- **Ugachick**: a feed company focussing on poultry feed with major presence throughout the country was singled out as the potential enterprise to start producing domestic aquaculture feed. With financial support from a development institution, the company installed an extruder for pelleted floating feed in 2010 and was thus the first domestic feed mill for fish feed. In addition, it received technical assistance to work on improvement of feed formulas.

During interviews we learned that commercial fish farms generally do not buy fish feed from Ugachick, as the company's feed is said not to perform well. This confirms observations in earlier reports. Explanations for the poor performance that were brought forward by interviewees include difficulties to source good quality ingredients and a lack of care and hence unfavourable feed formulas, which apparently began once technical support ended. Dalsgaard et al. (2012) found that since under the former programme supported by the government, the operation sold its bulk part of produced feed to Kenya, quality control was never stimulated. Similar findings were presented by the majority of interviews who were of the opinion that while under supervision of external technicians, quality was acceptable in the early years of operation, however this has now reduced.

- **Sabra & Sons in Gombe (Wakiso)**: is a company specializing in poultry and fish. Apart from having ponds for tilapia production, they are one of the local companies that have been active in feed production for several years, with recent (2018) expansion of equipment.
- **KADRC:** capacity of 8-10 tons/day, sell feed – to be confirmed
- New feed mill in Busega, Kampala: during our interviews in November 2018 we learned that a new feed mill is about to be constructed in Busega, Kampala. We could also see the factory from the outside. Although we could not get any further information regarding capacity or planned start-up, we were told by an interviewee who knows the market very well that the factory was owned by businessman and entrepreneur Omar Ahmed Mandela, a well-respected individual that has successfully established various enterprises such as the City Oil gas stations or Café Javas. – to be confirmed

Apart from the local feed mills, a number of feed mills have been established in the region, including Skretting (part of Nutreco) in Zambia and some local companies in Rwanda and Kenya. It appears however, that these companies meet enough demand in their corresponding domestic markets and do therefore not export feed. A major producer is Aller Aqua, also of Zambia, which is connected with Yalelo an expanding fish farm in Zambia, which is also considering setting up in Uganda (various pers. comms. 2019), although the exact timing is not clear, indications are that the process has started.

Overall, the lack of affordable quality feed has been pointed out by all interviewees as an important constraint for the better performance of the sector. Given the lack of quality feed in the domestic market, most commercial operations rely on imports. Mentioned countries of origin include Mauritius, Israel, Brazil, and Vietnam. However, importing quality feed has its own challenge. First of all, higher transport costs add to the price, secondly, buying feed from overseas implies that importers need to place big orders (a full container load in order to optimize transport costs), which in turn results in significant investment and cash flow constraints. For companies with small annual orders or new entrants in the market, suppliers generally require advanced payment. Considering transport routes of up to two months and more, it implies that companies have sufficient funds that can be locked-in in the value chain for several months. It is for this reason, that smaller farms cannot afford this line of feed purchase.

Instead, smaller producers and smallholder farms buy locally available feed or produce their own feeds, a practice that results in poorer growth of fish and either smaller fish or longer production cycles. Some interviewees even claimed to have lost part of their stocked fish due to deteriorated feed that they bought from local producers, assuming that it was due to rancid oil.

Fish processors

Thanks to a long and ongoing demand for Nile perch in the international market, Uganda boasts with a well-developed processing industry. Due to a traditional linkage to the EU market, several plants have established high food safety standards. Considered as future players in the farmed fish value chain (although currently this is not the case) it is noted that as of November 2018, the following fish processing plants were approved for export to the EU:

- Perch Ltd., Entebbe
- Greenfields (U) Ltd., Entebbe
- Karmic Foods Ltd., Entebbe
- Gomba Fishing Industries Limited, Jinja
- Ngege Limited, Kampala
- Lake Bounty Ltd, Kampala
- IFTRA Uganda Ltd, Kampala
- Mpongo Ltd., Kampala
- Byansi Fisheries Co. Ltd., Kalisizo

However, largely focussed on Nile perch value chains, only few processors also process tilapia. From all the processing plants we visited or contacted, none however processed farmed tilapia. Instead, wild tilapia was

the preferred raw material for processing. Reported destinations include the Middle East, United Arabic Emirates, Japan and the EU.

None of the contacted companies or interviewed stakeholders knew of catfish being processed in factories. Many explained that for local markets, fish are either sold whole or processed by smaller operations, with only limited access to very specific local markets and no linkage to regional or international markets.

Traders

Landing sites

Although typically linked to capture fisheries, landing sites are important actors to be considered when assessing fish value chains in Uganda. Landing sites are often the first access point to terrestrial trade value chains for fish farmed in cages in Lake Victoria or on islands. For example, in Kampala, there are four major landing sites. Also depending on location, adaptation of capture fisheries landing sites to channel cage grown farmed fish to markets is clearly an option; a good example comes from the PESCA project, which is to use the Mwena landing site in Kalangala District as the base for the proposed cage-based AquaPark

Fish markets, retail, fish outlets

We identified five categories of types of place where fish is sold to consumers.

Typical fish markets

The most traditional way of selling fish to consumers are the local fish markets, which are typically located in wet markets, which can be found in most major centres. Our observations suggest that a very high share of total traded fish reach consumers through this channel. However various reasons make it difficult to sell farmed fish in traditional fish markets and only very small volumes of farmed fish are thus sold in these places, mainly in times of very low wild capture supply.

Specialist Retail outlets

As a consequence of this challenge, some larger fish producers and fish farmer associations started to sell farmed fish in specific fish outlets:

- **Walimi Fish Farmers' Cooperative Society (WAFICOS)** is working on the set-up of a retail outlet for tilapia in Kampala with support from National Agricultural Research Organisation (NARO) and Msingi, a private organisation registered in Kenya. The outlet is meant to sell fresh farmed fish in live tanks and chilled.
- **GoFish** is a business that operates three retail outlets in Kampala. Their outlets feature tanks with live tilapia, chilled fish whole and filleted, as well as an adjacent restaurant, where fish can be consumed within the premises.
- **SoN** operates a small retail outlet where they sell their own tilapia in Kireka (Kampala).
- Other

Supermarkets

Another distribution channel is supermarkets. While few larger supermarkets and some smaller shops have frozen fish sections, the majority of smaller shops do not have such facilities and do not therefore sell fish. Besides of supermarkets, there are also a few small shops such as 'Farmers Choice' in Entebbe that sell frozen meat and fish. Shop owners and managers report that the total volume of locally farmed fish that are being sold through these channels is very small. For example, one of the larger supermarkets called 'Shoprite', which has an extensive seafood sections, mostly sells imported fish. Even Nile tilapia is from imports and at the time of visit, only Nile perch products were sourced from local processors. Shoprite carries Chinese tilapia frozen in approximately 1 kg bags, containing 4-5 small whole fish.

Restaurants

While fish can be found on the menu in most restaurants, particularly in the lake areas, there are no restaurants specialized in fish as they can be found in many other countries. Feedback from restaurants suggests that they buy fish predominantly 'whole, ungutted', with preference for wild capture products a favourite of the local consumer, as well as tourist. Depending on location, this can be quite a good revenue sources for the restaurants. Not selling farmed fish is related to availability, rather than choice, as well as issues of size being smaller than the preference at this time.

Farm gate sales to consumers

Finally, as mentioned above, some farms sell fish directly to local households and consumers.

Cold storage and ice plants

There are only a few registered commercial cold storage facilities, mainly for storage of products destined to export markets. Most are located in Kampala or Entebbe. As of November 2018, only one of them had EU approval: Entebbe Handling Services Ltd. (ENHAS) in Entebbe Wakiso District.

Ice is available on demand from dedicated ice production plants or also from fish processing factories. Feedback from interviewees suggests that minimal amounts of ice are used as many value chain actors prefer to work without ice.

Sector Associations

As mentioned above, some farmers as well as processors are organized in associations. Sector association are an important backbone for both the fisheries and aquaculture sector and, as one interviewee pointed out, the sector would not be what it is were it not for the coordination that these associations brought into the aquaculture sector. There are many registered and unregistered associations, cooperatives, and other structures in Uganda, some key better organised examples include, amongst others:

- Walimi Fish Farmers' Cooperative Society (WAFICOS)

WAFICOS is a cooperative that was established in 2004. Members are mostly smallholders, although the cooperative is open to any entity, regardless of size. Whereas it had a register of more than 500 members at some time, currently, only about 300 remain active. Members of WAFICOS pay an annual fee and in

exchange benefit from various services such as technical assistance, coordinated harvests and better access to markets.

Motorbike & women distributors strategy is being tested at WAFICOS. They have come up with a plan/model that works. This include training the operators on how to manage the businesses. They need support in cold storage facilities. This is important for women & youths in the area. They (WAFICOS) need cold storage facilities? Where? Where is this plan/ model that works?

Recommendation on direct selling to local institutions (including large mining camps) has been muted. WAFICOS (a producer group) have hatched a model/plan with Makerere University and they should start the deliveries to some targeted institutions soon.

Some WAFICOs members had a good viable experience distributing product to DRC, linked to a business operator (banker) from Eastern DRC, where at some point they managed to profitably shipped up to 6 tons of fish every week. Unfortunately this deal collapsed due to the banker being transferred elsewhere, and thereafter they faced challenges securing another reliable business operator from DRC.

- Uganda Commercial Fish Farmers Association (UCFFA)

Established in 2017, UCCFA currently represents 22 active members, but exclusively producers. There are no processors within the association, even though they would be welcome. Membership is free. The association provides different services to its members such as the facilitation of access to quality fingerlings, quality feed and markets. Due to its rather small membership numbers, the association is quite dynamic, and given its market share, the association has significant bargaining power. It was pointed out by a representative of UCFFA that the association could for example negotiate a reduction of VAT on feed if they deemed it necessary.

- Uganda Fish Processors and Exporters Association (UFPEA)

Established in 1993, UFPEA is strongly linked to the Lake Victoria fisheries. It actively promotes the interest of industrial fish processors in Uganda and the development of commercial fish value chains for Nile perch.

- Women Fish Network

The Uganda Women Fish Network is a non-profit organisation that focuses on empowerment of women and smallholder in fish value chains. It is open to both women and men, although most members are women. As of November 2018, it had 60 active members. Smallholders are often represented as a cluster. Members pay a fee that is used for common activities organised by a secretariat. Activities include coordinated harvests with the goal to facilitate market access, collective orders for feed, and value adding activities to harvested fish.

Other actors & key institutions

Apart from the key actors, there are many more actors and institutions that influence demand for fish and dynamics of fish value chains. These include;

Ministry of Agriculture, Animal industry and Fisheries (MAAIF)

Aquaculture and fisheries are organized under the Ministry of Agriculture, Animal Industry and Fisheries. MAAIF's vision for Uganda is a competitive, profitable and sustainable agricultural sector. In order to achieve this objective, it seeks to transform subsistence farming to commercial agriculture. The ministry consists of four directorates, including the Directorate of Fisheries Resources, and seven agencies, including NARO.

Directorate of Fisheries Resources

The Directorate of Fisheries Resources (DiFR) is among others the competent authority for the management and further development of the aquaculture and fisheries sector. It consists of the three departments; Department Aquaculture Management and Development (DAMD), Fisheries Resource Management and Development (Natural Stocks) Department, and Fisheries Control, Regulation and Quality Assurance Department. According to official information, aquaculture does however not appear to be a core focus of the Department.

Department of Aquaculture Management and Development (DAMD)

DAMD is one of the three departments under the Directorate of Fisheries Resources. Its key objective is supporting sustainable, market-oriented fish production and value addition that contribute to improved food security and household income.

Fisheries Training Institute (FTI), Entebbe

Traditionally focused on fisheries education, FTI has introduced a new diploma course in 'Integrated Aquaculture and Agriculture' with a strong focus on aquaculture and its integration with agricultural activities (e.g. aquaponics). There are plans to introduce a Certificate in Aquaculture with greater emphasis on practical skills.

Regional organisations and institutions

WorldFish Part of the CGIAR Group, WorldFish is a leading international research centre working in fisheries and aquaculture with focus on reducing poverty and hunger. WorldFish has a large programme with a research station in Egypt. After having evaluated various countries and locations in Eastern Africa, WorldFish opened a regional office in Zambia in 2007, where it has worked on aquaculture development promoting small-scale farming through dissemination of its genetically-improved farmed tilapia (GIFT).

Fish producers in neighbouring countries

Kenya's aquaculture sector grew significantly over recent years, thanks to support from international donor projects such as the USAID funded Aquaculture & Fisheries Collaborative Research Support Program (AquaFish CRSP). From a low 1,000 tons of farmed fish in 2005, production grew to 24,000t in 2014 from where it dropped down to 15,000t in 2016 (See Annex V: Data and statistics).

Another country that has received strong governmental and donor support to develop its aquaculture sector, is Zambia. At the moment of writing, the aquaculture sector was even further developed than in Kenya, with Nile tilapia likewise accounting for the largest share in production, which was estimated at over 30,000t in 2016.

Although still less developed, fish farming at commercial scale also started in other neighbouring countries, including Tanzania, Rwanda, and Burundi or has been considered (e.g. Ethiopia). The preferred species is Nile tilapia in these countries as well.

East African Industrial Fishing and Fish Processors Association (EAIFFPA)

EAIFFPA is an umbrella of various sector associations, including TIFPA in Tanzania, AFIPEK in Kenya, and UFPEA in Uganda.

Donor funded projects supporting aquaculture development in Uganda and the region

The fish sector in Uganda and the region has benefited from substantial overseas development support over the past two decades. More recent donor funded projects include:

- Fisheries Investment for Sustainable Harvest (FISH): a project commissioned by USAID in 2006
- Support to Enhancing Development of Commercial Aquaculture (2014-2016): an FAO project
- EU-EAC True Fish Farming Story in Lake Victoria Basin (TRUE-FISH)
- Demonstration site for aquaculture at KADRC: establishment through bilateral aid from the Chinese government
- Responsible Fisheries Business Chains on Lake Victoria Project: a BMZ funded project with focus on improved fisheries management in Lake Victoria

Annex V: Summary of interviews undertaken

Various stakeholders and actors in the fisheries & aquaculture value chain were interviewed during this study. These included; farm owners/managers, hatchery managers, fish processors, market traders, government fisheries officers, shop and restaurant, representatives from fisheries organisations and associations, consumers and others. A list is provided here for the key contacts.

#	Names	Institution	Phone Contacts/email
1	Mr Edward Sembalilwa	Kampala-Lubaga Division DFO	+256 772619665
	Mr Henry Magulu	Kampala-Lubaga Division FO	+256 772462214
2	Mr Masereka	Kasese/Mpondwe Fisheries Officer	+256 772990404
3	Mr Robert Osinde	SON Fish Farm	+256 756879720
4	Mr Felix Ochueng	NAM Fish Farm	+256 702450901
5	Mr F.A. Okware	Tororo- Market Master	+256 772695334
6	Ms Easter	Tororo Fish Trader	+256 786922766
7	Ms Julie	WAFICOS	+256 776984409
8	Mr Simon Olok	WAFICOS	+256 772697629
9	Mr Ataba Mathia	Arua –Catfish Trader	+256 772877710
10	Mr James Enyaku Micheal	DFO-Soroti	+256 772554273
11	Ms Immaculate Nyangoma	Soroti –Catfish Farm Manager	+256 775339623
12	Mr Jackson Onyait	Soroti- Catfish Producer	+256 789411367
13	Mr Enab Samson	Soroti-ERAB RESTURANT	+256 785675351
14	Miss Faith	Soroti Fish Customer	+256 772934827
15	Mr Phillip Adome	Salama	+256 779464858
16	Mr Eugene Egesa	Busiya DFO	+256 772328779
17	Mr Patrick Nkwanga	Tororo DFO	nkwangapatrick@gmail.com
18	Ms Rehema	Tororo-NMWDC	+256 782756885
19	Mr Okware Patrick	Tororo District	+256 772455090
20	Mr Okoth Eric	Chairperson - Tororo Fish Vendors	+256 752660211

Annex VI: Population information

Neighbouring countries

Population numbers and trends (source: UN, 2018)			
Country	2018	2023	2028
Burundi	11,216,450	13,049,303	14, 985,535
DR Congo	84,004.989	98,160,404	113,770,328
Kenya	50,950,879	57,395,145	64, 166,647
Rwanda	12,501,156	13,960,532	15,427,633
South Sudan	12,919,053	14,671,974	16,502,233
Uganda	44,270,563	51,822,128	60,239,885
Tanzania	59,091,392	68,591,196	79,155,997
TOTALs	**191,033,498**	**317,650,682**	**285,096,076**

Uganda Population Centres

	Name	2019 Population		Name	2019 Population		Name	2019 Population		Name	2019 Population
	> 50,000			30,000 to 49,999			15,000 to 29,999			5000 to 14,999	
1	Kampala	1,353,189	1	Iganga	45,024	1	Adjumani	28,700	1	Kanungu	14,600
2	Gulu	146,858	2	Kabale	43,500	2	Paidha	28,348	2	Kiboga	14,512
3	Lira	119,323	3	Busia	43,200	3	Luwero	28,338	3	Kiruhura	14,000
4	Mbarara	97,500	4	Fort Portal	42,670	4	Wobulenzi	24,415	4	Rukungiri	14,000
5	Jinja	93,061	5	Mityana	41,131	5	Yumbe	24,300	5	Sironko	14,000
6	Bwizibwera	79,157	6	Tororo	40,400	6	Namasuba	22,507	6	Kamuli	12,764
7	Mbale	76,493	7	Hoima	39,625	7	Bugiri	22,500	7	Kisoro	12,400
8	Mukono	67,290	8	Lugazi	35,036	8	Kayunga	21,704	8	Apac	11,776
9	Kasese	67,269	9	Masindi	31,486	9	Wakiso	20,530	9	Pader	11,600
10	Masaka	65,373	10	Ibanda	31,000	10	Mubende	18,936	10	Bugembe	11,598
11	Entebbe	62,969	11	Pallisa	30,745	11	Kotido	18,800	11	Mayuge	11,503
12	Njeru	61,952	12	Nyachera	30,509	12	Moyo	18,800	12	Bweyogerere	11,473
13	Kitgum	56,891	13	Nebbi	30,354	13	Kyenjojo	18,600	13	Kumi	11,400
14	Soroti	56,400				14	Kireka	17,947	14	Kapchorwa	11,300
15	Arua	55,585				15	Kamwenge	17,169	15	Pader Palwo	11,152
						16	Bundibugyo	16,919	16	Mpigi	11,082
						17	Ntungamo	16,915	17	Moroto	10,300
						18	Busembatia	15,889	18	Kyotera	8,472
						19	Ntungamo	15,300	19	Lyantonde	8,039
						20	Buwenge	15,130	20	Kilembe	7,914

Annex VII: Data collected from various market visits in Uganda

Other information about Kasese, as well as other areas is summarised below and captures some of the issues facing distribution of farmed fish in Uganda and links to regional markets. This information is gleaned through interviews with from various fisheries staff, fish farmers and traders in the field following visits by project staff. (reported Yusuf Kassi, PESCA, 2019). Additional focused market visits from around Uganda collected useful data from farmers, traders and others; this data was collected with the assistance of the TAT. Some key issues are summarised here below;

Walimi Fish Cooperative Society (WAFICOS)

WAFICOS is located right in the heart of Kampala City at a market that is owned and operated by Kampala City Council Authority (KCCA) near Makerere University at Wandegeya market. The outlet has been operational since 1st April 2019. The space occupied by this outlet was given to WAFICOS to use it free of charge for the next 6 months. After 6 months WAFICOS will sit down with KCCA management and work out the way forward in terms of payment of rent. The facility currently in place has tanks that are earmarked for the sale of live fish though at present fresh chilled and frozen fish are for sale. Installation of tanks to sell live fish was accomplished using a grant from National Agricultural Resources Organisation (NARO). During the market visit, about 100 kgs of both fresh chilled and frozen fish we displayed for sale. Msingi, based in Nairobi Kenya had given a small grant to WAFICOS to install a cold room for their fish.

Product forms and Infrastructure

Only fresh chilled and frozen fish are being sold at the WAFICOS outlet.

Prices

The fish are initially bought from the fish farms and brought to the selling point with WAFICOS having to foot the bill of ice and transport. The fish are bought in kilograms at the farm but almost all consumers visiting the selling outlet wants to buy per piece.

Fish	Source of Fish	Product form	Buying Price Per Kg (UGX)	Selling Price Per Kg (UGX)
Nile Tilapia	Farmed	Fresh	8,000	9,000

Distribution chain

They are operating a retail outlet for tilapia from fish ponds and fish cages. The fish are purchased from the farmers then sold on retail to the final consumers

Key Value Chain actors' challenges

- Keeping the fish very fresh is a challenge especially when power goes. Though they have a generator on standby but the cost of operation given volume of sales at the moment is quite high and sometimes they opt to purchase ice in order to maintain product quality.

- They do not have any transport to move fish from the fish farmers to the outlet in Kampala and they resort to hiring transportation.
- The majority of fish farmers are not willing to sell their fish to WAFICOs due to lower prices being offered compared to what they obtain at farm gate
- Convincing fish farmers to bring fish to the WAFICOS outlet will be a challenge due to issues like transparency, guarantee of payment at reasonable prices and guarantee of market
- Location of the fish market in the city centre of Kampala makes it very hard for the majority of customers to access it given the endless traffic jam of Kampala

Busega

This market is located at the outskirts of Kampala on Masaka roundabout and it is a road side market. The market is more than 20 years old since it was set up and operates wholesale and retail markets. Trucks bringing fish arrives early morning hours with wild caught tilapia and Nile perch for the morning markets, which runs until 10 am. The sources of fish are Kiyindi, Masaka and many other landing sites within the central region. The fish are sold direct from the refrigerated vehicles while others which have come by motor cycles are sold from make shift wooden tables.

Product forms and Infrastructure

There is no ice plant in place and the ice available is only brought by other trucks who sell to the fish traders. Fish are sold from make shift tables. About a kilometre away from this market a new modern market is being constructed by the government of Uganda. Close to this market there is a treatment and drying yard of by-products from factories processing Nile perch for export market. The products range from carcasses, Nile perch heads and skins all destined for Democratic Republic of Congo (DRC) markets

Prices

Fish Specie	Source of Fish	Product form	Buying Price Per Kg (UGX)	Selling Price Per Kg (UGX)
Nile Perch	Wild	Fresh	8,500	12,000
Nile Tilapia	Wild	Fresh	8,000	10,000
Nile Tilapia	Farmed	Fresh	8,500	9,000
Catfish	Wild	Fresh	6,000	7,000

Distribution chain

- They do not have ice in place.
- There is no storage facility in case the fish are not all bought in a single day and some of the fish would have stayed long time on the landing sites
- In some cases, the cold chain is not well managed due to lack of ice and transport

- It is a road side market and there is no parking space
- The cost of moving fish from the landing sites is very high both for those transported by motor bike and refrigerated

Busia

This market is located in Busia town that is approximately 200km from Kampala. It is sitting right on the border with Kenya. This is one example of a well-organised and operated market, which is managed by a cooperative. The operations of the fish market dates back over 30 years plus. It has been dealing with wild caught tilapia, catfish and Nile Perch from the many waters of the country with little farmed fish. The cooperative is called Busiya Fish Traders Association (BUFA). It was registered in October 2008.

Most of the farmers sell fish on farm to buyers who comprise of both men and women. The buyers are of three categories; there are those individual households who buy for home consumption, those who buy to take to other local markets (mostly women) and those who buy to take to the Busia fish market. Those who bring to the market buy also from other places like Jinja, Buikwe, Wakiso, Kampala, Masaka and from Western Uganda.

Once the fish reaches the market, it is bought by different buyers who are mostly middle-men who buy on behalf of Kenyan traders. The fish is packed in baskets in quantities of 100 – 300 kg and ferried on bicycles across the border. When they ferry smaller quantities, they dodge the customs clearance formalities.

An interview with the market chairperson revealed that a single truck of fish that arrives in the market has about 60 individuals associated with it, for activities such as offloading, weighing, packaging, loading and ferrying on bicycles across the border.

There are two small ice plants in the district but their capacity cannot produce enough ice for all traders and farmers. It was also noted that traders prefer to bring smaller quantities because if they bring big quantities buyers bring down the price because they know that the market is flooded yet there are no preservation facilities.

Most traders preferred buying form cage farmers because of the good size of fish (500 g or more) and the fact that cage farmers normally have an idea on how much fish they have in their cages unlike pond farmers. They cited scenarios where a trader drives to the farms after a farmer telling him/her that he has a particular quantity but upon harvesting they find very small quantities.

Product forms and Infrastructure

As a traditional market for wild caught fish this has not been going well in terms of supplies since the Uganda government deployed military personal to tackle illegal fishing activities on the waters of Uganda. Since October 2018 almost 90% of the fish being sold at this market is farmed fish from ponds or cages.

BUFA owns a 15,000Mt ice plant and it is in production while the second 15 000Mt old plant is no longer working together with its old 3 ton refrigerated vehicle. Employees some stuff to run the ice plant and a savings and loan scheme.

Prices

Fish Specie	Source of Fish	Product form	Buying Price Per Kg (UGX)	Selling Price Per Kg (UGX)
Nile Perch	Wild	Fresh	10,000	12,000
Nile Tilapia	Wild	Fresh	6,000	8,000
Nile Tilapia	Farmed	Fresh	7,000	9,000

Distribution chain

The BUFA market operates every day and it has both wholesale and retail markets. Traders from Uganda and Kenya come to the market to buy fish for export to Kenya via Busiya. Other traders go to the fish farmers while others buy from the fishermen and bring them to Busiya to sell to the fish traders who are now involved in fish export to neighbouring Kenya.

Services Offered by BUFA to its members

- Savings and loan scheme
- Production and selling of ice to its members
- Administrative role by smoothing the process of paperwork, in order to ease fish movement to Kenya
- Registration of its members in order to minimise unnecessary completion that can sometimes be destructive
- Training to its members

Key Value Chain actors' challenges

- Inadequate ice production due to a broken second ice plant and power interruptions
- Lack of transport vehicle to move ice from plant to the market and to the various landing sites, as well as fish transportation
- Training of its members to improve product handling and management of BUFA
- Lack of fish from the farms due to inconsistence of supplies and fish farmers unreliability

Soroti

This market is situated on the outskirts Soroti town and it is a temporary structure as the government of Uganda is constructing a new modern market, which will accommodate various products including fish. Soroti fish markets operate mainly in the morning and evening times though every day of the week. It is one region where catfish is taken as a delicacy in the whole country. There is a well-known restaurant called ERAB restaurant located along the Soroti Mbale highway. Special dishes are prepared here and the fresh catfish is served with a local food called Atapa. All the catfish sold are sourced from the wild.

Product forms and Infrastructure

About 50% of the fish products sold here are all dry fish while the 50% represents the fresh fish. According to the traders, fresh fish comes from Lake Victoria and Lake Kyoga. There is no ice plant in Soroti and the closest source of ice is Jinja town 240 km away.

Prices

Fish Specie	Source of Fish	Product form	Buying Price Per Kg (UGX)	Selling Price Per Kg (UGX)
Nile Perch	Wild	Fresh	9,000	12,000
Nile Perch	Wild	Dried/Smoked	8,000	10,000
Nile Tilapia	Farmed	Fresh	8,000	9,000
Nile Tilapia	Wild	Fresh	7,000	10,000
Nile Tilapia	Wild	Dried/Smoked	8,000	12,000

Distribution chain

A trader who buys the fish from the fishermen comes with them to the market for sale. Traders in the market will then buy from them and sell on retail within the market. The same applies for those selling fresh fish within the market

Key Value Chain actors' challenges

- They do not have any access to ice
- The catfish from the farms were reported to be very small and there were inconsistences in their supply.
- On the day of visitation to the market the traders reported that the Uganda soldiers had imposed a two-months ban on accessing water to catch the fish so that they could recover but it was seen a wrong move by traders since it is the only source of their livelihoods.
- There is inconsistency supply of fish since the majority of their fish comes from the wild
- The price of farmed fish is very expensive for the traders
- The customers complain about the sizes, tastes of fish from the farms compared to the ones coming from the lake

Mpondwe

It is located in the western side of Uganda on the border between Uganda and Democratic Republic of Congo. It is 53 km from Kasese town

Product forms and Infrastructure

The main products being sold here are dry by-products from Nile Perch processing factories in Uganda, Tanzania and Lake Turkana in Kenya, which constitute 90% of the tonnage. Approximately 10% of dried catfish, dried tilapia and small fish come from Uganda and South Sudan. The market for dry fish takes place on Tuesdays and Friday of every week and the main buyers are Congolese traders who take them deep inside of the country. The traders who run this dry fish trading are doing it on behalf of their bosses who are based in Kenya, Tanzania and a few in Uganda

Prices

Fish Species	Source of Fish	Product form	Buying Price Per Kg (UGX)	Selling Price Per Kg (UGX)
Nile Perch-Heads	Wild	Dried & Salted	N/A	5,300
Nile Perch-Skins	Wild	Dried & Salted Fresh	N/A	2,300
Nile Tilapia	Farmed/Wild	Fresh	7,000	10,000
Catfish	Wild	Dried & Salted Fresh	7,000	10,000

Distribution chain

The suppliers in Kenya, Tanzania, and Uganda only sell their products via these agents who now negotiate with the Congolese. These agents do not allow anyone to talk to the Congolese traders so the chain is tightly controlled.

Key Value Chain actors' challenges

- There is a lot of corruption along the way when fish are being moved from Kenya, Tanzania or from other places in Uganda, by those charged with the laws and it is very frustrating.
- This trade in dry fish by-products is highly profitable and only influential and powerful people have special permits to trade and transport these fish which excludes other people from participating.

Arua

Arua is located a few kilometres from the Democratic Republic of Congo boarder within a distance of approximately 14 km to 40 Km depending on the specific border point.

Product forms and Infrastructure

The main fish sold in this market are dry salted fish, which are obtained from Panyimur market, which is 123 km from Arua town. The Panyimur market only operates on Sunday of every week and the fish sold here are sold at whole sale market. Various traders from the West Nile region distribute the fish products

in small markets in the region. Congolese buys dry salted fish, since they are easy to handle and distribution in DRC lacks cold chain and other facilities for fish preservation.

Prices

Fish Specie	Source of Fish	Product form	Buying Price Per Kg (UGX)	Selling Price Per Kg (UGX)
Nile Perch	Wild	Dried/Salted	8,000	12,000
Nile Tilapia	Wild	Dried/Salted	6,000	10,000
Nile Tilapia	Farmed	Fresh	6,000	12,000

Key Value Chain actors' challenges

- The costs of transporting fish from Panyimur is very high
- The traders cannot buy smoked farmed tilapia or catfish since they are expensive
- The operation of the wholesale market once a week is a challenge since sometimes the traders run out of stock in the middle of the week, hence losing income through no sales

Tororo

This market is situated in the heart of Tororo municipality and it is a temporary structure as the government of Uganda is constructing a new modern market which will accommodate various products including fish. Tororo is also close to the Kenya boarder though most of its customers sell fish within Uganda

Most of the farmers sell on-farm to either traders or individual households. The traders pick the fish from the farms on motorcycles, bicycles, or trucks. Most farmers expressed the desire to reach markets, but they are limited with transportation to markets and lack of information on potential markets. At the Malaba border, there is no proper marketing structure, despite the fact that traders from various places bring fish which is sold through agents to Kenyan traders. Some of the fish is bought by local traders who sell in markets within Tororo. These are mostly women.

Farmers in Busia and Bugiri said that they don't have a market for catfish, unlike in Tororo where they said that the market is available. This is attributed to people's traditional preference for tilapia over catfish. A few farmers who were growing catfish said that it has a better yield in terms of size but most of them were putting it in their ponds as an incidental crop, not the main cultured species. For this reason, they did not have any data on catfish.

It was also noted that there is an emerging potential market in Rwanda but most traders cannot fulfil its requirements. The market requires fish to be gutted before taking to the market but most farmers do not have the required facilities for primary processing.

Product forms and Infrastructure

About 80% of the fish products sold here are all dry fish while the 20% represents the fresh fish. According to the traders, fresh fish are very difficult to handle in case they are not bought on the very days since there is no storage facilities for preservation of fresh fish. There is no ice plant in Tororo and the closest source is Jinja town which is 120 km away. It is thought that the addition of such facilities, if well managed might expand the distribution of fresh fish, including farmed fish.

Prices

Fish Specie	Source of Fish	Product form	Buying Price Per Kg (UGX)	Selling Price Per Kg (UGX)
Nile Perch	Wild	Fresh	9,000	12,000
Nile Tilapia	Wild	Fresh	6,000	8,000
Nile Tilapia	Farmed	Fresh	8,000	9,000

Distribution chain

A trader who buys the fish from the fishermen comes with them to the market for sale. Traders in the market will then buy from them and sell on retail within the market. The same applies for those selling fresh fish within the market

Key Value Chain actors' challenges

- They do not have any access to ice
- On the day of visit to the market, the traders reported that the Uganda soldiers had imposed a two-months ban on accessing water to catch the fish, so that they could recover but it was seen a wrong move by traders since it is the only source of their livelihoods.
- There is inconsistency supply of fish since the majority of their fish comes from the wild
- The price of farmed fish is very expensive for the traders
- The customers complain about the sizes, tastes of fish from the farms compared to the ones coming from the lake

Bugiri

- The marketing of fish in Bugiri is similar to that in Tororo. Buyers pick the fish from farmers. Buyers include individual households and traders who either sell locally within Bugiri or take to Busia market. Most of them said the reason for selling on farm is because they lack information on potential markets and the transportation to reach markets. They also expressed fears of quality losses in case they reach the market and cannot sell their fish yet they don't have any preservation methods.

Mbarara District

- The DFO reported that generally farmers sell their fish in Mbarara Market, locally called Kola Nolya, market as a collection centre on Thursdays. Many bulk buyers and fish mongers buy from this central market and distribute to small centres in the region. The DFO reported that fish is usually sold fresh but there is a trend of frying as a way of processing at the farm or the market before delivering to market to increase shelf life and marketability.

Bushenyi District

- The DFO reported that medium-scale farmers sell locally because of low fish supply levels to area and larger scale producers sell to Congolese buyers who take the fish to DRC or deliver themselves to border markets. It was also reported that supply is still below the demand because of production constraints like feeds costs and quality.

Kisoro District

- The Assistant DFO Mr. Augustine reported that the demand for fish in DRC is high but the main challenge is some levels of insecurity in the eastern DRC. He further noted that there is an opportunity for farmed fish due to the current enforcement exercises by the Fisheries Protection Unit leading to reduction in quantities of wild fish going through the Borders.

Kasese District

- For fresh/frozen, there is need for specialized vehicles and fast transport to avoid spoilage, there is a need for cooling systems within the market place, three phase power at border markets, special fish handling places in the market and special containers to carrying fish, which are all not available
- For salted fish, which is preferred by eastern Congolese in DRC, he proposed a constructed place for drying and adding salt as some fish delivered to the market is usually not properly dried and a place for salt addition.
- For smoking processing, one of traders who imports fresh and frozen product, reported that most of his customers may need smoked fish and therefore proposed a provision of smoke processing near bulky and border markets
- That Congolese prefer salted and dried Tilapia locally called Makayabu, this is temporarily stored in rooms at the border where the commission agents bring the Congolese buyers to buy. There is no established market, storage facilities, handling places and containers, yet the market handled large volumes from mainly the lakes and some from farms.
- Small quantities are also exported by motor cycles to inner markets in DRC

Meeting Fish Farms: SON & NAM Fish Farms

The two fish farms were visited on two consecutive days with NAM meeting taking place on 1st May while SON Fish Farm meeting took place on 2nd May 2019.

NAM is located in Buikwe 40 km by road from Kampala with a production output per annum of 100 Mt. NAM sells all its fish on site to buyers or traders from Rwanda or Democratic Republic of Congo. The selling price, which is at the farm gate, ranges between USD 1.9 – USD 2.3 per kilogram of fresh tilapia.

SON is located in Buikwe district as well, and it is 90 km from Kampala. Its production output per annum is approximately 1000 Mt. The selling price at the farm gate ranges between USD 2 – USD 2.2 per kilogram of fresh tilapia within Uganda while in Kenya they sell their fish between USD2.6 – USD3.1.

Product forms and Infrastructure

Both fish farms deal in fresh fish on ice. They do not have ice production on their sites, so it is outsourced. The majority of fish from SON are sold in Kenya through two depots one located in Eldoret, while the second one is in Nairobi. In addition to the two depots in Kenya, SON has three retail fish outlets in Kampala.

Distribution chain

Key Value Chain actors' challenges

- The main challenges of the two farms are pressure of fish from the capture fishery.
- The same markets where they sell their fish are also inundated with cheap imports of frozen tilapias from Asia especially China especially in Kenya and Democratic Republic of Congo.
- Although there is a competitive advantage of selling fresh fish in the market, compared to cheap imports, which are originally frozen, the disposable incomes of the final consumers, which are very low, pushes the consumers to opt for the cheaper products.
- Access to ice is a big challenge since it is not always available and fluctuations in prices due to a lack of transparency on the side of the buyers in the market, who ask for special discounts which undermines the farms profitability.

Key issues relate to fish access to markets through lack of knowledge and lack of preservation infrastructure and therefore prompts selling at the farm gate to traders who then seek markets, usually in urban centres or at borders. Busia market is receiving consistent volumes due to the flow of fish to Kenya from various locations in Uganda, so have developed basic handling structures, but a lack of suitable storage for proper preservation and proper handling. As a key route for farmed fish this is investigated further in the recommendations section of this report. Requirements for handling fish to get them to market depends on the final market and the speed to market. This basic logistical challenge faces farmers and prompts many to just sell at the farm gate to avoid the costs and requirements to achieve such distribution. DRC is a particular example where being the eastern DRC, where internal markets are spatially arranged and road systems and distances lack appropriate facilities, fish that are not frozen and in appropriate freezer trucks need to be ready for a longer trip. Salting and drying is preferred in these areas for this reason.

Annex VIII: Summary data from regional missions to Kenya & Rwanda

MARKET ASSESSMENT MISSIONS - (KENYA AND RWANDA) - *Blessing Mapfumo - Consultant*

Objective: To briefly assess some strategic regional market points, to understand fish distribution and marketing dynamics, learn lessons and also to identify potential business partners and strategic locations to market farmed fish products from Uganda. This complements to visits conducted by the previous project consultant earlier this year.

Dates and Itinerary: KENYA - Nairobi city, Monday 13th May

RWANDA - Kigali city, Tuesday 14th May

RWANDA - Gisenyi (border with Eastern DRC), 15th May

Key Highlights from the country visits

- Both Kenya and Rwanda urban centres are facing increase in populations, stable economies and high purchasing powers. Demand for fish products continues to increase.
- Kenya, Rwanda and also DRC businesses have long term experience in selling fish from Uganda, including farmed fish
- Strategic markets specific for farmed fish seem to be in early stages of development with own farm outlets seen in both Kenya and Rwandan cities
- Victory Farms, SON (Kenya) and Kivu Tilapia Farm, Fine Fish Ltd (Rwanda) have set up own outlets in the capitals, but they are not filling them to capacity due to big demand yet low supplies, with the intention of expanding their production into these outlets as the market develops. Equally fish from others are an option for such outlets, with strategic partnerships with suitable producers.
- Tilapia (mostly wild) dominate fresh fish markets (in both countries), with limited volumes of catfish
- Chinese imports of frozen tilapia are seen everywhere and competitive as they are delivered at very low prices and are increasing taking up market share. Importers say they receive all year round supplies of fish from China, at cheaper prices, so with such consistent volumes have established reliable supplies and market connections.
- DRC is by far the largest destination of Chinese fish products (tilapia, mackerel and also frozen catfish)
- Rwanda has put in place trade restrictions for unprocessed fish (SPS regulation), but traders regard this as short-termed. Shortfall in supply is clearly visible on the markets in Rwanda, and prices have gone up
- Kenya has generally good trading terms for fish and fishery products with Uganda
- Trade between Rwanda/Uganda and DRC is mostly facilitated by middlemen operating from Rwanda. One key, well established distributor met in Rwanda who is ready/willing to do business

discussions of distributing Ugandan fish in DRC and Rwanda – based on their long-term experiences and connections.

- Value added products such as fish fillets, fish sausages, smoked products etc – although not clearly visible in city outlets (Kenya/Rwanda), need to be developed especially targeting niche markets in the urban centres – this would include hotels, large institutional markets (such as the UN in Nairobi, for instance), where consistent volumes of value-added products would have opportunities.
- A network of willing women fish traders especially in Rwanda who can be part of distribution chain
- Both Kenya and Rwanda city markets tend to prefer larger fish 800g+
- City restaurants (both Rwanda/Kenya) are regarded favourable for fresh fish products, but these tend to like big fish +800g
- The Gisenyi-Goma belt/environment appears to be a high potential zone for moving volumes of fish, one reason being that a number of rich Congolese stay in Gisenyi (Rwandan side) - and have become a key segment of the market. They prefer doing financial transacting on the Rwandan side where they also feel more secure
- Numerous hotels, restaurants in Nairobi and many of these demand fish, especially fresh fish. If strategically approached, these could be niche markets for farmed fish products that can meet consistent quality expectations. The same could apply to Kigali city, Rwanda.
- Promotional efforts for farmed fish products are little known or close to nil in both countries
- Markets for fingerlings, including catfish fingerlings (from Uganda) are regarded as flourishing especially in Eastern DRC

KENYA - Monday 13th May 2019 (One day)

OBECTIVE: Visited **Nairobi city** to understand fish markets and opportunities for the marketing of farmed fish products from Uganda

NAIROBI CITY MARKET, market that sells fresh animal products including fish

Respondents: Views of Susan Oduor, Woman Fish Trader +254799863564 ***Susanaoduor@gmail.com*** – also representative of Africa Women Fish Traders Network, Kenya and Zak, Fish Trader nearby +254727529120

- Nairobi - the last official population was taken in 2009 and at that time was 3,138,369 in the city proper. That number has since grown to approximately 3.5 Million. The metro area has over 6.5 million residents and continues to grow.
- Although people love beef, fish are also very popular source of protein in the city. Fish is in high demand during major holidays such as Easter and Christmas season
- Price is generally controlled by the supply and demand cycle

- Most buyers prefer freshwater fish, Tilapias and Nile perch both in whole and filleted forms. There are also marine fishes from Mombasa, but they don't see these competing with freshwater fish.
- Buyers include:
  1. Restaurants,
  2. Institutions (schools, hospitals etc)
  3. Individual consumers
  4. Catering services
  5. Small butcheries
- The same situation applies to other smaller Nairobi fish markets such as Gikomba, City market and Kenyatta market. City market sell mostly wild caught fish originating from Kisumu (LV).
- Some volumes of fresh whole/frozen tilapia are coming from Uganda otherwise bulk of fish in the market originate from Kisumu
- For farmed fish products, traders worry of inconsistent supplies, consumer perceptions of inferior quality and of a very short shelf life, Issues have also been raised on them having a "flat" taste hence farmed fish have tended to fetch lower prices.
- There are no known promotional efforts ongoing for farmed fish
- Approximately 3,000 kgs (3 t) of fresh fish are sold in the market per day

TILAPIA

- Fresh tilapia +750g = 450Ksh/kg (USD4.45)
- Frozen tilapia +750g = 450Ksh/kg (USD4.45)
- Dried/smoked tilapia = per piece = 150Ksh/ each (USD1.48)
- Filleted tilapia = 1200Ksh/kg (USD11.87)

CATFISH

- Catfish not sold much at the market
- Only smoked catfish of ~ 800g+ feature on the market @ 200Ksh/piece (USD1.98)

CHALLENGES

- Unstable market prices caused by cheap fish imports from China
- Constant increase in levies to traders by government (Counties and Fisheries Department)
- No functional association of traders in City market
- Demand for fish will continue to increase, however supply is sometimes a challenge (especially from traditional sources, Kisumu), farms don't guarantee consistency and often sell thru their own city outlets.

OTHER OBSERVATIONS

- Numerous hotels, restaurants in Nairobi and many of these demand fish, especially fresh fish. If strategically approached, these could be niche markets for certified farmed fish products
- SON Uganda, Victory Farms – Kenya have begun developing outlets to sell own farmed fish. These have demonstrated the feasibility and marketability of farmed fish products in country
- Feasible to ship fresh fish on ice to Nairobi city markets, as demonstrated by SON – approx. 650km distance?
- Several small-scale women traders around city market and these could be explored in the city fish distribution equation
- Quality control efforts generally good at the market, though need some improvements (packaging, handling, grading etc). Market is generally smart and organised

Photos of Susan's market stall selling smoked catfish and some fresh tilapia and other fish (Others refused to get fish photos taken at their outlets)

RWANDA – Tue/Wed 13th/14th May 2019 (Two days)

OBECTIVE: Visited Kigali **city market** to understand fish markets and opportunities for the marketing of farmed fish products from Uganda

- Kigali population is approx. 1.13 Million (2018); Rwanda population approx. 12.8 Million. Population is growing and median age is 19 years.

Kigali City- (1) Fine Fish Ltd - Kimironko Outlet (0784646403/0788915754): small retail outlet that sells live fish close to large all-goods market – attendants only speak Kinyarwanda)

- Live sales of fish only (with oxygenated tank) – all tilapia from a cage farm
- Close to a busy all-food/goods market
- 3,500 RWF/kg (USD 3.88/ kg)
- Average size range 500 - 600g
- Big fish are however preferred, sought after by their principle markets – local restaurants and bars and also individual buyers
- Chinese buyers come to buy fish here around 15 Chinese a week (Chinese workers in Rwanda are many and without imports of fish that are not processed, it is driving more interest in local markets)
- Demand far outweighs supply here
- They sale 100 - 130 kg per day these days. They could sell more if supplies were adequate
- See also pictures

Kigali City- (1) Kivu Tilapia Farm Ltd – Nyamugogo Outlet attendants only speak Kinyarwanda) _ check details on their website too

- They had no fish, most of their fish are sold out in early mornings and these days supplies are erratic – they are only receiving fish once a week (before it used to be twice a week).
- The same farm which supplies them also supplies Gisenyi town (which is close to the farm)
- Rwandans prefer their local fish to China frozen fish
- They have been importing from Uganda before the existing SPS regulatory controls – to fill in shop capacity. Demand is big
- Rwandans prefer big fish of nearly a kilo or more: Selling prices of 5,500 RWF/kg (USD 6.1/ kg)
- Sells to ordinary restaurants, bars, individuals

Other Observations - Kigali

- Kigali could be an interestingly potential market due to better incomes (willingness to pay up to 5,500RWF/kg), (USD 6.1/ kg), however market for farmed fish need to be strategically developed. With the current ban on unprocessed fish, this implies developing value-added options for Rwanda, where demand is high
- As with Nairobi, local fish farms have recently opened own outlets, but they are not filling them to capacity due to big demand yet low supplies especially since the recent SPS regulatory controls of Ugandan fish were enforced – two outlets were visited, owned by a cage farmer and also by a cooperative
- Kigali city is well-organised in terms of infrastructure development and other convenient services for fish distribution and marketing – Rwanda is particular well developed compared to neighbouring countries and is very supportive of business development
- The country's fish produce falls short of its demand as it has been importing more than 15,000 tonnes per year, according to figures from RAB.

Gisenyi/ Rubavu– Women Fish traders (Co-operative Koaba, contact Emeres on 0782469033)

- In addition to wild fish supplies, they receive cage farmed fish from co-ops around the Lake and also Kivu Tilapia Farm Ltd – a commercial farm linked to some of the Co-ops that supplies generally significant volumes on regular basis
- They buy at 3,000RWF/kg (USD 3.33/ kg) from the co-ops and KTF
- They then sell per piece at 2500 RWF (USD 2.77) each (usually fish of 800g+) …say USD 3 / kg)
- They sell mainly to local restaurants, hotels and individuals around Gisenyi.
- Demand is greater than supply in Gisenyi. They are not getting enough fish these days – regulatory controls of Ugandan imports were cited here too.
- Lots of rich Congolese stay in Gisenyi and have become a key segment of the market because they tend to doing financial business on the Rwandan side. They feel more secure in Rwanda

Gisenyi Fishing Supply, SYLVERE KARERA BUKEYE: Owner/Partner ***sbukeye@gmail.com*** +250788537211

OBECTIVE: Visited a strategic and large-scale fish distribution depot that ships various product forms from China and the region for re-export to DRC

- A major, key distributor based in Gisenyi with main business to ship product to Goma, DRC
- Met at his depot where we witnessed a cold-room and several empty 40 ft containers, with a max load of approximately 25- 30 t of fish possible, a few had fish ready to be shipped to DRC (see photo)

- Some containers full of Chinese fish mackerel and Tilapia – destined for DRC, in fact the bulk of their frozen fish is presently coming from China, frozen and destined for Goma, DRC and in some cases, surrounding towns in Eastern DRC
- Containers of fish from China land at Dar es Salaam port. It then takes 1,800 km distance to reach Gisenyi
- For every 500 km they recharge the container's cooling system along the way
- They ship an average of about 50Mt a week of both tilapia and mackerel from China
- They do business with China because they receive all year round supplies of fish
- Mackerel has a high/low season of supply. The high season is Jan-May
- Buying price for tilapia is some $950/Mt can go up to $1100/Mt sometimes
- They sell in cartons of 15kg = $25/carton in Rwanda and about $28 in DRC (incl. tax)
- For a 40 ft container, they pay over $12,000 container costs ($5,200/clearing+ transport) and $7,000 taxes
- Fish prices and also costs have significantly increased from when they started over 5 years ago.

Supplies from Uganda

- They have been sourcing some of their tilapia from fish farms (cages/ponds) in Uganda, mainly cage farms, including SON. What they prefer are cage farms because cages can be harvested while they wait and loaded into container.
- They have stock of 55t from Uganda right now which are in Goma. The fish come fresh on ice
- Its approximately 650 km from Uganda farms to the Gisenyi depot (takes around 48 hours from time of harvest to arrival at Gisenyi depot (transport approx. 14 hrs.)
- They buy at around $2/kg from Uganda farms (farm gate)– prices used to be a little higher in the past, but now has gone down because production has increased
- They get catfish to a lesser extent and periodically from some Ugandan fish farms (as fresh on ice) at $1.50/kg fresh – no dried catfish yet
- They get some frozen catfish from China, at cost $900/Mt and sell in Rwanda for $2 and a bit more in DRC.
- They don't see competition from dried catfish from Nigeria in Goma
- Although Rwanda has SPS regulatory controls of imports from Uganda, they still find ways to get the fish into Rwanda markets (though it is difficult).

- At the Ugandan border with Rwanda, they declare that the fish are in transit to DRC, then their containers are sealed, and then the seal only broken when the consignment crosses the Rwanda/DRC border.
- They sometimes pay huge "facilitation fees" in DRC to get the product moved around there.
- High taxes in DRC. Electricity costs are high. Bad borders. Bad roads. They also do their financial transactions on the Rwanda side.

Rwanda Fish Supplies

- They supply mainly to Hotels around, supermarkets and most importantly small women traders locally, in Gisenyi
- Rwandans love big fish of 800g+
- Cold room challenge. They need new cold room to store fish
- SPS regulatory and other border issues with Rwandan authorities, but they see these as temporary.

Annex IX: SWOT Analysis Matrices

Overall SWOT Analysis

Strengths	Weaknesses
• Environment conducive to fish culture and focused on endemic tilapia & catfish species for farmed fish production; water bodies, climate, tested species, expertise for support to research and government willingness and policy commitment to sector growth;	• A lack of significant farmed fish production in Uganda and a related lack of development of associated value chains by private sector. A lack of quality feed production in the country preventing rapid expansion and thus development of infrastructure for market development.
• Support from various sources to improve market infrastructure in the country, including PESCA that is targeting specific market infrastructure for farmed fish. Coupled with ongoing improved road connections between major centres/ trade corridors. Many regional support studies to help define the sub-sector situation and contextualise the current situation to support decision processes.	• Unclear, unavailable, disconnected, inaccurate production & market data sources to inform private sector operators and allow realistic market planning. Many smaller producers exposed to unscrupulous dealers and informal trading systems resulting in poor performance and lower price opportunities. Lack of transparency in fish trading and pricing by fish farmers and traders nationally and regionally.
• Strategic geographical position of the country, which is central in a region of large growing population; surrounded by 5 countries (South Sudan, Kenya, Tanzania, Rwanda & DRC), all of which consume fish and have a growing demand for fish consumption. Also, a broader regional connectivity that expands that market hinterland beyond the immediate neighbouring countries.	• Fisheries infrastructure (market, landing sites), developed for capture fisheries but not well-placed for farmed fish distribution due to a transitional competitiveness and tight trader relationships. High costs of transportation and logistics; lack of distribution structures, hubs, collection points, organised routes from farms to markets. Production spatially distributed and makes difficult the collection of consistent volumes due to many disorganised small producers
• Established working standards from the capture fish processing facilities, backed by well-trained personal and institutional structures & systems for certification/ quality standards. Currently listed as certified fish exporter with EU providing a wider market opportunity if this is maintained. Selected processers are already looking at investing themselves in aquaculture.	• General lack of knowledge about farmed fish in terms quality standards, availability, access, where to find fish and when. Misconceptions about price and size related to traditional pieces vs. weight approaches to pricing.

• Establish commercial, farmed fish producers' organisations, which are keen to expand markets, as well as many other established groupings keen to take advantage of growing potential.	• Support from the government is driven by expected sector growth and has put a number of things in place over the past 20 years. This has not resulted in significant changes, except increased small-holder investment and some commercial interest. Extension capacity and activities significant.
• A growing number of established serious commercial operators and other investors showing interest through seeing potential in Uganda, both national and international. Not least Yalelo from Zambia, looking at a very large investment in cages (June 2019)	• Fast population growth that includes a significant proportion without required income to purchase fish (fish remains a luxury product beyond the pocket of most of the population). Main local markets focus on small, irregular or no purchase of fish, resulting in an overall lower demand in the country than expected. Regional countries also generally composed of a low-income bracket that is contrary to farm fish cost/price/ profit relationships.
• Donor interest in the sector ongoing and upcoming projects supporting aquaculture starting that will be focused on Uganda (and EAC countries) directly, and can therefore align with current activities and support investor interest for positive sub-sector growth.	• Absence of regional & national generic promotion of farmed fish, as well as specific enterprise-based marketing of farmed fish. Coupled with absence of general fish consumption promotion (not just farmed fish) to enhance interest in fish as a healthy and convenient choice
Opportunities	**Threats**
• Large national & regional population and growth that does not have access to fish. The next 10 years can expect approximately 100 Million increase in population for Uganda together with its 5 neighbouring countries. This will require more than 300,000 Mt of fish delivered at a competitive price (assuming consumption levels of 4kg/cap/annum).	• Regional markets competing, potential for trade barriers (TBT) being established, reduced access to markets as a result, as regional countries growth their own farmed fish sectors and start to protect them, as well as serve them themselves.
• Promotional approaches to improve interest and consumption of fish as the population grows, targets for segments such as youth, which represent a large proportion of the population. Promotion of farmed product usage and conveniences, smaller sized fish, quality, price positioning to stimulate purchase, but ensure profitability.	• Regional & neighbouring countries offering better investment environments (financial, institutional, incentives, lower risks) for the sector, resulting in Uganda missing out in potential investors interest. Regionally competitive policies and promotion to attract investors are required, so that investor *site selection assessments* favours Uganda.
• Align production and market orientation to consumer tastes, preferences, income levels, regional availability and eating cultures; avoiding direct competition with existing capture fisheries. Promote consumption to areas away from lakes, where fish is less available	• Increased entry of large producers, although good for the growth of the sector, also will have a negative effect on small-scale producers. This is seen as a natural economic development process, but reactivity to this would support smaller farmers to align as producers to supply the larger investments.

• Targeted development of distribution infrastructure specific to farmed fish to reach areas demanding fish volumes, but also in areas where fish are not easily accessed. Alignment with growing population centres and border requirements to develop both national and regional opportunities.	• Continued import of Chinese and other cheaper substitutes to the region (including Uganda), provides a competitor that dilutes national market performance. Although a source of food for a lower income level, the perception of competing with farmed fish remains a threat to investor confidence.
• Rapid policy alignment and visibility to promote and attract investors to Uganda for production and other inputs (primarily feed production). *Relates to a threat as neighbours are competing at the same time.*	• Continued perception that smaller sized farmed fish are in fact illegally caught wild fish, restricts the open /transparent marketing of farmed fish. Methods exist to identify farmed fish, through controlled identification using dyes for instance, but this is not something that is currently practiced and would be a major procedure to install at any scale.

SWOT Analyses related more specifically to the 4Ps – with additional review of specific interventions

	Strengthes	Weaknesses	Opportnuities	Threats
PRODUCT	• Ongoing production, albeit spatially distributed with many small producers • Popular & fast-growing species (tilapia/catfish) • Species suited to a variety of systems • Relatively disease resistant, although some risk exists • Seed production & availability all year round – quality improving • Local expertise available for production • Ease to process into value-added products forms (e.g. fillets) • Ability to address different consumer segments	• High production costs • Poor international rating because of colour of flesh • Underdeveloped value chain infrastructure	• Favourable physical/environmental conditions all year round • Minimal pollution in aquatic & terrestrial environments • High domestic & regional market for all income groups • Investment policy environment conducive • Diversity for feed ingredient sources • Ability to grow to marketable size with minimum supplementary feeding for small scale operator • Intensive pressure by enforcement agents on lakes is giving an opportunity for farmers • Increasing nutritional intelligence: white meat vs red meat	• Perceived competition with wild fish with similar features • Shorter shelf life • Cheap imports from Asia • Competition from alternative (cheaper) protein sources e.g. chicken, beef etc • Regional competition as neighbours all focus on tilapia/ catfish farming expansion • Tariffs & Non-tariff Barriers (TBTs) • Regional insecurity • Climate issues – drought & other
PRICE	• Price differentiation for different income groups • Competition from capture fisheries	• Seasonal price fluctuations	• Value addition & menu alternatives • Live fish market outlets	• Seasonal drops in consumer earnings • Increased management and larger producers could push

		• Better management and increased supply prices expected to reduce		prices down affecting competitiveness of smaller producers
PLACE	**BUSIA**			
	• Strong co-ops with 10-year experience – established structures	• Inadequate ice • Low local purchasing power	• PESCA support • Unmet demand in Kenya	• Cheap imports
	GULU			
	• Trade hub to the North all the way to Juba • Low access of wild fish	• Low income households • Low level of aquaculture development	• High & growing population including to surrounding towns & districts • Influx of refugees?	• Civil unrest in South Sudan
	MASAKA			
	• Good infrastructure & connections	• Proximity to Lake fish	• Conduit route to access Rwanda & DRC market points	• Cheap other protein alternative
	KAMPALA			
	• Biggest market - high population • Established outlets • Established secondary/value addition processing plants • Hub for other routings throughout the country (Masaka, Gulu, Busia, etc. for regional and national markets). Easy access by roads. • Diverse income levels open up opportunities for more marketing options • Close to central institutions	• High congestions • Hygiene conditions on markets need improvements	• Doing business with existing farmed fish aqua shops • Utilising existing markets points e.g. WAFICOs, SON outlets, GoFish etc.	• Competition with wild fish

	MPONDWE			
	• Proximity to busy market • Good road network	• Limited to no ice • Established buyer groups dominate movement of fish	• Unmet demand in DRC (strategies are complex to realise this opportunity due to buyer structures in place) • Selling of farmed fish to existing and new buyers to meet DRC demand	• Competition from factory by-products & Chinese fish • War & civil unrest/ border issues • Immediate Ebola issues (recent reported cases in the vicinity: July 2019)
PROMOTION	• Generally good potential through various institutions to promote fish • Well-supported by government in effort to promote aquaculture. Various agriculture shows, events, market locations & development/ improvements.	• No significant promotional efforts for farmed fish • May require significant funding • High cost of some promotional means • Low income bracket • Ugandan consumers most conscious on price may ignore promotion	• Fish trade events linked to other food events • High level political icons to spearhead promotional campaigns • Promoting new, value added products • Regional promotional events • Able to focus on educated public	• Level of promotion and focus might be less effective

Annex X: Detailed guidance to the feasibility study / design process

	Proposed Establishments/ Investments	Target places/Locations	What is specifically required (items/equipment/facilities)	Proposed Activities	Comments/Remarks
IN-COUNTRY INVESTMENTS (UGANDA)					
A	• **Model demonstrated through existing farms is a farm gate shop for the local market that will distribute fish to local communities. This is for fish that is not being distributed to distant markets or being picked up for instance by traders who arrive with their own ice and trucks. This is a small addition to the AquaPark design that should be included. The exact modalities and product forms are likely to be whole fresh, with some basic processing if specifically requested by customers. Similar to a landing site point of sale.**				
	Establish own farmgate shops/kiosks at AquaParks	- Apac farm gate - Kalangala farm gate	- Kiosk building - Large freezers/or chill store - Refrigerated displays for fresh whole fish - Electricity (or solar system to power all refrigeration) - Labour - Packaging material - Ice - Possibly live fish holding tank - Fish boxes	- Fresh fish (from harvest above) will be directly sold to customers at farmgate shop - Women traders/ motorbike traders also come to collect fish here & distribute to nearby villages/ districts (see 4 below)	- Fresh whole fish sales (ungutted) - AquaPark farms' direct marketing – - Also, able to talk to customers/farm visitors directly and show them different products and whole farming method, first hand - Models (e.g. LHA, SON, Victory Farms etc)
B	• **Outlets for Ugandan farmed fish at strategic locations. This includes enhancing of already established markets where farmed fish are handled and need consistent volumes, significantly at border towns, such as Busia. Gulu/ Lira would also be recommended based on proximity to Apac farm and to serve a catfish market demand that is lacking at this time, as well as Arua with connectivity to DRC as well as local population in West Nile district**				

	Establish own outlets in other strategic Ugandan towns	- Mpondwe – tilapia sales - Busia (tilapia/catfish) - Soroti (tilapia/catfish) - Tororo (tilapia/catfish) - Gulu – tilapia/catfish - Arua (tilapia/catfish) - Kampala (small fish market segment) - Entebbe (tilapia) - Jinja (tilapia)	- Fish delivery truck/van - Cold store - Freezers - Refrigerated displays for fresh whole fish - Fish boxes - Electricity (or solar system to power all refrigeration) - Labour - Packaging material - Ice - Live holding tanks - permits/licenses (if needed) - Develop Guidelines for the safe retailing of farmed fish products	- Fish delivery truck/van collects fresh fish from farm chill store & move around the towns and distributes product to the strategic towns - Ice is collected from farm Dalsgaard et al. (2012) observed, overall fish seems to fetch higher prices in locations further away from the lakes, where traditional value chains do not reach, or if so, to a lesser extent, and where fish farming has not developed yet. Less 'served' locations could thus make an excellent entry point for aquaculture products.	- To start with one outlet in each strategic town? - Outlets to be at or close to busy markets & easily accessible - May be linked to small restaurant, if possible - At Soroti – they prepare fresh dishes of catfish here & many people come to buy - Part of forward vertical integration thus controlling all aspects of business operations with limited 3rd parties involved - thus improves efficiencies while potentially reducing costs - Models of Lake Harvest/SON/ Maldeco /Victory Farms/KTV models
C	• **Motor cycle distribution to connect farms to various markets. Involvement of women traders to organise the transportation and business side of the action Women traders or motorbike distributors will come collect product at outlets and distribute to nearby locations/ townships or districts. Motor bikes with chill boxes to transport fish of volumes 100 Kg approx.**				
	Establish a network of women traders and/or	- Especially linked to 2&3 above –all locations - Use local women trader/ business groups	- Give them the tools, knowledge to ship product to end user - Buy them motorbikes? - Cooler boxes with ice - Plastic containers	- Women traders or motorbike distributors will come collect product at outlets and distribute to nearby locations/ townships or districts	- This fulfils project aspiration of enhancing women trader associations

	"Motorbike" distributors? (Mobile marketing)		- Packaging material - Develop Guidelines for small scale traders of farmed fish products - Some "agent" training needed - Incentive scheme	- Selling at busy intersections, busy markets, convenience stores, food markets etc	
D	• **Establish connectivity from farms to various larger outlets, this can be a focused truck in the Kampala area, or also complimented by the motorcycles indicated in the above point. Truck to be managed from a central unit, which also has a chill store in place, provided by the project**				
	Supermarkets, Hotels and restaurants	- Shoprite - Mega - Quality supermarket - Hotels in major cities Kampala, Jinja, Entebbe etc	- Fish delivery truck - Ice - Refrigerated displays for fresh whole fish in supermarkets - Frozen meat section in supermarkets	- Fish delivery truck will move around the towns and drops product to supermarkets & restaurants (might be linked to #3 above) - Approach hotels/ restaurants and supermarkets in area & develop a relationship with them. Do a strategic marketing campaign to this segment - Quality-assurance labelling (to differentiate product) - Brand product as local origin - Some hotels/restaurants & supermarkets tend to be quality conscious and brand-reputation loyal.	- Many supermarkets and major shops have Refrigerated display units for fresh whole fish (Zambia, Zimbabwe, RSA) - Some hotels/ restaurants/ supermarkets etc find it easier to prepare meals from locally-sourced, fresh ingredients, grown with care and sustainable methods

E	• **Provide support to existing focused farmed fish outlets (already in place through WAFICOS, etc.) to enhance their capacity, and promotional ability. Establish 1 or 2 extra outlets from Project funds to be managed by Producer organisations, or designated operators. Could partner with existing shops owned by specific operators, but better a new entity serving general farmed fish operators. Locations to be centred on larger population centres where access to lake fisheries is restricted**				
	Explore the utilisation of existing AquaShops (by other companies/fish traders)	- SON - Kampala - GoFish	- A good business deal negotiator - Fish delivery truck - Ice	- Negotiate win-win business partnerships, capacities, competition issues etc	- Some of these outlets may have supply constraints - Use existing outlets to manage the unforeseen barriers when entering a new market. They have established/ instant networks - Example of Chicoa in Malawi using Maldeco & Lake Harvest AquaShops
F	• **Essentially a built-in strategy to take advantage of disposal income at end of month, although specifically targeting areas where outlets are to existing, so using a distribution motor cycle model, or truck model to access more areas. Deliveries to institutional buyers is an area to explore, such as mining companies with large staff structures, or hospitals for instance**				
	"Pay day" model	- Schools - Hospitals - Public offices building - Police/Army barracks - other	- Fish delivery truck - packaging -	- Cash on delivery. Fish delivery truck will move around targeted places and drops product packed in small units – per individual's order. One focal person will co-ordinate the collection of cash	- In some places in Africa, the purchasing power & excitement to buy is high on paydays - Works even better with frozen product - NITMA Enterprise, Kariba model

G	• **Partnering with value-addition operators (established, or new) to supply raw material for onward distribution – specific markets for smoked/ dried are pertinent with distance in mind and particularly to remote areas of country and into DRC, such as through Mpondwe/ Arua. Provision of smoking equipment and required training at a market place for onward transportation**				
	Production and distribution of Value-added products	- Fillets = Freshcuts Ltd. (Kampala?) company has tradition of making fillets & may be approached - Catfish sausages – such as Katifarms - Catfish bait for Nile perch - Smoked product – Northern Uganda - Selling to: - Mpondwe - Arua - Busia - Soroti - Tororo - Major urban centres - Dried catfish for the DRC market	- Live fish transport to the processing centres - Live fish holding tanks	- The idea is to use already existing processing/value addition companies where the desirable live fish will be sent to for processing/value addition – assuming the companies have all the other necessary facilities for processing - The unused capacities could easily be appreciated for processing of farmed tilapia. - Aggressive promotion especially to niche markets – urban restaurants - Send live/fresh catfish to Susan Neri, Kenya for catfish sausage processing	- Needs assessing the implication of production cost vs price to sell smoked products as smoking/drying would mean product shrinks/loses weight. - Fish farmers need to be innovative and aggressive in this e.g. sausages, coated products, smoked products etc. - Processing/value addition will on the one hand increase market access through product diversification, while on the other hand provide employment opportunities.

H	• **Farmed fish are not well-promoted in Uganda, if at all, on a generic national basis to support the sector. Whilst individual farmers, have some retail promotional activities and even website development, this is lacking in a generic sense. General sector promotional campaigns, through visible events, and or generic radio and other billboard type campaigns is needed**				
	Promotional campaigns	- Countrywide - Roadshow at each outlet location	- Promotional materials (in various forms) - Social Media strategy Website Billboards, flyers, local newspaper inserts, in-grocery store, local churches, - Chefs to demonstrate fish dishes - Range of products to be available - Feedback forms etc	- Promote consumption of aquaculture products - Preparations from products - Direct promotion of product to schools, hospitals, colleges and other points where bulk food purchases are conducted periodically -	- Create & promote a market for small sized (100 - 200g) fish by consistent supply.
I	AquaPark farms attaining certification using the EcoMark label	- Apac Farm - Kalangala Farm - Certified products may target some niche markets (Hotels, supermarkets, Embassies etc – mostly in major cities)		- Self-assessment process - Farm auditing - Certification	- EcoMark certification will improve transparency on the origin of products as well as environmental and social conditions of production in Africa. Certification also justifies that the product was produced safely and to the best quality standards

REGIONAL DISTRIBUTION					
K	• **Border point bulking able to supply various outlets as required. Busia Mpondwe, Arua, other in Uganda and linking with onward borders in Rwanda for DRC.** • **Similarly, to national distribution outlets, becomes complicated by competitive issues with existing shops from Uganda, but certainly partnering with outlets in the target country would seem possible to provide a regular supply of fish. The partnership with a particular business is a structural agreement, the actual supply modality for the fish is the key step, in terms of provided fish on time and in certain volumes, or on demand, etc. This is where distribution centres on borders need to have a bulking centre facility to hold fish and react to requirements of distribution outlets as required.**				
	Explore the utilisation of existing AquaShops (by other companies/fish traders)	- Rwanda - KTF - Kenya - Victory Farms - SON outlets in Kenya? - Others identified	- Delivery truck - Permit/licenses - Value-added product - Fresh/frozen product - Supermarkets - Ice	- Again, the idea is to ship product beyond borders to existing AquaShops/outlets - Negotiate win-win business partnerships, capacities, competition issues etc with outlet owners	
L	Doing business with well-established distributors to ship product across complex borders especially to DRC and South Sudan	- Aim is to utilise their cold chain investments) - Live fish holding tanks - Ready product: fresh/frozen, smoked etc – per their demand	- Discuss contractual arrangements - Negotiate buying contracts	- Negotiate win-win business partnerships with key distributors who will come pick up the product directly from the farm – and take it across borders	- Silvere (of Gisenyi Fish Supplies) at Rwanda border with DRC already have experience & facilities to ship product from Uganda (including for farmed fish) & is willing to discuss business prospects

Annex XI: Comments from reviews & validation meeting – actions noted

STAKEHOLDER VALIDATION MEETING FOR MARKETING STUDY

RIDER HOTEL, SEETA 27TH June 2019

PART A
COMMENTS FROM STAKEHOLDERS
After presentation of the report by Mr. Blessing Mapfumo (Agrotec STE) the stakeholders made the following comments and recommendations to the consultant

1. Revise fish consumption of 4.8kg highlighted in the report vis-à-vis the reported 8.6kg per capita.
    - *This is not possible, although various per capita numbers are cited, without accurate data numbers cannot be confirmed and so various estimates from government and others are used throughout.*
2. To provide the current and potential yield of Uganda's farmed fish
    - *Production data for Uganda is not available, but calculations suggest wider opinions on reality. Potential yield can be calculated based on estimated different production systems, such as ponds (small) ponds (commercial) and cages of different sizes. Current estimates are based on averages and estimates with no data to confirm reality. The figure of 110,000 t production is cited from Government sources, but is considered likely to be high.*
3. To clearly identify the factors in the export market that makes Uganda's products less competitive.
    - *Generally Ugandan products can be exported, but price determines how exports have developed, but importantly producers' access to markets and their ability to develop such markets.*
4. To outline measures/strategies for attracting investment in farmed fish sub sector across board.
    - *Subject of a separate section included in this report*
5. The study should give specific quantitative details of how much, who, where and when is the fish needed to go beyond the other market survey reports.
    - *Target markets have been recommended based on population and geographic proximity and distribution/ transport routes. It is not possible to establish exactly how much can be consumed, as distribution infrastructure is undeveloped. Specific data on willingness to pay is key to such a calculation, with only average per capital consumption as a possible starting point.*
6. The consultant was asked to include projections on price fluctuation in the medium term in the view of regional aquaculture development initiatives.
    - *This has been addressed, with inputs from current experienced actors suggesting a reduction in price likely in the near-term.*
7. Information arrangement and alignment
    - *The report has been restructured to logically present the findings and recommendations.*
8. Review the SWOT analysis on the area of weakness where he erroneously reported lack of government support to the sector yet for the last 20 years there has been a lot of resources allocated to aquaculture.
    - *Noted – change made*
9. To Include the agro-industrialization strategies and measures by country in the report
    - *Addressed in section G.6*
10. The consultant was also called upon to include data on imports of fish into the EAC region

- *Addressed in the relevant section*

11. The stakeholders also called upon the consultant to include successful farmed fish marketing models that has worked well from other countries with similar production strategies.
    - *Included in relevant section*
12. To suggest reliable business models for operation of proposed market infrastructures.
    - *Although not part of the report this is address partially in the recommendation's sections*
13. To clarify Symbiotic relations between public sector, private sector, POs and vendors and their relationship for the sustainability of facilities, Feasibility analysis, Aquaculture investment framework, PPP and self-financing model.
    - *Addressed in the relevant section*
14. To provide the current national current and potential fish production and consumption data disaggregated regionally.
    - *This has not been addressed, as supporting data is not accurate. Per capital estimates are provided for Uganda and regionally, but without accurate data estimates would be taken out of context*
15. Provide clarity on each of the proposed market infrastructures for every location identified
    - *Included in the interventions section*
16. To clearly point specific intervention areas and the types of marketing infrastructures in the proposed locations.
    - *As above point 15.*

Identified gaps, opportunities, competitiveness and specific interventions proposed to utilize the potential markets identified effectively and efficiently

1. Small-scale fish distributors (similar to WAFICOS 5-t cold room) targeting 50 distributors taking 5 to 10 kgs per day.
    - *This has not been developed as it is not clear what is required*
2. Direct delivery to institutions is a super idea but it's now upon us to exploit it
    - *This comes with the promotional recommendations section*
3. Regional distribution centres with specialized storage facilities to spur fish consumption and marketing.
    - *Within the recommendations section*
4. EcoMark/certification to increases product branding and acceptance into foreign markets.
    - *Discussed in the relevant section*
5. Market segmentation in terms of size and product forms is to be promoted and harnessed
    - *Agreed, promotion recommendations are made*
6. Branding and packaging of the farmed fish needs to be clarified.
    - *Agreed, promotion recommendations are made*
7. Product differentiation strategies needs to clarified
    - *This is to occur at an operator level, depending on their market access*

After presentation of the report stakeholders were divided into groups to discuss the report and the following recommendations were made by groups to the consultant

- On the SWOT analysis, the stakeholders recommended various issues
    - *Presented in Annex IX*

Promotional

- Development of promotional materials for farmed fish
- Value addition/certified products
- Undertake regular trade shows
- Direct promotion to institutions
- Branding of small

- Setup incubation centres
- Agro-based industrial food festivals

Ranking of place for proposed facilities

1. Busia
2. Gulu
3. Masaka
4. Kampala
5. Albertine

Proposed fish marketing facilities

Fish marketing facilities; these include backup collection centres through distribution channels and sales; these may include the following; Facilities established in major urban centres with rural distribution approaches thus;

Infrastructure at the centres

i. Cold storage (refrigerator/ cold rooms, refrigerated trucks, tricycles with cooler boxes, ice plants
ii. buildings (offices, sales centre, training Centre, ICT centre, canteen, toilet and washrooms, parking yard etc))
iii. energy systems/stand alone with 24/7 power reliability
iv. ICT infrastructure (software) equipped with a web-based marketing system and 24/7 internet reliability

Member recommended various stakeholders to be involved in facilities management – these have been included in the report

Conclusion and general recommendation

- After presentation by the groups, the stakeholders expressed content and satisfaction of the work done by the consultant in terms of the general mapping.
- Some identified gaps were identified and recommendations made to the consultant for improvement in specific areas.
- The consultant was specifically asked to rank the specific proposed interventions, to ease prioritization during resource allocation.
- Stakeholders also agreed that the next step will be business and financial modelling of proposed marketing facilities.
- The project coordinator closed the meeting by stressing, the issue of timeliness and requested the consultant to submit the final report within a week.

PART B

Recommended action for Improvement and revision of draft report on market assessment of farmed fish in Uganda conducted by Blessing Mapfumo (Agrotec STE)

Initial reviews 17/6/2019 and 19/6/2019 - the department recommended the following areas to be revised by the consultant to improve the report before it can be presented during the validation meeting to be held on 27/6/2019

1) To reduce the text as much as possible so as to reduce on the number of pages to about 50 pages using precise and direct presentation of findings and recommendations
    - *Reducing the text is not possible without loosing important context and background. Some information has been moved to Annex to shorten the main text.*
2) To include an Executive Summary of not more than 2 pages giving a brief picture of the market situation of farmed fish, quantified potential demand and available markets, identified constraints and specific recommended interventions for the constraints.
    - *Shortening the Executive Summary is not practical per se however data has been included as suggested, despite estimates and inaccurate data being available*

3) To re-arrange the report in a simplified concise format with an executive summary, brief introduction of objective, the TORS, methodology and a back ground of situation analysis and SWOT analysis, precise findings of market study based on the approach of 4Ps used, identified quantified and segmented market and challenges and barriers to market entrance, conclusion and specific recommended interventions for market penetration.
    - *The overall report format has been improved. It is logically presented*
4) To clearly quantify the available market both regionally and nationally, the production levels, the marketing challenges (product characteristics and its challenges, the quantity, price, the competing products, the distribution channels) and targeted interventions for each of the challenges.
    - *This is a large consideration and has been generally addressed, but needs further study time to allow a more comprehensive coverage.*
5) To use descriptive data through tables, charts and graphs and reduce text.
    - *Addressed in part, but text explanations are required to adequately explain context.*
6) Maps should be accompanied by regional population data, preferred fish species, product form (fresh, chilled, cured and others, per capita consumption, available Infrastructure in the region and challenges for possible intervention)
    - *This data is included in regional sections, population data is used to guide the report context*
7) To caption the tables and figures for the readers to understand the message before reading the text and tabulate the report information where possible.
    - *Tables and figures are captioned*
8) To segment the market and provide the quantities the product forms (size, fresh, chilled, cured and others) which can be absorbed by each segment.
    - *This is not possible with this level of study*
9) To focus on what can practically work for the country and recommend how the current situation can be utilized for interventions.
    - *Recommendations have been formulated and prioritised*
10) Using the 4Ps approach already utilized in analysis to address the weakness of each of the Ps and provide concise specific interventions for each of the Ps.
    - SWOT discussion sections address each of the 4Ps
11) To provide a detailed value chain analysis, with all the actors and supporter clearly identified including aspects such as distribution vans, market outlets, processors, motorcycle transporters, ice plants, road side markets and small quantity mongers and areas of interventions for market penetration.
    - *Not addressed as time not sufficient to investigate these requirements in detail. Value chains are sufficiently described for the purposes of this report*
12) To provide clear regulatory, policy interventions and legislation for enhancement and promotion of organized marketing of farmed fish.
    - *Addressed in a new section of the report*
13) To cite sources of the information attributed to other individual and the secondary data quoted in the report. And avoid as much as possible reporting information without clear source cited.
    - *Sources are cited, where they are clearly available. Consultant's experience is also included in the report, where such expertise draws on many examples throughout the region*

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