Resilient, robust and reliable agro-food sectors in Kenya

From aid to sustainable trade in the aquaculture sector

Obwanga, B.O.; Mwarabu, L.R., Bolman B.; Van Rijn, F. and Musyoka, M.P.

Aquaculture in Kenya

Kenya’s fisheries sector plays an important role in the country’s economic and social development, and includes the aquaculture (farmed fish) and the capture fisheries. The fisheries subsector earns the country an average of USD 70 million (KES 5.3 billion) (Ngugi and Manyala, 2009) annually from exports. Besides generating foreign revenue, aquaculture provides a source of subsistence and livelihood to the rural poor. Although production statistics are anecdotal, estimates from the State Department of Fisheries indicate that fish production markedly increased from 1,035MT (2004) to 23,501MT (2013) driven by increased resource allocation to the sector through the Economic Stimulus Program (ESP) initiated by the Government of Kenya (GOK) in 2007 (MALF, 2013).

This brief provides an overview of the supply chain, institutional governance and innovation support system in the aquaculture (farmed fish) sector based on a literature review and stakeholder interviews. These are evaluated using a strengths, weaknesses, opportunities and threats (SWOT) framework to identify existing opportunities as well as challenges that could potentially impede growth in the sector. It is a first step towards documenting and sharing insights that support a move towards a more resilient, reliable and robust sector.

A rising sector

Fish production systems in Kenya rely heavily on capture fisheries, although fish farming (aquaculture) has been making a substantial contribution recently as well.

In 2015, estimates showed that the fisheries sector (both aquaculture and capture fisheries) had the potential to contribute more than 8% to Kenya’s gross domestic product (GDP), an increase from the usual 5%. Although Kenya has plenty of natural water resources, the aquaculture sector faces stiff competition from crop farming (Ngugi and Manyala, 2009). Reportedly, only 0.014% of the part of the country that is potentially suitable for aquaculture (1.4 million ha) is used for that purpose, 95% of which is small scale (Munguti et al., 2014). Most fish farming takes place in selected parts of the country (Nyanza, Western, Coast, Central and some parts of the Rift Valley). Cognizant of the fish industry’s potential contribution the country’s GDP, in 2007–2008 the government supported the sector with over KESH 5 billion under the Economic Stimulus Program (ESP). This support increased fish production from 1000 MT in 2000 to 9,710 MT in 2008. The programme also helped to increase the number of fish farmers and improvement in the fish farming infrastructure.

In addition, to government funding, the sector also attracts support from bilateral and multilateral donor projects, including USAID, the European Commission, JICA, DFID, and SIDA among others, as well as direct

3R Kenya

As part of the transition strategy from aid to trade in Kenya, Wageningen UR will implement a project that assesses and validates lessons learnt from the Netherlands Embassy’s Agriculture and Food and Nutrition Security programmes and other related programmes that support competitive market-led agricultural development. The 3R (Resilient, Robust and Reliable) Kenya from Aid to Sustainable Trade project investigates whether the lessons from the aid era can be transferred and scaled up in the coming trade era. 3R Kenya focuses on the aquaculture, dairy and horticulture sectors. The overall aim of the 3R Kenya project is to have well-informed stakeholder actions that support the transition from aid to sustainable trade (people, planet, profit) in the aquaculture, dairy and horticulture sectors.
investments from countries such as Australia (KES 16 bn), Israel (KES 4 bn), the United Kingdom (KES 738 m) and India (KES 434.3 m) (Rothuis et al., 2011). Support from the Netherlands specifically focused on business development and capacity building. Dutch companies have played a crucial role in the provision of feed, expertise and investment capital, agro-processing equipment and technology, as well as expertise on value chain development. Programme support for aquaculture from the Dutch Embassy includes ETC (the Netherlands) and Jambo Fish Kenya in conjunction with Fleuren and Nooijen BV, who produce fingerlings and sell table-sized catfish for the urban market.

In addition to financial support, the sector has become a policy focus with the development of the National Aquaculture Policy (NAP) in 2011 (MOFD, 2010). The 2011 NAP has been promoting coordination in the industry and between the sectors, as well as in the overall National Agriculture Sector Policy 2010-2015 and the overall country development framework of Vision 2030 (MOFD, 2011). Kenya exports fish to the European markets, but the export business is hampered by poor quality and lack of value addition. However, most of the fish is consumed in the domestic market. Cultural aspects, tastes, income levels and nutritional and health awareness drive the demand for fish in the domestic market. Apart from communities that traditionally eat fish, for other communities fish is almost a luxury item or otherwise it is consumed for health or medical purposes (Rothuis et al., 2011). For instance, the preference in low-income families is for small portions of fish either whole or in quantities of 100 g-150 g (e.g. tilapia) or smaller pieces of larger fish (e.g. catfish). In middle-income families the size ranges from small to larger fish around 250 g-350 g, while in the high-end market there is more demand for bigger fish, upwards of 350 g (Rothuis et al., 2011). However, notable studies indicate that fish is becoming an increasingly important meal component in both rural and urban households. Fish consumption is highly dependent on household income levels. Consumption is also driven by taste (Rothuis et al., 2011). For instance, there has been a trend, particularly among rural consumers from traditional fish-eating areas, to avoid fishpond-farmed fish because of taste preferences. Species preference plays a significant role since majority of consumers prefer tilapia to catfish.

Issues in the aquaculture sector

The aquaculture sector faces a myriad of issues in terms of challenges and opportunities that characterize the supply chain, institutional governance and the innovation support systems along the value chain. Combined, these three themes help us to understand the robustness, reliability and resilience of the aquaculture sector.

Robustness: supply chain sustainability

Robust supply chain integration refers to efficient and trusted interactions between supply chain partners that reduce transaction costs and the risks involved in enhancing product quality and safety and reinforcing sustainability. In this brief, robustness will be approached from the perspective of sustainability, with a view to highlighting the robustness of the aquaculture sector in terms economic, social and environmental sustainability.

Table 1: Strengths and opportunities vs. weaknesses and threats in terms of sector sustainability

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<th>Strengths and opportunities</th>
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<td>Low value addition</td>
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<td>Shorter value chain which ensures the producer has direct contact with consumers and can thus maximize returns</td>
<td>Poor feed quality</td>
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<td>Increasing entrepreneurship</td>
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<td>Availability of unexploited land and water resources</td>
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<td>Poor uptake of production technologies</td>
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<td>Cultural aspects that limit fish consumption</td>
<td>High market standards</td>
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Strengths and opportunities

- **High demand for fish** (high market potential): Increased awareness of the health benefits of fish is driving demand for fish upward. The increase in demand is widening the gap between production and consumption, creating a significant market deficit that can only be rectified by increasing production. The increased fish demand is creating demand for inputs through backward linkage into the fish production process, including fingerlings and fish feed.

- **Value addition opportunities**: value addition can increase shelf life. There are also opportunities for increasing value by means of cluster farming and forming cooperatives.

- **Opportunities to diversify**: diversification could be achieved by farming other species, such as common carp, marine culture (mariculture) or bait-fish. There are also opportunities for processing different fish and fish products.

- **Awareness programmes**: the Government of Kenya (GOK) is funding several programmes to
create awareness of the benefits of fish and encourage the consumption of white meat (fish) through its ‘eat more fish’ campaigns. These campaigns are driving up demand for fish.

- **Awareness of aquaculture as a livelihood source by government and households**: aquaculture sustains (and complements?) the livelihoods of the rural poor.
- **Shorter value chain**: marketing chains for farmed fish are usually relatively short (producer-consumer) hence eliminating intermediaries; farmed fish prices compete with the price of wild fish. These shorter value chains are important incentives for farmers as they tend to increase incomes.
- **Increasing entrepreneurship**: There has been a rise in the number of entrepreneurs on the market, especially among fingerling producers.
- **Availability of unexploited land and water resources**: Kenya has immense natural water resources (133 km² of springs, rivers, lakes, reservoirs, temporary water bodies as well as an Exclusive Economic Zone (EEZ) and favourable geographic and climatic conditions for freshwater (cold and warm) aquaculture and mariculture. These resources provide opportunities for cage culture in rivers, lakes and reservoirs.
- **Availability of programmatic financial support**: increasing support from financial institutions including the Equity Bank, Faulu (microfinance), Kenya Women Holdings, and Kenya Commercial Bank KCB.

**Weaknesses and threats**

- **Low value addition**: low value addition on fish renders it a short life cycle and limits consistent availability in the markets. Most of the fish sold in the market has very low value addition, despite the relatively high preference for fresh fish. However, distant markets would require value addition in order to extend the shelf life of fish and streamline supply in these markets.
- **Poor and inadequate knowledge on fish breeding**: farmers lack knowledge on fish breeding. As such, the production of fingerlings is limited to a few farmers or groups. This restriction leads to scarcity of fingerlings and constrains the production of fish.
- **Inadequate extension services**: although the State Department of Fisheries provides extension services to fish farmers, inadequacies in the quality and content abound. The inadequacies in extension lead to poor documentation and reporting of production statistics.
- **Dependency on rain-fed aquaculture**: most aquaculture depends on rain-fed aquaculture, but only 17% of the country receives the minimum required rainfall for rain-dependent farming.
- **Poor uptake of production technologies**: although there are production technologies (e.g. cage production system) that seek to enhance the production and quality of fish, and the quality of feed; these technologies have low adoption rates. This low adoption stems partly from the high costs involved, the high technical capacity required, and inadequate financing.
- **Water pollution and droughts**: most farmers depend on natural water supplies (springs and rivers, which are prone to pollution and scarcity) that compete with other farming activities. Most rivers from which water can be extracted for aquaculture are highly polluted, and water levels drop significantly during the dry season. As such, pollution,
drought and climate change pose risks to aquaculture that relies on rain and natural water sources.

- **High market standards:** high export standards limit access to markets and also dictate investments in the sector.
- **Low preference for fish:** traditionally there have been non-fish eating communities, due to consumer perceptions based on religion, for example. Although consumption is increasing, the rate of increase is not enough to boost the sector so that it can develop faster and realize its full potential.

Reliability - institutional governance

Reliable institutional governance refers to public-private cooperation; co-innovation and a public economic policy framework that supports private investment and enhances opportunities for (inter)national trade. This brief focuses on how policies, standards and markets are being supportive from a trade perspective, that is, the degree to which they support private investment and enhance trade opportunities.

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<td>Existing policy frameworks</td>
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<td>Established policy institutes</td>
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<td>Development support and tax exemptions</td>
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<td>Research infrastructure</td>
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**Strengths and opportunities**

- **Policy frameworks in place:** the new National Aquaculture Policy NAP-2011 and the NASDP (2010-2015) takes into consideration all components of the value chain and supports international best practices in aquaculture. Moreover, NAP and NASDP take into consideration both the small-scale farmer and large-scale farmer and aim to strengthen all aspects of the value chain, including local sector needs, and create a conducive environment for private sector investment.
- **Established policy institutes:** the State Department of Aquaculture and the Kenya Bureau of Standards (KEBS) work with other state departments such as the Kenya Bureau of Standards (KEBS) to develop standards for feed and seed.
- **Development support and tax exemptions:** provision of tax exemption (VAT) on raw materials in the 2016-2017 budgets has already encouraged more people to manufacture feed. The government has previously supported the development of the fish industry through its Economic Stimulus Program (ESP) on aquaculture, which included digging ponds to stimulate fish production and providing fingerlings because they were in short supply.
- **Publicly funded research infrastructure:** GOK funds the Kenya Marine & Fisheries Research Institute (KMFRI) that carries out research in different areas of aquaculture and collaborates and partners with other organizations.

**Weaknesses and threats**

- **Slow implementation of the NAP and NASDP policies:** the NAP and NASDP policies are recent, and it is likely to take time before they are fully implemented. Another reason for this is the devolution process, which has posed a challenge to aquaculture given that some counties do not identify aquaculture as a priority. Moreover, there is low capacity to implement the policies and realize their objectives.
- **Lack of existing regulations on feed:** despite the NAP and NASDP, there are gaps that need to be addressed by specific policies. Currently, the fish feed sector is almost unregulated and depends on a general policy framework that focuses on other sectors of agriculture and livestock production.
- **Reluctance and low funding in the sector:** although there is considerable donor and government funding, these funds are not enough to transform aquaculture into a more vibrant, competitive sector. In addition, the sustainability of continuous donor or government funding is questionable given other competing sectors. Funding activities such as extension within the fish farming sector has been met with reluctance because of the risks of funding individual farmers and the low returns achieved in the sector despite its potential.
FARM AFRICA AQUA SHOPS - promoting quality and marketing

Farm Africa is running the Aqua Shops project in five western Kenya counties, including Busia, Kakamega, Kisumu, Vihiga and Kisii, to support fish farmers with equipment, feed and technical knowledge needed for their ponds to thrive in the long term. Aqua Shops are an invaluable source of quality support and training for Kenya’s fish farmers. The Aqua Shops project aims to enhance the entrepreneurial skills of fish farmers through training on quality management practices by:

- Providing farmers with fish feed and manure, as well as technical aquaculture advice so they can set up and manage their own ponds
- Piloting profitable new schemes such as intensive fingerlings farming
- Providing farmers with training on marketing and selling their produce, using online platforms
- Using knowledge gained to develop a franchising model, which, if it works, can be used throughout Kenya and across eastern Africa

Achievements so far

The project has grown significantly since it was set up in 2011, with 56 shops set up in five years, benefitting over 7,500 farmers and contributing to an increased income of up to 63%. Sales of fish have increased through a partnership with digital platform E-soko, which connects farmers with traders online, and is also used to send technical tips to farmers via text messaging.

Resilience - innovation support system

Resilient innovation systems refer to the dynamic adaptive capacities that enable agents (research, extension and projects) and systems to adequately respond to changing circumstances. In this brief we focus on how these agents and systems support technical, institutional, and social innovations (the enabling conditions) or remove barriers that prevent these innovations from happening.

Table 3: Strengths and opportunities vs. weaknesses and threats in terms of the innovation support system

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<td>Collaboration between government, farmers and development organizations</td>
<td>Strong dependency on support in the sector</td>
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<tr>
<td>Establishment of Aquaculture Association of Kenya (ASK)</td>
<td>Inadequate and inconsistent reporting and documentation</td>
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<tr>
<td>Enabling research infrastructure that allows research at the policy, institutional and production levels</td>
<td>Cumbersome import procedures</td>
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<tr>
<td>Linkages between the farmers and markets</td>
<td>Poor information sharing</td>
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<td>Poor transport in rural areas</td>
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Strengths and opportunities

- **Collaboration between government, farmers and development organizations**: the State Department of Fisheries is encouraging people to practice aquaculture as a business, which is why it is training of farmers via an enterprise budget for aqua-business and production technologies. The extension workers at the county level provide information on farm management issues; site and species selection; and help to prioritize aquaculture at the government and county government level. The government is also collaborating with NGOs to provide extension, training and funding for fish farming activities (e.g. between government and multilateral donors through the KCDP project) and research on new species and technologies.

- **Enabling research infrastructure**: designated aquaculture research and training centres have been set up throughout the country (how are they collaborating with the actors and how is the research agenda set)?

- **Linkages between farmers and markets**: the potential for enhancing market linkages is high. These linkages include; linkages between stakeholders (government, NGO and civil society) and linking local farmers to local, urban, regional and global markets.

Weaknesses and threats

- **Strong dependency on support**: stakeholders and especially farmers in the fish farming sector have developed the ‘support dependency syndrome’ because of government support. The dependency syndrome inhibits creative solutions to the challenges affecting the sector and even slows down progress in the sector following government-supported initiatives such as ESP.

- **Inadequate and inconsistent reporting and documentation**: inadequate funding for the fisheries department; scanty research on aquaculture economics; uncoordinated promotion of aquaculture through too many institutions; low priority in government for aquaculture; a lack of robust and demand-based research coupled with low funding – all of the above mean there is inadequate information available on aquaculture.

- **Cumbersome import procedures**: there are a myriad of documents and processes to go through when importing inputs for feed manufacture or equipment for fish production. These processes cause delays, and the various charges for these procedures inflate the cost of imported products, not to mention fluctuations in the exchange rate.

- **Poor information sharing**: poor information sharing and an unwillingness to share information be-
tween farmers, the government and other development partners in the sector reduce actor interaction and the pursuit of common goals and simultaneously promote the duplication of efforts. There is usually inadequate information on market demands and prices – a problem emanating from a lack of central marketing organizations.

- **Poor transport in rural areas:** road and communication networks are often poor, which constrains production and market participation activities. Poor roads also drive up the cost of transport and reduce market access.

**Conclusion**

In general, the full potential of aquaculture has not been realized yet despite the immense opportunities – mainly because until recently it had little priority. Although the sector has enormous investment potential, inadequate institutional and policy frameworks, low investment in fish production and technologies to improve marketing, among other challenges, have caused the sector to stagnate. As a result, some components of the value chain are not well developed.

Nevertheless, stakeholders have identified mechanisms that will improve the status of aquaculture. These mechanisms include innovations and improvements by actors in the value chain. For instance, farmers have formed the Aquaculture Society of Kenya, which brings together farmers, breeders, marketers and processors on a platform to strengthen processes in the value chain and monitor pertinent issues, such as seed and feed quality. There are also strategies to add value to products as a market entry point, including making fish sausages and samosas, and branding products for entry into the supermarket supply chains. However, these efforts are still rudimentary and may require support in terms of training and credit facilities. The farmers are also exploiting the use of cage culture for fish production as well as the use of raised tanks, where fish are produced in a small area but stocking density is increased. It is also worth noting that the 2010-2015 National Aquaculture Strategy and Development Plan has already expired, so a new one will need to be developed. In addition, the private sector in aquaculture has received less support in comparison to other sectors, despite the stipulation in the strategic plan and the aquaculture policy that the sector receives additional funding. Supporting the private sector may result in the exploitation of the immense potential, specifically in seed and feed production.

This brief provided an overview of the sustainability, institutional governance and innovation support system in the aquaculture sector. These findings will be validated and fed into the next phase of the programme to provide and share solid, evidence-based knowledge that supports the transition from aid to sustainable trade.

**References**