Review of five Netherlands government funded aquaculture projects in Africa

Peter G. M. van der Heijden, Wout Abbink and Eugene Rurangwa

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Up-scaling the FAO-China South-South Cooperation Programme through triangular cooperation with the Government of the Netherlands

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This report describes the results of a review of five aquaculture projects that have been implemented in the past twelve years. The projects were located in Kenya (4) and Ethiopia (1). The aim of the review was to draw lessons and recommendations for design and implementation of future aquaculture projects. All projects had been funded completely or partly by the Government of the Kingdom of the Netherlands with the aim to support aquaculture sector development. Beside project documents the main sources of information were thirty two interviews with a range of project stakeholders. Four projects had capacity building as a major or even main component. The experiences and lessons learnt by Dutch and African project stakeholders as well as impacts on the aquaculture sector that lasted after project closure are described. Recommendations for design and implementation of future aquaculture projects are provided.

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Photo cover: Tigoi Tilapia Hatchery, Vihiga County, Kenya
Photo: Peter G.M. van der Heijden

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1 Background

The development of aquaculture in Sub-Saharan Africa (SSA) can be classified into three historical phases:

The introductory phase, at which aquaculture has been introduced during the colonial time in many Sub-Saharan African countries. For instance, in Kenya, fish farming was introduced in the 1920s by the colonialists, initially for sport fishing, and evolved into farming of consumption fish in static water ponds or to produce seed for stocking of ponds, dams and rivers (Obwanga et al., 2020). In Ethiopia fish was introduced and released for stocking of water bodies in 1925. In 1955 the Ministry of Agriculture built some fish ponds in Bishoftu and Akaki areas for observation of growth of fish (Issa, Mengistu & Aizhi, 2018). This did not lead to any fish farm development of importance; in 1986 Balarin stated that Ethiopia has 'a virtually non-existant fish farming history' (Balarin, 1986).

The Public supported phase. After independency, many African nations embarked on aquaculture development, financed mainly by donor and government funds. During this phase, subsistence pond aquaculture has been popularized, mainly for food security, poverty alleviation and job creation in rural areas. Technical and financial assistance contributed to the creation of hatcheries for the seed supply and to extension services. Fish farming was popularised by the Government of Kenya in the 1960s, through the "Eat More Fish" campaign. When funding stopped, many ponds were abandoned because of lack of seeds, feeds and poor harvests. In Ethiopia in 1974-1975 some fish culture activity was initiated by the Addis Ababa University. Study ponds were constructed at Akaki and Dukem areas some 20 to 25 km South East of Addis Ababa. The Sebeta Fish Culture Station (now called National Fish and Other Aquatic Resources Research Centre) was established in 1975/1976 under Japanese technical assistance program. Regional fisheries and aquatic life research centers have also been established at Bahir Dar, Gorgora and Ziway in 1998.

The public-funded attempts to develop aquaculture in especially Sub-Saharan Africa have been assessed, evaluated and discussed in considerable detail by several authors and in conferences (see FAO et al., 1987; FAO 1995,1999; Brummet & Williams, 2000; CIFA, 2004; Moehl et al, 2006.; Hecht, 2006; Brummet, 2008; Satia, 2011). The Technical Guidelines supporting the implementation of the FAO Code of Conduct for Responsible Fisheries and Aquaculture with regard to aquaculture development (FAO, 2001; FAO, 2007; FAO, 2008; FAO, 2010; FAO, 2011) reflect a number of the important lessons learned.

The private sector–led phase. Amidst the many attempts to develop aquaculture for smallholders, a small number of medium and large-scale commercial fish farms, some already established in the 1990's or before, managed to stay in business. Since 2000-2010, the development of the aquaculture subsector has benefited from a business approach, a flow of knowledge and technology, the introduction of intensive farming systems namely RAS and cage farming, accessibility to commercial feed and fingerlings, large capital ventures and partnerships of foreign investors with local entrepreneurs. Specialised commercial farms are found in South Africa, Namibia, Kenya, Zambia, Uganda, Zimbabwe, Nigeria and Ghana, supplying annually hundreds or even thousands of tons per farm of good-quality fish (tilapia, sharp-tooth catfish), shellfish (oysters, abalone) and crustaceans (shrimp) grown in semi-intensive or intensive production systems (floating cages, earthen ponds or concrete basins with water recirculation systems), using hired labour, high-quality fingerlings and commercial manufactured feeds. Between 2000 and 2019, aquaculture production in Sub-Saharan Africa has grown by 11% annually on average — almost twice as fast compared with the rest of the world, with a few countries growing above 20% per year (Ragasa et al., 2022). Private sector investments contributed to aquaculture expansion across SSA's inland water, from 9 cages in 2006 to more than 20,000 in 2019. The production is sold on local, regional and international markets.

Seeing the success of pioneer cage farms, more investors started cage farming in African lakes and water reservoirs after 2010. An expanding number of floating cages, operated by small, medium and large companies, that produce mainly Nile tilapia can be seen in Lake Volta, Lake Kariba, Lake Victoria, Lake Cahora Basa, Lake Kivu and Lake Muhazi (to name just a few). These lakes host over 90% of the total inland

cage aquaculture production in SSA. Cage culture is the newest and the fastest growing subsector of aquaculture in Kenya, Rwanda, Uganda and Ghana.

The government of Kenya contributed to creating a business environment conducive to investment in key economic sectors, including commercial aquaculture. The present status of fish culture activities in Ethiopia is mainly limited to small holder farmer level, and to the stocking of fish in new water bodies. Fish farming in Ethiopia is a secondary and part-time activity taking place in small freshwater ponds. The number of fish ponds and participants is not compiled properly due to poor data handling system on fish farms. Issa, Mengistu & Aizhi (2018) estimate that there are 4500 fish ponds. These are supplied with fingerlings through government extension service that collects fingerlings from natural water bodies. Some fingerlings are supplied from fish research centres and newly established hatchery centres (Issa, Mengistu & Aizhi, 2018). The company Africa Sustainable Aquaculture ASA was established in 2015; it is the only commercial aquaculture company in Ethiopia.

Objective of this study

In 2019 a 3-year agreement was signed between FAO, the Government of China, and the Netherlands Government. The genesis of that agreement is the support to the "South-South Cooperation" (SSC) meaning China's support to development in less developed countries, a form of collaboration facilitated by the FAO. The Netherlands is committed to be a partner in this SSC, hence promoting the South-South Collaboration into a "Triangular cooperation, TrC". The overall aim of the project as a whole is to upgrade the capacity of the Freshwater Fisheries Research Centre (FFRC), part of the Chinese Academy of Fisheries Sciences (CAFS), and the FECC, the Foreign Economic Cooperation Centre (part of the Ministry of Agriculture and Rural Affairs) in order to increase their effectiveness and impact of international development efforts. Wageningen University and Research (WUR) is service provider on behalf of the Netherlands Government.

Both China and the Netherlands are involved in projects aimed to support aquaculture development in Africa. To support the design of future aquaculture projects, a comparative analysis of China and Netherlands-supported aquaculture projects has been undertaken. It is believed that identifying the factors that contributed to their success or failure and harvesting the lessons learnt would be a worthwhile exercise. A study of selected projects including visits to aquaculture project sites is presented in this report. In preparation of this study, a jointly conducted desk study was carried out to kickstart this activity. The result of the desk studies are reported in 'Joint review of aquaculture sector support projects in Africa' by WUR, and 'Joint review of aquaculture sector support projects in Africa' by FFRC, CAFS.

The main objective of the study is to draw lessons and improve the design, implementation and organisation of future aquaculture development projects in Africa by means of reviewing the aquaculture development projects that were selected in the start-up phase of this TrC project. This report contains the results of the study with descriptions of the outcomes, impacts and lessons learnt by various stakeholders who were involved in the selected projects. The report provides recommendations on how to improve the set-up, organisation and implementation of future aquaculture development projects in Africa.

2 Methods

2.1 Selection criteria

Based on a number of criteria that are described in the desk-study reports (internal reports) that preceded this study, five projects that were (partly or completely) funded by the Netherlands government were selected for further study. Information, such as project plans, reports, interviews, website information, etc. that was published by the projects, was collected. The following criteria for selection of these aquaculture projects were agreed upon by the team:

- The selected project concerns aquaculture in one or more African countries. The whole African continent is considered.
- Aquaculture should be the main focus. Integrated aquaculture is also considered. Of agricultural projects that also have a clear aquaculture component, only the aquaculture component is considered.
- All types of aquaculture are considered; freshwater and marine, fish, crustaceans, shellfish and seaweeds.
- Projects should be aimed at improving the food security situation in the country or countries concerned.
- Projects aimed at raising household income by means of farming aquatic plants or animals that are not for direct consumption (i.e. seaweeds, ornamental fish), are not excluded, since improved household income implies improved food security for the households concerned.
- Projects that are aimed at a visible and/or lasting effect in the country are preferred over in-depth studies. Short-term, one-time consultancy jobs by one expert and small desk studies will be excluded.
- Chinese and/or Dutch governments are an important (or only) source of funds and/or Chinese or Dutch staff play major role in project implementation. Projects implemented in collaboration with other nationalities can be included if China or the Netherlands played a major role.
- Project must have started within the last 12 years. Starting point is actual take-off of project activities (not formal contract signing which can be years before actual project start). Starting point should thus be from January 01, 2009 onwards.

2.2 Impact on aquaculture value chain stakeholders

Impact of the selected aquaculture projects was assessed through an aquaculture food system lens. This means that we have tried to determine the effects of the project on the aquaculture value chain operators and on the companies and institution that play a supporting or enabling role in the value chain. In Appendix 2 this distinction between value chain operators, supporters, enablers and external financial supporters is explained in more detail.

2.3 Descriptions of projects reviewed

Four of the five projects studied were located in Kenya, the fifth was located in Ethiopia. The five projects that were studied can be differentiated in two categories. In the first category are projects of which all components and activities were paid from the project funds that were made available by the Dutch government. This was the case for contributions and input from private companies as well as from public institutions. Most projects that were studied fell into this category. Although the project's objective may include contributing to long-term goals that may lay the foundation on which a young sector can be built (such as building human capacities and sustainable provision of essential inputs), the fact that all activities are paid for may lead to less critical, opportunistic and short-term attitude of the persons and organisations involved.

In the second category are projects of which the public funder required a significant input (co-financing, in cash or in kind) from the companies and/or institutes involved. Because of this requirement the project partners involved in such projects tend to be more careful and critical with regard to the results/outcomes of the project. The question whether the expected returns to the company or institute will on the short or longer term compensate for the time and/or money invested is critical to whether the company or institute will join the project. Long-term results may include an expanded network; being more familiar with the business environment, the sector and the regulations in the country where the project takes place; having a concrete example of the company's expertise and contribution to show to potential business partners in the country/region, etc. Of the projects studied Food Tech Africa falls into this category. The Agribusiness Support Facility Ethiopia also aimed to support persons and companies who wanted to invest in aquaculture, and has achieved this objective to a limited extend with support to the establishment of Africa Sustainable Aquaculture (ASA).

In most cases it is the funding conditions of the main party providing the funds that determine if a project will fall in the first or in the second category (or will have characteristics of both categories). The requirement that project partners contribute to the total project budget will have an impact on the project objectives and choice of activities that will be undertaken within the project framework, as well as on project implementation. Projects that are co-funded by the project partners will probably have (more) activities that are in the short and/or medium-term business interest (profit prospects) of the partners involved. Projects of which all activities are paid from public funds can focus solely on more medium or long term objectives, such as training human capacity, providing basic infrastructure and securing provision of basic inputs for a sector in its early stage of development.

Appendix 1 to this report contains descriptions of the five aquaculture projects that were studied.

2.4 Selection of stakeholders for interviews

In the phase following the selection of projects, the various types of stakeholders that could be involved or impacted by the selected aquaculture development projects were identified.

From all selected projects that were studied, the team knew at least one or a few of the people who had been involved in the project implementation. A snowball approach was used, meaning that these people known to us were asked to name other people who had been important in the project. One team member himself had been involved in 3 of the 4 Kenya-based projects and his contact list of persons involved in these projects proved very useful for this study. Because of his involvement in these projects as well in this study he was not among the people who were interviewed for this study.

In Table 1 the number of persons interviewed per stakeholder category is shown. The number varies considerably per project. This is caused by the different character of the projects, with some projects having more different categories of stakeholders than others, and whether persons that represented certain stakeholder groups could be located and were agreeing to be interviewed. The project with the largest number of stakeholders interviewed was KMAP because this project had involved or impacted many people. Also, time availability of the study team limited the total number of interviews that could be held and processed (i.e. editing of transcriptions, extraction of important information).

Table 1 *Types of stakeholders and number interviewed of the projects selected for this study.*

	Name Project					
Stakeholder category ↓	**Food Tech Africa**	**KMAP**	**3R Kenya**	**Integrated Water Management SEKU**	**Agribusiness Support Facility Ethiopia**	**Total**
Funding provider	1	1	1			**3**
Main implementing organisation (NL)	1		1	1	1	**4**
Main implementing organisation (Africa)	1	1	1	1		**4**
Private Company (NL)	1					**1**
Private company (Africa)	1	3			1	**5**
Knowledge institute (NL)		1	1			**2**
Knowledge institute (Africa)	1	3	2	1		**7**
Fish farmer	1	3	1			**5**
Farmer organisations			1			**1**
Total						**32**

* Note: one interviewee had been involved in two projects, so the total number of interviews is one less than the total number of respondents in this table.

2.5 Interviews

For each category of stakeholder separate questionnaires were developed. The questions focused on identifying in which project activity (or activities) the interviewed stakeholder had been involved in, his/her opinion on how these activities had taken place, the impact of these activities on the stakeholders and project beneficiaries, and the lessons(s) he or she had drawn from the engagement in the project. Some of the questionnaires used can be found in Appendix 3.

People interviewed were approached by phone, email or a letter, informed about the purpose of the interview and asked for their collaboration. For the preparation and execution of the interviews done in Kenya two Kenyan aquaculture experts were contracted. These experts (Mr Benson Obwanga and Dr. Erick Ochieng Ogello) were selected for their knowledge of the Kenyan aquaculture sector, network and familiarity with some of the selected projects. Most of the stakeholders interviewed in Kenya were contacted by one of these two local consultants.

Nineteen of the 31 interviews were done face to face, the others online. Fifteen Kenyan stakeholders were interviewed on their farm, in their office or in their shop. During the interviews the questionnaires were used as a check list or guide for the conversation. The interviews had a semi-structured character, meaning that it was possible to discuss also aspects that were not directly an answer to one of the questions from the questionnaire, but that were found relevant by either the interviewee or interviewer. Interviews lasted between 45 minutes and 1 hour 15 minutes. All interviews were recorded. Transcripts of the interviews were made using an online transcription program (Amberscript: Audio & Video Transcription | Speech-to-text) that uses artificial intelligence to create written text from recorded speech. The rough transcriptions that were made by this automated transcription program were edited by one of the interviewers.

Photo 1 – 6 *Interviews being conducted at various locations in Kenya (June 2022).*

2.6 Interview analyses

The 31 interviews gave a lot of information. For analysis and comparison, it was required to extract the most relevant information from each interview. To avoid personal bias as to what information is (not) important, at least two team members read all the edited transcriptions and extracted the information deemed as important for this study. This was the information regarding:

- the role the interviewee had played in the project,
- which project activities the interviewee had been involved in,
- remarks about the design and the implementation of the project,
- impacts the project had on various stakeholders,
- important impacts or contributions of the project that were still existing years after the project had ended,
- the weak points, or aspects that were less successful, and
- lessons learnt regarding design, implementation and other aspects of the project.

The most relevant information was brought together on a spreadsheet (Excel). From this spreadsheet the recommendations and lessons were extracted.

The five projects that were studied were very different in character, and different stakeholders of the same project can have different views on the project. The analysis of the interviews focused on commonalities in the assessments by the interviewee as to what went (not) well, impacts of the project on various stakeholders and lessons learnt, both within the projects, and between the projects.

3 Results and long-term project impacts

In the project descriptions (Appendix 1) already a number of important outputs and achievements are mentioned. In this part we focus on the long-term impact of the projects on the value chain actors, supporters and enablers. (See Appendix 2 for description of these three categories).

3.1 Impacts on value chain operators

The following impacts of the projects studied on aquaculture value chain operators were identified:

Two projects had contributed to the establishment of training facilities and demonstration farms, or to the upgrading of already existing facilities. This has enhanced possibilities for capacity development for existing and future aquaculture producers or professionals in the country.

Trained aquaculture producers applied the new knowledge and skills (better management practices) which resulted in higher/better production and harvest. Small-scale farmers learnt to look at aquaculture as a commercial activity by applying record keeping, cost and profit calculation and better marketing.

One project brought market competition from cheap tilapia imports and its impact on the fledgling local fish farming sector to the attention of the highest authorities in the country. This led to discussions in the media but did not lead to lasting import policy changes.

Building on the knowledge gained and on shared business interests, new follow-up aquaculture projects have been initiated and are currently running between some initial public-private project partners with geographical expansion of activities in East Africa, and to joint ventures between local and Dutch partners.

3.2 Impact on aquaculture value chain supporters

The following impacts on aquaculture value chain supporters were identified:

Foreign companies involved as partners in project implementation experienced spin-off effects in other African countries. A small number of local fish feed and fingerling producers obtained up-graded and more effective production facilities as result of involvement in the projects studied, leading to enhanced output, sales and income. Establishment of on-farm training sites and involvement of fingerling producers and input suppliers in training events and other project activities led to expanded networks and clientele base and enhanced sales. The same was the case with persons trained to become aquaculture agents, of which a significant number are still operating as private consultants for aquaculture producers and investors. For (future) fish farmers the above mentioned impacts mean improved availability of quality fingerlings, fish feed, training opportunities and expert advice.

3.3 Impact on aquaculture value chain enablers

The following impacts on aquaculture value chain enablers were identified:

The studies conducted by various projects informed many aquaculture stakeholders including Netherlands embassy staff members of the current aquaculture situation and of future prospects. Also taking part in national platforms and round tables led to better informed government staff and institutions and raised awareness of aquaculture's possibilities as a commercial venture.

Researchers and teachers became better equipped (both knowledge and skills-wise as well as with facilities and equipment) as result of an institutional upgrading project. Aquaculture researchers became more farmer-oriented in their choice of research subjects and more accessible for producers.

Having learnt the detrimental long-term effect of free input supply, one district government stopped with free supply of aquaculture inputs to fish farmers.

3.4 Impacts on the sector as a whole

The following impacts on the aquaculture sector as a whole (including supporters and enablers) were identified:

Some of the projects initiated and/or supported the establishment and/or participated/contributed in events organized by national aquaculture platforms/round tables and networks of aquaculture producers, input suppliers, researchers and policy makers and policy implementors. This enhanced contacts, communication, learning and networking between different stakeholders as well as between private and public partners.

It was realized that maintaining an active national platform in a large country is expensive (transport costs), often too expensive for contributions by private members, and may need outside funding for a longer period.

A better understanding of the current situation of the sector and its needs was obtained on the side of government entities involved in or affecting aquaculture development.

4 Recommendations

The analysis of the information extracted from the interviews and reports led to the following recommendations. They are divided in recommendations regarding design, implementation and more personal / individual lessons learnt by the interviewed stakeholders while taking part in the projects studied.

4.1 Project design

The initial ideas for a project often originate in a foreign institute or funding organization. It is important to involve local stakeholders early in the development stage of the project: in validation of the original project idea, in design and in writing or validation of the project proposal. Local culture and local technological development play a role in design and approach. Local persons involved in project design should not be involved in political activities or organizations to avoid the project becoming linked to, or a vehicle of a political party or person.

The design of aquaculture projects should be based on the needs of local stakeholders and on ideas of persons who know the sector well, not on the pre-conceived ideas of foreign project designers or funders. New projects should build on results and achievements of earlier projects and programs aimed at aquaculture development, and align their activities with activities of on-going aquaculture sector development projects and programs.

Project goals should be well defined and clear. Indicators and measurable targets (milestones) to be achieved during and at the end of the project should be defined and monitored. Also, a clear financial and reporting structure, and internal and external communication strategy are important. The project design should allow flexibility and leave room for adjustments. When the (local) circumstances change, this may lead to adjustments of the approach, methods or targets. Adaptive management as well as a monitoring and evaluation component that suits the project objectives are thus recommended in project design.

In many African countries the aquaculture sector is in an early stage of development (see also Chapter 1. Background). It appears that sector development or transformation is generally not achieved within the life span of a project (i.e. four years). A longer period is needed to achieve this, and this should be considered when projects are designed, and project objectives and targets are formulated.

Agricultural development projects that target the development of more sectors than only aquaculture should allocate sufficient funds to the aquaculture sector. Especially when the sector is in a very early stage of development, more time is needed to investigate who should be involved, in which region to focus and what activities are needed and useful to start with. More established sectors tend to be faster with identification of partners, beneficiaries and activities and may absorb most funds unless aquaculture's part of the total project budget has been well secured.

As in other sectors, equal involvement of women and youth in aquaculture project activities does not come automatically and needs special attention already in project design.

Design of projects with both public and private funding (Public Private Partnerships)
A preparatory phase in which the roles, exact nature of activities and outputs are clarified is an important factor for success for all projects. However, the preparatory phase for PPPs may need more attention and time, due to the important role for private companies. During preparation new markets and new business environments need to be explored. Foreign companies want to meet with potential local partners and stakeholders to share and mature the initial project idea. Funding for a preparatory phase is often in the form of seed money or private money of project initiators, or from a foreign institution or embassy. Organizing a matchmaking event where foreign and local partners finalize the project idea and make initial

engagements together, to be followed by drafting a joint project proposal could be suitable preparation. Such engagements could be extended to discussing the roles and responsibilities, such as project- and local coordination, the financial contributions and the lines of communication.

The project idea should be further consolidated and documented with exploratory fact-finding missions and preliminary feasibility or market studies that explore existing business opportunities, political climate, financial aspects, general infrastructure, human resources (labor, education, expertise), knowledge institutes, capacity of potential local partners (experience, expertise, equipment), etc.

The sustainability of what is initiated or built by the planned project should be considered in the design stage. The ecological and social carrying capacity of the region or ecosystem where aquaculture development is taking place should be assessed and considered. This is especially the case for cage culture development in lakes and reservoirs.

Design of public funded projects
In contrast with PPPs in which there is a prerequisite financial and/or in-kind contribution requested from partners, projects that are solely funded by the government or donor are often designed following a development cooperation program, with limited involvement of local stakeholders in the design of the project. Local partners are interested in participating for the duration of the project. The selection of partners and their accountability should be well screened in advance by the funder. This process should be given sufficient time.

4.2 Project implementation

For a good start of the project a kick-off meeting where all partners are present is important. In this meeting the project activities, the timeline and the expected outputs are highlighted.

Trust among partners in a multi-stakeholder project can be built by joint information and data collection and sharing, especially in the starting phase.

Good coordination of the project is a crucial component for success. The best results will be obtained when coordination is in the hands of an experienced, well-organised project partner. In case the coordination is the responsibility of a foreign-based organisation, the involvement of a good local partner in charge of local coordination, logistics and communication with parties on the ground is important. Easy accessibility of the project management is also an important factor. Frequent rotation of staff involved in implementation can lead to delayed outputs.

Administrative and financial procedures of African academic or government institutions tend to be complicated and slow, especially when financial transactions (payments by or to foreign entities) are concerned. Therefore, the procurement of equipment is often the responsibility of the foreign project partner. Still, custom regulations can lead to delay of the equipment delivery once it has reached the country of destination. In addition, purchase of equipment was in some cases tied to the country that provided project funding, and this limited choice may not have been the cheapest nor the best that was available on the international market or most suited equipment for the local sector. Sufficient spare parts should also be made available when foreign equipment is purchased. African partners would therefore prefer a free choice regarding equipment purchase.

A survey or assessment of training needs of the target audience, and distinction of various groups within the target audience in advance of the training event is recommended. Trainings should take place in a language that is understood by the trainees. Training content should match with the time available and with absorbing capacity of the trainees. The training approach should be tailored to the target audience; trainees with only limited formal education will learn best from hands-on, practical trainings in a setting like their own farm. More theoretical subjects can be treated in training events for trainees with more years of formal education. Producers who were trained on the basics of aquaculture in earlier programs may wish advanced training to develop further their skills and business. Model farmers may need support to achieve up-scaling or for

development of the next step in the aquaculture value chain. Persons interested to start a (commercial) fish farm will benefit much from assistance by an experienced consultant in the starting phase (farm design, farm construction, start of operations).

To obtain skilful and confident farmers and farm managers it is better to train a smaller group intensively than to train many (future) farmers superficially.

The impacts of training given should be evaluated by the project, to learn what trainees indeed apply on their farm from what was taught.

Exposure visits to foreign countries should preferably be to countries and farms operating in similar conditions as found in the country where the project takes place.

Assumptions and estimates regarding the demand for fish should be carefully assessed at the starting phase. Cost price of farmed fish in relation to price and availability of other animal protein alternatives should be taken into consideration.

Affordable and good quality fish feed proves to be an important issue and challenge in many African regions. Fish farmers are reported to have stopped due to high fish feed prices. Having experience with projects that offered free or heavily subsidized fish feed may contribute to such behaviour. Exploration and production of locally produced and affordable fish feed (ingredients) seems useful and applicable in many regions.

Projects should preferably work along the whole aquaculture food system. When available resources do not allow such an approach on a national scale, projects should carefully assess the effect of planned activities on other elements of the aquaculture food system, avoiding or mitigating expected negative effects.

To enhance aquaculture production, processing, trade and distribution (the activities of aquaculture value chain operators), projects should engage with private actors who have shown their interest, preferably by previous investments of own resources, to ensure the continuity after project closure. To enhance the provision of aquaculture inputs and services to value chain operators (the activities of value chain supporters) projects should as much as possible engage with private actors who are already supporting the sector or who plan to take on such a role. Sufficient time should be taken to find and select private investors interested to become involved in aquaculture development. To avoid unfair competition with private value chain actors or supporters and to allow a sustainable, private sector-based sector development, value chain enablers (public parties) should be reluctant to take on the role of value chain operator or value chain supporter, and projects should carefully assess the consequences of supporting such a role of public entities.

On project management
Good and frequent communication between project partners, especially between partners who are based in different countries, is crucial. The same for communication between project coordinators and the funding organisation. Clarity on the roles of various partners is crucial. It should be clear who initiates and leads certain activities.

For projects that include a research component it is crucial that results of research and trials are shared with producers, more so with producers who were involved in the trials, in an early stage. Private parties may own research data that could help advance the sector much faster but may be reluctant to shares uch information. In case of sensitive information and data, a confidential sharing agreement can be used.

A project leader should be flexible, open and not focussed on controlling when (s)he is expected to apply adaptive project management. The project coordinator should be able to oversee what people and processes on all levels and phases of the project need, and take proper action addressing the needs.

A strong Monitoring and Evaluation component is key to be able to apply adaptive management.

At the end of the implementation period projects should report and share widely (especially in the donor and development organisation community) what has been achieved. This will make it possible for subsequent projects to build on earlier achievements and results; the risk of duplication is thus reduced.

4.3 Personal lessons learnt by interviewees

Apart from insights gained and lessons learnt that relate to design and implementation of projects, the interviewees also shared lessons they had learnt as a person or that had made them reflect on the role they had played, (or could play again in the future). Some of those more personal lessons and insights are listed here.

Lessons learnt by foreign project partners (funding agency, coordinators and researchers)
A Netherlands based researcher became aware of the working difficulties of his African peers to access information, rapid internet connection, international network and to work in sub-equipped laboratories. Nevertheless, engaged local researchers open doors when working with them in the field. They have a local network and can ease connections with public and private sector with respect to local culture. Joint research by local and foreign researchers and regular exchange of up-to-date information is recommended when field research work is involved in the project.

Farmers have extensive knowledge to share from their experiences. Working with them requires having a listening ear and to use exchanges and doing things together, rather than academically teaching them. Hands-on use manuals and equipment protocols should be translated in the stakeholder's language, since most small and medium scale fish farmers do not master the English language.

For projects that intend to make a direct impact on the livelihood and income of poor local communities (informal sector), a research with impact can be achieved with relatively small budgets when one understands well how the informal sector works and when the major bottlenecks for persons in the informal sector (lack of capital) is directly addressed.

For project success, a core of committed local people involved in project implementation is key. One also must learn to deal with local cultural aspects (i.e., more hierarchical systems and bureaucracy in African institutes).

A funding agency staff member learnt that smallholders can also be assisted indirectly, by assisting larger enterprises in the first phase with improving production and supply of necessary inputs (i.e. feed, fingerlings).

Lessons learnt by African project partners
In areas/countries that do not have a functioning commercial aquaculture enterprises, having a functional farm that can serve as an example is crucial for attraction of investors.

"I strongly support that projects work with private model farmers. For assisting small-scale producers, the concept of AquaFarms (= group of owners of ponds that are close together and share certain services and facilities) should be considered".

It is important to realize that stakeholders in a project partnership have different interests and move at different paces. Private partners that have been involved (often) in earlier projects may reach a stage of project burn-out (= reduced interest in further engagement).

Just producing and selling products such as fingerlings is not enough: buyers need to be given additional information and/or training about proper stocking density in their facility and often also about other basic farm operations. This can avoid that possible disappointing harvest resulting from sub-optimal stocking density and farm management is blamed on the fingerling producer or on the feed.

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Appendix 1 Descriptions of projects that were reviewed

1. Capacity building to deliver competent human resources in IWRM and aquaculture of equitable and sustainable livelihoods in Kenya's Arid and Semi-arid Lands and beyond (Abbreviated in this report to Integrated Water Management SEKU)

Basic data

Project period:	2012 – 2016
Organisation coordinating the project:	Q-point (Netherlands)
Location:	Kitui, Kenya
Main partner and beneficiary:	South Eastern Kenya University (SEKU)
Other project partners:	Ghent University (Belgium), Technical University Delft (Netherlands), Sustainable Aquaculture Solutions SAS (Netherlands) and Egerton University (Kenya)
Funding:	NUFFIC – NICHE program (Netherlands Initiative for Capacity development in Higher Education)
Total Budget:	EUR 1,300,000

Objectives

The main objective of the project "Capacity Building to deliver competent human resources in IWRM and aquaculture of equitable and sustainable livelihoods in Kenya's Arid and Semi-arid Lands and beyond" (to be shortened to IWRM-SEKU) is building the capacity of SEKU to fulfill its mission, which is "To provide quality education through teaching, research and extension, innovation and entrepreneurship with emphasis on dryland agriculture, natural resources, water and environmental management." In the year the project started, SEKU had 300 staff members and 2000 students.

Activities and outputs

A great number of activities were undertaken as part of the project:

1. SEKU staff members were trained in workshops and short trainings about:
   - Leadership and Strategic Planning (University Management Board, Deans, CODs, Directors)
   - Pedagogy
   - Research Skills (Directorate of Research, Technology and Innovations)
   - Extension
   - Quality Assurance and Performance Monitoring and Evaluation (With Directorate of QMS and PC)
   - Value Chain Analysis in Aquaculture and Dairy (Egerton, Bukura, Ehiopia)
   - Hydrological Measurements (SEKU)
   - Aquaculture Practicals (SEKU)
   - Hydrological modeling (by Delft University, the Netherlands)
   - Gender mainstreaming ((by Q-Point)
2. Development of short courses on Aquaculture (5) and short training programs on Hydrology and IWRM (5)
3. Postgraduate Scholarships for SEKU staff members (7 MSC, 1 PhD)
4. Review and Updating of existing academic programmes:
   - PhD –Integrated Water Resources Management
   - MSc-Integrated Water Resources Management
   - MSc -Aquaculture
   - BSc - Hydrology and Water Resources Management
   - BSc - Aquatic Science

5. Gender mainstreaming: 3 workshops (for various SEKU staff), formulation of SEKU Gender; mainstreaming policy (approved by university senate); sensitization of staff and students on gender)
6. Hardware support:
    a. Establishment of computer lab with 47 laptop computers, desk, chairs
    b. Office and teaching equipment (laptop and desktop computers, printers, copy machines, projectors)
    c. Laboratory equipment (Spectrophotometer, Current meters (Doppler), Sediment Sampler (USDH 48), Water sampler, Borehole Dipper, Water quality multimeter (with reagents), Theodolite (with surveying staff and stand), Soil analysis sieves, Automatic Weather station, Recirculatory Aquaculture System, Aquaria, Fish ponds (raised and ordinary), Microscopes, Proximate analysis kits. Water Harvesting: 5 Water tanks (3 tanks x 10,000 litres; 2 tanks x 3500 litres), Water supply pipeline to fish ponds)
7. Expanded network to many organisations in Kenya and beyond; Outreach to secondary schools for girls in/near Kitui; Development of Business Plan for the Centre of Excellence in IWRM and Aquaculture.

Sources of information:

- NUFFIC Tender document for this project NICHE/KEN/158
- Nuffic Call for subsidy tenders for project NICHE/KEN/158
- Project Website: Aquaculture and integrated water resource management (IWRM) - Q-Point (q-point-bv.nl)
- Project Newsletter 3 (found on project website)
- Project newsletter 4 (found on project website)
- Interviews with 3 stakeholders
- Questionnaire for African knowledge institute representative completed in writing by one project stakeholder

2. Kenya Market-led Aquaculture Programme KMAP

Basic data

Project period:	2016 – 2019
Organisation coordinating the project:	Farm Africa
Location:	10 counties in West and 4 counties in Central Kenya
Partners:	Netherlands Senior Experts (PUM; Netherlands), BoP Innovation Center (Netherlands), Larive International BV (Netherlands, with its partner Food Tech Africa (FTA), World Fish Center (WFC; global) and Wageningen Centre for Development Innovation (WUR WCDI; Netherlands)
Funding:	Embassy of the Kingdom of the Netherlands
Total Budget:	Eur 4 million

Project objectives

To work directly with farmers, aquaculture inputs suppliers and traders to raise pond production by applying improved practices and introducing new technologies, commercialize farmers' fish production, strengthen market systems and the policy environment so as to help farmers turn their ponds into thriving businesses. These objectives are achieved through implementation of strategic interventions in production, marketing and policy. KMAP aims to contribute to the development of a sustainable aquaculture industry in Kenya by raising production levels to the tipping point needed for feed manufacturing to be commercially viable and to close the consumption gap.

KMAP built upon the lessons learnt from other aquaculture development projects. First: the Economic Stimulus Program ESP that was carried out by the Government of Kenya with the objective to promote fish farming. To this end, between 2009 and 2012 an estimated 48,000 fishponds were dug across the country. In addition, owners of the new ponds were provided with free feed and fingerlings for a first culture cycle. Small farmers that owned and operated 3 fishponds or more were an important group to which KMAP focused its activities. It was believed that having expanded from one to three ponds showed that the owner had maintained interest in fish farming as a possible commercial activity even after free supply of inputs had

ended. For women fish farmers, the criterion of operating three ponds or more was lowered to one active pond.

Second: KMAP also bult on a program in which 38 aqua-shops were established in five counties of Western Kenya. AquaShops are private shops run by trained owners who besides fish farm inputs also provide advice and technical assistance to fish farmers. This program included the training of AquaShop owners and of 35 youth who have been working as AquaShop agents to market the Aqua Shop products and services, while providing basic technical support, on a commission basis. The AquaShops project was also implemented by Farm Africa in 2011 - 2015.

Activities and outputs:

1. Baseline studies**:** Mapping of feed and fingerling producers; Capacity and needs assessments of the four key associations representing the private sector and fish farming entrepreneurs; Market study on current fish markets, producers and products (by Lattice). Environmental impact assessment (EIA) to assess actual and potential effects of fish farming on the eco-system of the target region; Value chain analysis of cultured fish to identify constraints and refine interventions; Gender analysis to assess gender-based value chain constraints and design a gender mainstreaming approach to ensure optimum participation of women, men and young people.
2. Provided training on technical aspects of aquaculture and on market engagement for 578 fish farmers to improve farmers' technical expertise and links to markets. Staff from public institutions, private companies and NGOs were hired as trainers. (June 2016 - September 2017).
3. Trained 16 young persons to become aquaculture agents (private consultants working in aquaculture extension and providing follow-up assistance to fish farmers who were trained by KMAP and to others).
4. Provided extension support to 1072 fish farmers (April 2016 - September 2017).
5. Reached 5020 fish farmers through trade shows, e-learning platforms and peer-to-peer learning.
6. Conducted research to test performance of 3 different strains of Nile tilapia with 3 different feeds in high and low altitude conditions.
7. Attempts to influence policies affecting aquaculture producers (import tax on farm imports; import of cheap consumption fish from Asia.
8. Support to national round table meeting of aquaculture stakeholders.
9. Testing of in-pond Recirculating Aquaculture System.
10. Lessons from KMAP project were recorded and shared by means of publishing the book 'Guide to profitable fish farming'.

Sources of information

- Project website: Kenya Market-led Aquaculture Program (farmafrica.org)
- Farm Africa Project Proposal: Kenya Market-led Aquaculture Programme (KMAP) (public version)
- Farm Africa briefs about Kenya Market-led Aquaculture Programme (KMAP); AquaShops
- Interviews with 11 project stakeholders

3. 3R Kenya – from aid to trade

Basic information

Project period:	2016 – 2020
Organisation leading the project:	Wageningen University and Research – WCDI
Project Partners:	African Centre for Technology Studies (ACTS; Kenya), TradeCare (Kenya), Egerton University (Kenya), Jomo Kenyatta University of Agriculture and Technology JKUAT (Kenya)
Funding:	Embassy of the Netherlands in Kenya (EKN)
Budget:	Approx. € 620,000 (for only aquaculture component. Rough estimate)

Objectives of the project

The objective of 3R Kenya was to draw lessons from the Netherlands Embassy's program in Agriculture and Food and Nutrition Security (FNS) projects in the sectors dairy, horticulture and aquaculture. This was done

with the goal of contributing to robust, reliable and resilient agri-food sectors in Kenya that are competitive and attractive to investors. These lessons learnt were thought to be of help to the Netherlands Embassy to make the change in its engagement in Kenya from bilateral development aid to sustainable trade and investment. This change was planned to take place in 2021. 3R stands for Resilient, Robust and Reliable.

Activities and outputs:
The activities of the 3R Kenya project that related to the aquaculture sector were the following:

a. Studies: - quick scan of Kenyan aquaculture sector. Report title ' From aid to trade: driving competitive aquaculture sector development in Kenya':
   - Comparing Kenya's aquaculture sector development with development in Egypt, Nigeria and Ghana. Report title: 'A comparative study of aquaculture sector development in Egypt, Nigeria and Ghana: Insights for Kenya's sustainable domestic sector development'.
   - Enabling factors for sector commercialization. Report title: 'Exploring enabling factors for commercializing the aquaculture sector in Kenya'.
   - Report title: 'Meta analysis of 3R Kenya findings about the transformation of the aquaculture, dairy and horticulture sectors'.

   From the studies also a number of Study Briefs were published.
b. Organizing and supporting national aquaculture stakeholder meetings (aquaculture round tables). These meetings had been started by the KMAP project but as KMAP was coming to a close, 3R continued the support to three round table meetings.
c. Video documentaries about pond aquaculture and about cage aquaculture.

Sources of information:
- Project website 3R Kenya Project – The 3R (robust, reliable resilient)- (3r-kenya.org)
- Interviews with 7 stakeholders of the project

4. Food Tech Africa

Basic information

Project period:	2013 - 2020
Main executing organisation:	Larive International (Netherlands)
Project partners:	Holland Aqua (Netherlands), ViQon (Netherlands), Fishion (Netherlands), Skretting (Netherlands), Almex (Netherlands), Wageningen University & Reseach (Netherlands), Ottevanger (Netherlands), TilAqua (Netherlands), Genap (Netherlands), Unga (Kenya), Dinnissen (Netherlands), Lattice Consulting (Kenya), Kamuthanga Fish farm (Kenya), KMFRI (Kenya), Roost Ltd. (Kenya) and several other Kenyan private partners & institutes.
Funding:	Netherlands Government's Sustainable Entrepreneurship and Food Security Facility (FDOV).
Budget:	Eur 3.919 million from FDOV plus EUR 3.919 million contribution from project partners

Objectives of the project
The objective of FoodTechAfrica was to demonstrate the effectiveness and efficiency of a fully integrated aquaculture value chain in East Africa. Through this the project aimed to contribute to the development of local capacity of supply chain partners and to achieve a positive spin-off in terms of increased production; increased productivity; improved infrastructure; improved technical capacity; more efficient markets; and enhanced local entrepreneurship.

Activities and outputs:
During the initial project period (2015-2018) and extension (2018 – 2021) FoodTechAfrica has undertaken the following activities:

a. At the initial stage, FTA implemented a number of studies/research projects on various aspects of aquaculture development in East Africa. Report titles:

- Survey on fish consumption in Kenya.
- Fish market analysis in Kenya: Nairobi, Kiambu and Machakos area.
- Aquaculture marketing and sales analysis in east Africa.
- SMS survey on fish consumption and preferences in Kenya carried out for FTA.
- Food safety and quality protocols for Kenyan fish farming and processing activities.
- Farm design for the Roost Ltd.
- Technical due diligence – feed production Uganda.
- Production and system optimization for Kenya.

b. Support to fish feed production in Kenya. A fish feed production facility was established at Unga Holding Limited, a Kenyan animal feed producer. Ottevanger provided the equipment and Skretting brought in its experience and knowledge. Unga staff was trained at Skretting Egypt. Fish feed production by Unga Holdings increased from near zero in 2017 to 1560 metric tons in 2019. The company uses local ingredients as much as possible and has reduced the use of fish meal to near zero over the years. The production for 2020 was estimated at 2310 metric tons but may have been lower due to Corona and the measures to contain the pandemic.
c. Support to fingerling production. The company Kamuthanga was provided with funds and technical assistance to build a Recirculating Aquaculture System Ras for its hatchery. Tilapia broodstock including YY males were provided the Dutch company TilAqua. This enabled Kamuthanga to produce male fingerlings without application of hormones. The farm produced 3.6 million fingerlings in 2019 – 2020.
d. Support to market-size fish production. An in-pond RAS system was installed in a 50 m^3 grow-out tank. This led to annual production of 56 tons in 2019, an increase of 24% compared to 2017. The limited water supply at the farm site prevented further expansion of the production.
e. Capacity building at vocational level. Staff and farmers were trained on-the-job at Unga Holdings and at Kamuthanga fish farm. Of these, 635 persons received a 1 day introduction course, and 59 persons received a certificate after attending a basic, advanced or expert level training. The experience and training material developed were used to set up the African Aquaculture Academy, a private vocational training initiative hosted by ACTS, Kamuthanga (pond and RAS culture) and Jewlet Fish Farm (cage culture).

Sources of information:
- Project website FoodTechAfrica | Sustainable aquaculture projects for East Africa
- FoodTechAfrica Monitoring 2018-2020 Monitoring end-term review report
- Interviews with 7 stakeholders

5. Agribusiness Support Facility (ABSF) for the Addis Ababa Chamber of Commerce and Sectoral Associations (AACCSA)

Project characteristics

Project period:	2013 – 2016
Main executing organisation:	WCDI -WUR, Addis Ababa Chamber of Commerce and Sectoral Associations (AACCSA: Ethiopia)
Partners:	Advance Consulting (Netherlands); Netherlands African Business Council (NL)
Funding:	Netherlands Embassy, Addis Ababa
Project budget:	difficult to distinguish aquaculture budget from budget for activities for other sectors

Objectives of the project

The Agribusiness Support Facility (based within the Addis Ababa Chamber of Commerce) had the task to promote agribusiness opportunities in Ethiopia to investors foremost from the Netherlands but also in the EU. ABS provided hands-on business support services and information, undertook research and settled disputes. ABSF aimed to achieve:
- Increased foreign direct investment in Ethiopia's agribusiness sector;
- Increased number of new domestic companies in the agribusiness sector;
- Increased trade between Ethiopia and high-value markets.

Average fish consumption in Ethiopia is low, estimated at less than 1 kg/person/year. However, communities living near rivers and lakes consume significantly more fish than this average. Aquaculture was one of the focus areas of ABSF. At the onset of the project, the aquaculture sector of Ethiopia was considered as insignificant, with an annual production of 15 to 25 tonnes/year, all produced by small-scale subsistence farmers. One of the objectives of ABSF was support to development of commercial aquaculture enterprises.

Activities and outputs:

a. ABSF has commissioned studies on the Ethiopian aquaculture sector. Report titles:
   - Investment opportunities in Ethiopia: Aquaculture sub -sector.
   - Tilapia aquaculture business model of Ethiopia: feasibility study.
b. ABSF organised 8 platform meetings of Ethiopian aquaculture stakeholders. As result of the discussions in these meeting the Ethiopian Aquaculture Association EAA was established in 2015. See Ethiopian Agriculture Association (EAA) (aquacultureassociation.org). After the closure of ABSF Ethiopia the organization of these platform meetings as well as other activities undertaken by ABSF were taken over by the Ethiopia-Netherlands Trade for Agricultural Growth project (ENTAG).
c. ABSF organized missions by Ethiopians to aquaculture companies and organisations in the Netherlands, and a mission of Dutch companies working in aquaculture to Ethiopia.
d. Managed an innovation fund that financially supported some start-up aquaculture activities proposed by (young) individuals and private enterprises, such as demonstration of cage culture in Lake Tana, support for a fishermen cooperative that wanted to try aquaculture, extruded fish feed production equipment by Alemna Koudijs, support to the company Africa Sustainable Aquaculture ASA.

Sources of information.

- Project website https://www.wur.nl/en/project/aaccsa_ethiopia.htm
- Proceedings of Aquaculture platform meetings
- Interviews with 2 stakeholders

Appendix 2 Aquaculture stakeholder categories

(Based on 'Agribusiness is a team sport: introducing stakeholder groups' by Ted Schrader (WCDI, Wageningen University and Research, 2021).

In any agribusiness system, there are many more actors and stakeholders. The figure below gives an idea of the many players that are active in the agricultural and aquaculture sector.

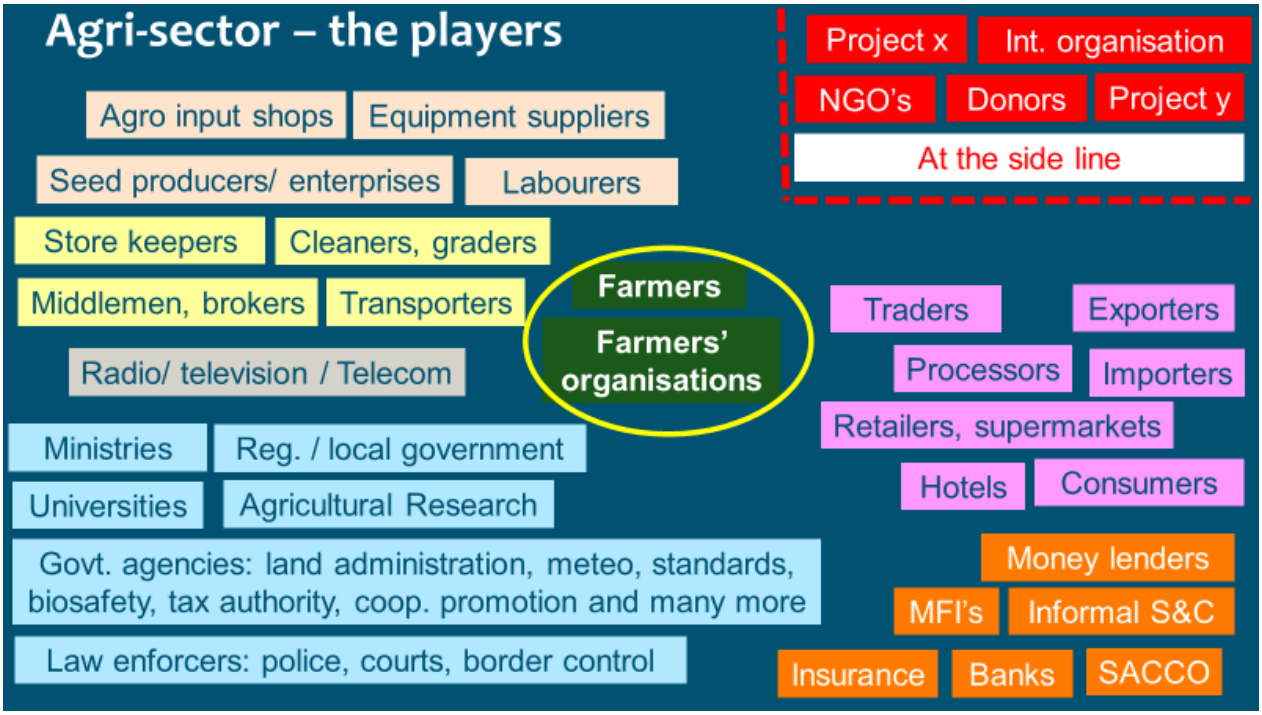

Figure 1 *Actors in agriculture & aquaculture sector.*

Four major stakeholder categories can be distinguished:

1. Value chain operators

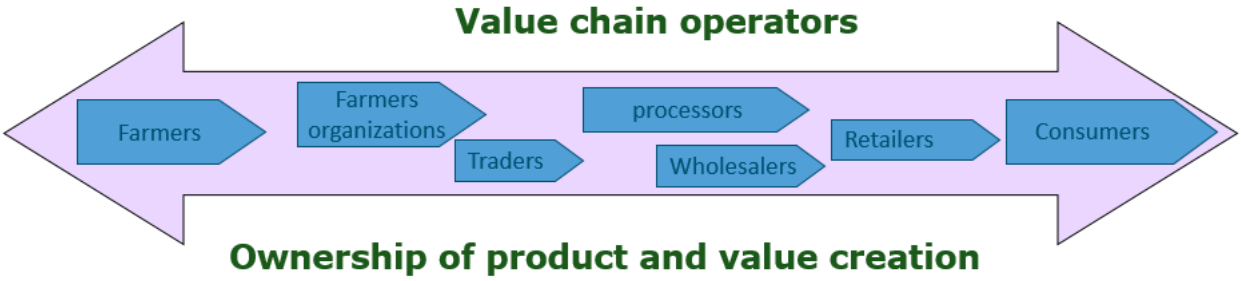

Figure 2 *Value chain operators.*

Value chain operators have in common that they all own the product / commodity at a certain moment and often add value before they sell the product to the next operator in the chain.

2. Value chain supporters

Value chain supporters provide support services to value chain operators, who pay for it. We call these business-to-business (B2B) services. Chain supporters are **private companies or persons** who have a stake in the value chain, but, contrary to value chain operators, they do not own the product.

The following private sector actors are supporters: labourers, agro-input providers and seed companies, financial services (Banks, MFIs, SACCO's, informal money lenders), middlemen and brokers, transporters, storekeepers, equipment suppliers, electricity and water suppliers, agribusiness support services and any other provider of services. To put this group in Figure 3:

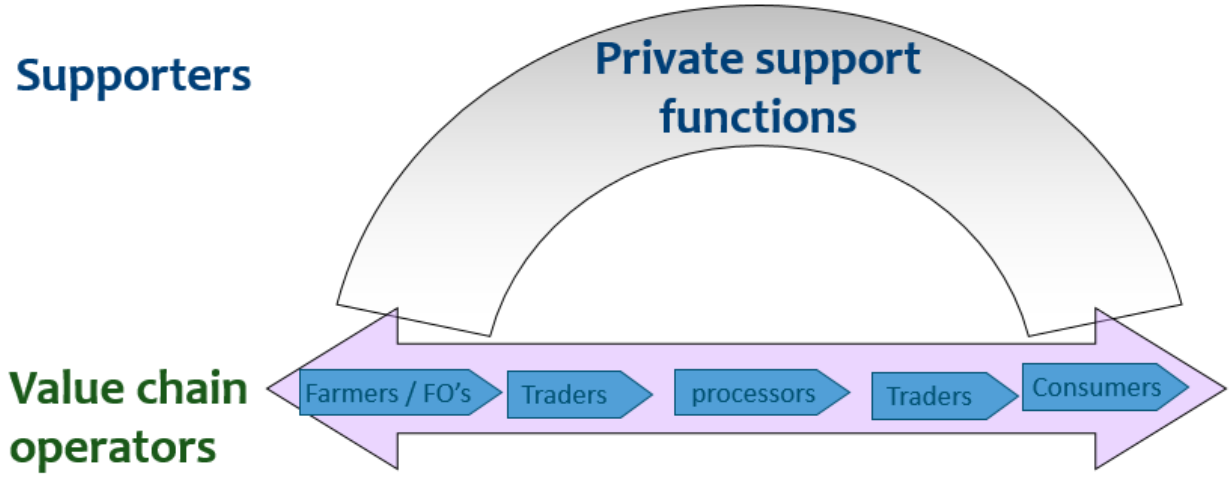

Figure 3 *Value chain supporters.*

3. Enablers

Enablers define and control the policy environment and/or create conditions for private sector players to develop their business. Value chain enablers are **public sector organizations** and include government structures at different levels and all kinds of public services. The following actors are enablers: Ministries, regional/district authorities, local administrative offices, government agencies (extension service, cooperative promotion, trade office, bureau of standards, …), law enforcement (police, courts, border control), tax revenue authority and others. Publicly funded research institutes and universities are also in the category of enablers. They can provide information and knowledge, do research to solve certain problems experienced in the value chain, connect By putting a second half-moon, the enablers can be added to Figure 4:

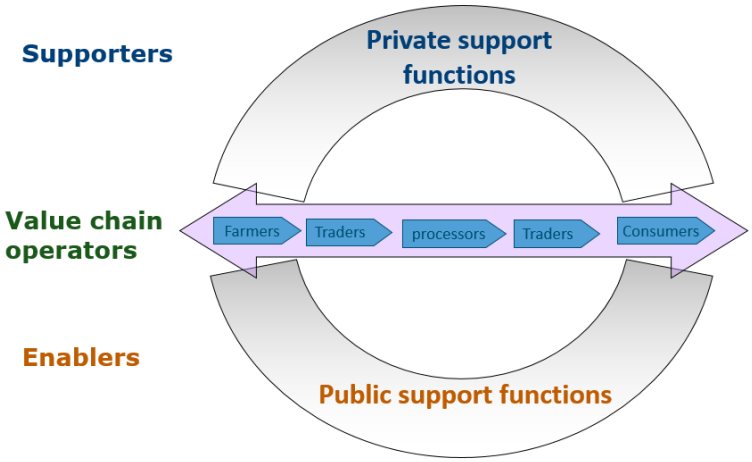

Figure 4 *Value chain enablers.*

The actors of the aquaculture market system can be identified with the following figure:

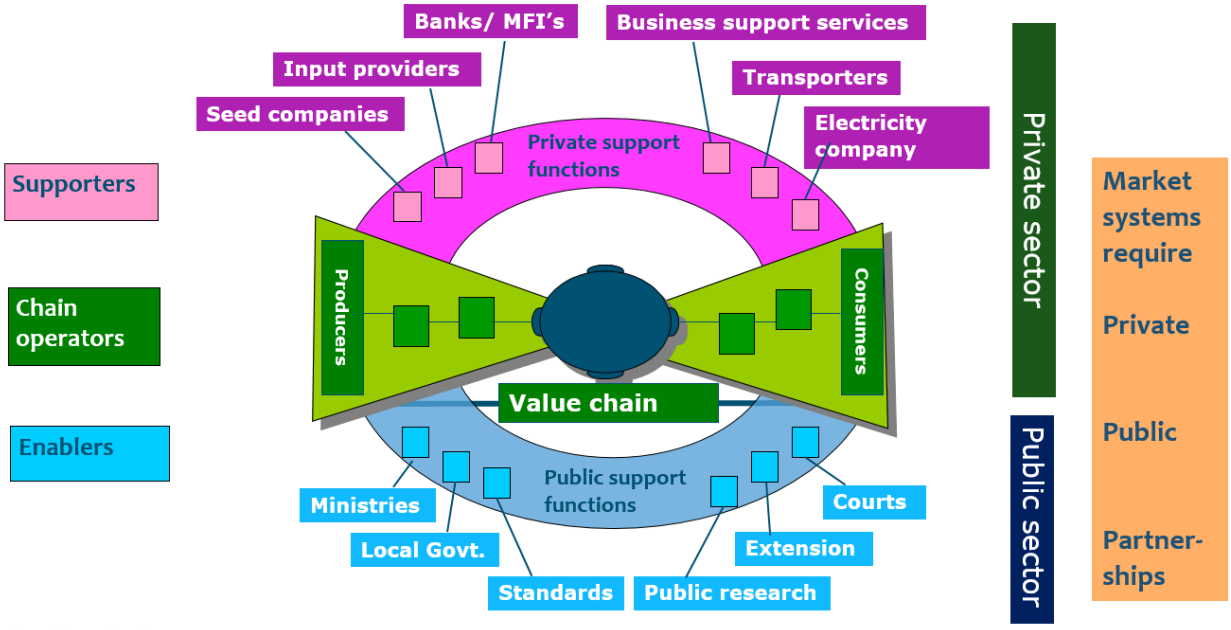

Figure 5 *Overview of actors in the aquaculture market system.*

4. Externally funded facilitators

In many countries, donor-funded development projects and programs, international development organizations, donor-supported international and national NGO's provide significant technical and/or financial support. These externally funded facilitators, who have in common that their activities are based on funds that are not generated in the national economy, should also be added.

We propose to visualize them as standing at the side-line, like the trainer of a football or rugby team. This makes it clear that donors, projects and NGO's are temporarily there and are bound to go – they are not there to stay.

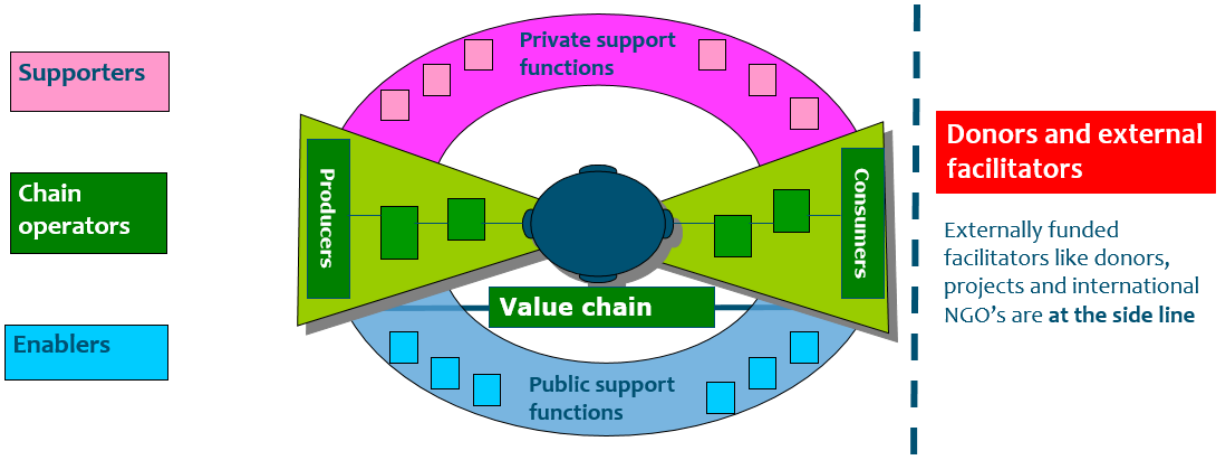

Figure 6 *Agricultural market chain actors and external funded facilitators.*

Putting 'external facilitators' at the side-line does not imply that they are not important. On the contrary, they can: provide important training and information services; bring stakeholders together; facilitate market linkages; support strategy development; accelerate innovations; create production, marketing or processing facilities, support scaling and institutionalization.

5. Aquaculture stakeholders in foreign-funded projects

In the aquaculture projects that were studied in the framework of FAO/FECCC/FFRC/WUR TrC Project the following major stakeholder groups were distinguished:

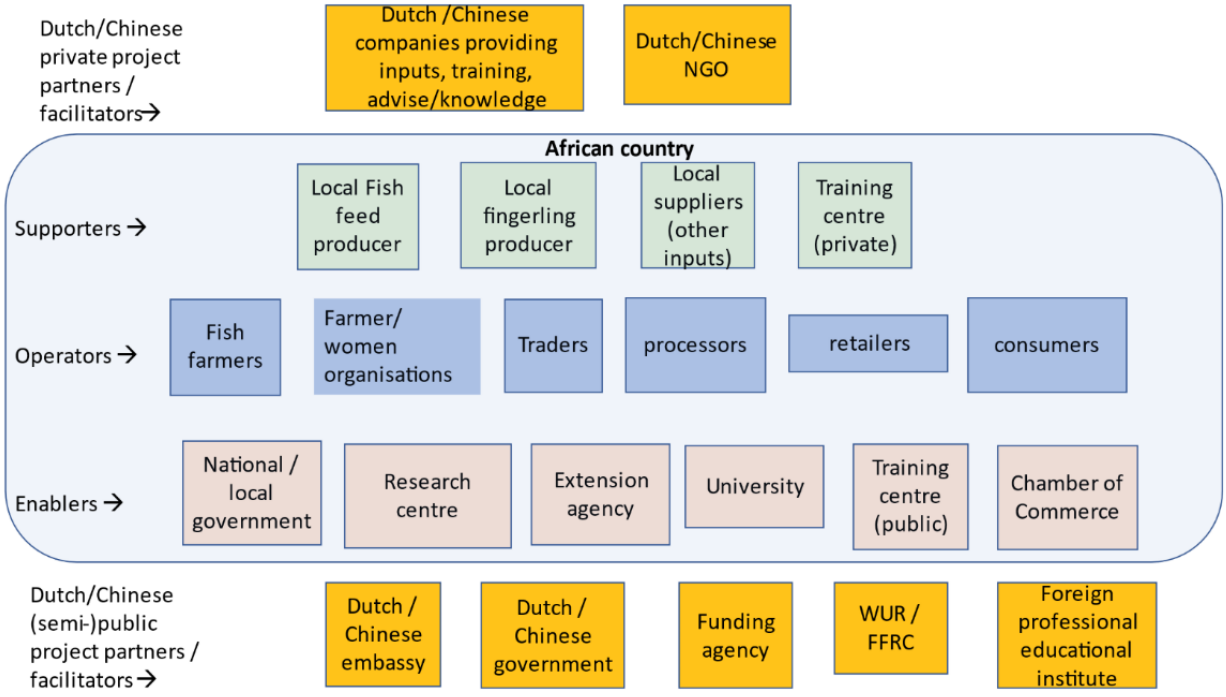

Figure 7 *Overview of stakeholders in NL / China supported aquaculture projects in Africa.*

Note: Stakeholder groups in the large light-blue rectangle are mostly located in African country. Groups mentioned in orange boxes are mostly based in the Netherlands/China, but may also be based in the African country where the project takes place or may have staff members based (temporarily) in the African country.

Appendix 3 Selection of questionnaires used in this study

Separate questionnaires were developed for 8 categories of stakeholders. Here we just add a selection from these 8 questionnaires.

A) Questions for the main African project implementor

Before the interviews secondary information about project has been studied.

Before each interview make agreements on confidentiality, recording of the interview with interviewee.

1. Name, function of person interviewed
2. Name of organisation
3. Location / address of office, updated contact details
4. Was your organisation involved in design and project proposal writing?
5. What roles did your organisation have in project implementation?
6. What role did you personally have in project implementation?
7. Could you describe or list the main activities that were executed by the project?
8. How was the project organised? How do partners plan, decide, communicate, implement, monitor, are being held accountable?
9. How would you score the execution of these activities? (Score 1 – 5: 1 = poor and 5 = excellent)

Activity	Score
Activity 1	
Activity 2	
Activity 3	
Activity 4	
Activity 5	

10. How would you score the impact the activities had on different stakeholder (target) groups? (score 1-5 for impact on each stakeholder group

	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5
Stakeholder 1					
Stakeholder 2					
Stakeholder 3					

11. What were clear and lasting successes in terms of impact of this project and what were the factors that made it possible to achieve this?
12. What aspects or elements of the project did not go as well as hoped for?

13. What lessons did you or your organisation draw from the experiences with this project?
    a. Lessons related to project design and organisation
    b. Lessons related to implementation
    c. Lessons related to partners
    d. Other lessons (budget, communication, etc.)

Or: How do you think could the effect / impact be improved if a similar project (activity) came along? Next time, what should be done differently and how?

14. Any other comments you would like to give? (any other remark in relation to the project, the role of the company, etc.)

B) Questions for European/Dutch private company representative

Before the interviews secondary information about the project has been studied.

Before each interview make agreements on confidentiality and recording of the interview with interviewee.

1. Name, function of person interviewed, updated contact details
2. Name of company interviewee is connected to (or was connected to during project implementation)
3. Location / address of office
4. Please describe in what way was your company is / was involved in project X
5. Was your company one of the organisations that wrote the project proposal (or took part in design of the project)?
6. Were other staff members of your company also involved in project X? If yes, describe what their role was and in what activities they took part
7. What role(s) did you personally have in the project?
8. Please describe the project's activities that you took part in (when, where, what, how often)
9. What can you say about how these activities went? (score 1 to 5; (score 1 to 5: 1 poor; 5 = very good)

Activity	Score
Activity 1	
Activity 2	
Activity 3	
Activity 4	
Activity 5	

10. What was the impact/effect of the activities your organisation was involved in on the stakeholders in Kenya? (distinguish between main stakeholders, possibly with score 1-5)

	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5
Stakeholder 1					
Stakeholder 2					
Stakeholder 3					
Stakeholder 4					

11. What can you say about how these activities went? (score 1 to 5)
12. What was the impact/effect of the activities your organisation was involved in on the stakeholders in Africa (in country X)? (distinguish between main stakeholders, possibly with score 1-5)
13. What were clear and lasting successes in terms of impact of this project?
14. What aspects or elements of the project did not go as well as hoped for?
15. What lessons did you draw from your experiences with this project?

Or: How do you think could the effect / impact be improved if a similar project (activity) came along? Next time, what should be done differently and how?

16. Any other comments you would like to give? (any other remark in relation to the project, the role of the company, etc.)

C) Questions for fish farmer involved in or reached by project:

Before the interviews secondary information about project has been studied.

Before each interview make agreements on confidentiality, recording of the interview with interviewee.

1. Name farmer, gender, age name of village/ward, number of children
2. Number and size of ponds/tanks owned. How many are in actual operation? (if possible: take pictures)
3. Who is doing day-to-day operations on the fish farm? How much time does farmer or family spend on fish farming per day?
4. Is additional labour hired in peak season or for harvest? If yes, what are the costs?
5. How much fish was harvested in past year? (species and volume harvested from each pond or tank, if possible. Otherwise total harvest (species, volume) of last year)
6. Where and how was the fish sold? Bought by whom? (trader, individual consumer, etc.)
7. What are main problems / challenges experienced in fish farm? (techniques, accessibility of inputs, markets and price for harvested products, support, credit, feed, seed, etc.)
8. In what way were you involved or reached by project X (X = name of project)? (description of link or impact of project on interviewee)
9. When was this? (year, time period, frequency)
10. Was this on your own request or were you approached by others? If approached by others: by whom? (name, function)
11. About implementation: What can you say about how link with the project went? Did it go well? Was it on time? Good quality? How much time or costs were involved? (description of services, material, advise that were delivered)
12. What was the effect on your fish farm? (Description of effects on production, costs, income, workload, environment, etc.)
13. Would you describe the over-all effect as positive, neutral or negative?
14. How do you think could the effect / impact be improved?
15. Any other comments you would like to give? (any other remark in relation to aquaculture and the project)

D) Questions for African knowledge (education /research) institute

Before the interviews secondary information about project has been studied.

Before each interview make agreements on confidentiality, recording of the interview with interviewee.

1. Name, function of person interviewed
2. Name of organisation/institute interviewee is connected to
3. Location / address of office
4. Please describe in what way was your institute is / was involved in project X (name project)
5. Was your institute one of the organisations that wrote the project proposal (or took part in design of the project)?
6. What role(s) did you personally have in the project?
7. Please describe the project's activities that you took part in (when, where, what, how often)
8. What can you say about how these activities went? (score 1 to 5)

Activity	Score
Activity 1	
Activity 2	
Activity 3	
Activity 4	
Activity 5	

9. Were other staff members of your organisation also involved in project X? If yes, describe what their role was and in what activities they took part
10. What was the impact/effect of the activities your organisation was involved in on the stakeholders in the Aquaculture value chain? (distinguish between impact on main stakeholders, possibly with score 1-5)

	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5
Stakeholder 1					
Stakeholder 2					
Stakeholder 3					
Stakeholder 4					

11. What were clear and lasting success of this project?
12. What elements or aspects of the project did not go as well as hoped for?
13. How do you think could the effect / impact be improved if a similar project (activity) came along? Next time, what should be done differently and how?
14. Any other comments you would like to give? (any other remark in relation to the project, the role of the institute, etc.)

E) Questions for Netherlands knowledge (education /research) institute representatives

Before the interviews secondary information about project has been studied.

Before each interview make agreements on confidentiality, recording of the interview with interviewee.

1. Name, function of person interviewed
2. Name of organisation/institute interviewee is connected to
3. Location / address of office
4. Please describe in what way was your institute is / was involved in project X
5. Was your institute one of the organisations that wrote the project proposal (or took part in design of the project)?
6. What role(s) did you personally have in the project?
7. Please describe the project's activities that you took part in (when, where, what, how often)
8. What can you say about how these activities went? (score 1 to 5)
9. Were other staff members of your organisation also involved in project X? If yes, describe what their role was and in what activities they took part
10. What was the impact/effect of the activities your organisation was involved in on the stakeholders in Africa (in country X)? (distinguish between main stakeholders, possibly with score 1-5)
11. What were clear and lasting success of this project?
12. What elements or aspects of the project did not go as well as hoped for?
13. How do you think could the effect / impact be improved if a similar project (activity) came along? Next time, what should be done differently and how?

Or: How do you think could the effect / impact be improved if a similar project (activity) came along? Next time, what should be done differently and how?

14. Any other comments you would like to give? (any other remark in relation to the project, the role of the institute, etc.)

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Report WCDI-23-258

Wageningen Centre for Development Innovation supports value creation by strengthening capacities for sustainable development. As the international expertise and capacity building institute of Wageningen University & Research we bring knowledge into action, with the aim to explore the potential of nature to improve the quality of life. With approximately 30 locations, 7,200 members (6,400 fte) of staff and 13,200 students, Wageningen University & Research is a world leader in its domain. An integral way of working, and cooperation between the exact sciences and the technological and social disciplines are key to its approach.

To explore the potential of nature to improve the quality of life

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The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 7,200 employees (6,400 fte) and 13,200 students and over 150,000 participants to WUR's Life Long Learning, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.