



AFRICAN UNION
**INTERAFRICAN BUREAU
FOR ANIMAL RESOURCES**



Technical Report

CONSULTATIVE WORKSHOPS ON AQUACULTURE BUSINESS MODELS AND EXTENSION SERVICE DELIVERY



Accra, Ghana 24th to 28th July, 2017.

TABLE OF CONTENTS

LIST OF ACRONYMS	IV
1. INTRODUCTION	I
2. OBJECTIVES OF THE WORKSHOP	I
3. THE WORKSHOP	I
4. PRESENTATIONS	2
4.1. Opening Remarks	2
4.2. Background Presentations	2
4.3. Sharing of Experiences	11
4.4. Group Discussions	37
5. OUTCOMES OF THE WORKSHOP	44
5.1. Aquaculture Business Models	44
5.2. Aquaculture Extension Services	45
ANNEXES	47
ANNEX 1: CONCEPT NOTE	47
ANNEX 2: PROGRAM OF THE WORKSHOP	49
ANNEX 3: LIST OF PARTICIPANTS	51
ANNEX 4: TERMS OF REFERENCE FOR GROUP DISCUSSION ON BUSINESS MODELS	57
ANNEX 5: TERMS OF REFERENCE FOR GROUP DISCUSSION ON EXTENSION MODELS	60
ANNEX 6: DISCUSSION GROUPS	64

LIST OF ACRONYMS

AFRM	Africa Fisheries Reform Mechanism
ANDA	National Aquaculture Development Agency
ARAC	African Regional Aquaculture Center
AU-IBAR	African Union Interafrican Bureau of Animal Resources
CAADP	Comprehensive Africa Agriculture Development Program
DRC	Democratic Republic of Congo
ECOWAS	Economic Community of West African States
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organisation of the United Nations
FISHGOV	Fisheries Governance Project
IGAD	Intergovernmental Authority on Development
IKYA	IITA Kalambo Youth Agriprenuers
NAEC	Nigerian Agricultural Enterprise Curriculum
NGO	Non-Governmental Organisation
NIOMR	Nigerian Institute for Oceanography and Marine Research
NPCA	NEPAD Agency
NUC	Nigeria University Commission
PPP	Public Private Partnership
PFRS	Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa
RECS	Regional Economic Communities
SU	Stellenbosch University, South Africa
UNDP	United Nations Development Program
USAID	United States Agency for International Development
USD	United States Dollars

1. INTRODUCTION

The AU-IBAR through the Fisheries Governance Project organized Experts' consultative workshops on Aquaculture Business Models and Extension delivery in Accra, Ghana from 24th to 26th of July, 2017. The workshop was organized with the view to developing guidelines to facilitate the transformation of African aquaculture into a more commercially oriented sub-sector focusing at models for business approaches and the transfer of commercial aquaculture skills to stakeholders with the view to strengthen the capacity of the aquaculture sector industry as a whole to deliver towards the CAADP and PFRS goals and objectives respectively.

2. OBJECTIVES OF THE WORKSHOP

The objectives of the consultative workshop were to identify elements and share experiences that would be used as input to formulate guidelines for developing Aquaculture Business Models and on enhancing aquaculture extension services.

3. THE WORKSHOP

The workshop, that drew both public and private sector participants from the various respective value-chain components, provided a multi-stakeholder forum at which the aquaculture business and extension service delivery opportunities, issues and challenges that affected the commercialization aquaculture on the continent were deliberated upon.

A total of 47 participated in the aquaculture business models and extension workshops. The participants were drawn from the following African Union Member States: Cameroon, Ghana, cote d'Ivoire, Democratic Republic of Congo, Nigeria, Rwanda, south Africa, Tunisia, Uganda, Mauritius, Kenya, Morocco, Malawi, Mali, Sierra Leone, Zambia and Zimbabwe.

Regional Economic Communities (RECs) present were ECOWAS and IGAD. The participants comprised private sector, public sector, research and academia, together with representatives of the AFRM Aquaculture Working Groups.

The deliberations comprised presentations from the respective consultants, facilitators and participants as well as group discussions. Below is a summary of the presentations given, deliberations and outcomes of the workshop:

4. PRESENTATIONS

4.1. Opening Remarks

A joint ceremony at which the business models and extension meeting was closed and the animal feed and aquatic animal seed workshop were opened was held Tuesday 25th July, 2017. The ceremony was officiated by Simplice Nouala on behalf of the Director AU-IBAR and the Honourable Ghananian Minister of Fisheries and Aquaculture Development, Madam Elizabeth Afoley Quaye.

4.2. Background Presentations

4.2.1. Background to Consultative Workshop to Formulate Guidelines for Aquaculture Business and Extension Services – AU-IBAR.

Africa has over the years become a net importer of fish and fish products despite its natural resource potential to produce more fish through aquaculture. FAO (2017) estimates Africa's average annual fish per capita consumption rate was 9 kg that was below the global average of 20 kg.

The potential for Africa's aquaculture stems from:

- i. Natural resource potential notably water, land, climatic conditions, etc.
- ii. Species that include indigenous commercial species with available production technology
- iii. Human resource potential from the continent's largely young population
- iv. Resources for the production of inputs such as feed
- v. Markets

This opportunity is currently largely under utilised as a result of the following major challenges:

- i. Sub-optimal utilisation and management of the available natural resources for aquaculture development.
- ii. Challenges in the supply and access to key inputs notably, feed, seed, human resources, appropriate technology and finance.
- iii. Challenges producers face in accessing markets.
- iv. Inadequate physical and sectoral infrastructure such as weak policies within both the public and private sector.

In order to increase aquaculture's contribution to the continental development goals transformation is required that shall bring about sustainable growth and materialise as increased

fish supply to help address Africa's growing food and nutrition needs, gainful employment and subsequent livelihoods, rural development and GDP contributions. As an initiative to address the challenges crippling the progress of aquaculture development in Africa, The Council for Africa Ministers of Fisheries and Aquaculture at Malabo in 2014 endorsed the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa (PFRS) whose Overall objective is to transform Africa's fisheries and aquaculture for food livelihoods and wealth. For aquaculture, the PFRS seeks to promote sustainable aquaculture development by jumpstarting market-led sustainable aquaculture through a variety of strategies appropriate interventionist approaches, strong strategic and implementation plans.

The Interafrican Bureau for Animal Resources' (AU-IBAR) mandate is to provide leadership for the sustainable management and utilisations of Africa's animal resources. The Fisheries Governance Project (FISHGOV) whose overall objective was to enhance the institutional capacity African Union Member States coherently implement the PFRS was subsequently implemented by AU-IBAR in collaboration with NPCA. The specific results FISHGOV sought for aquaculture centered upon strengthening institutional capacity and regulatory frameworks for sustainable aquaculture development; environmental monitoring, habitat and ecosystems preservation in aquaculture practices; aquaculture network and information sharing and extension and service delivery.

The change envisaged from the PFRS is the transformation from a predominantly smallholder based agricultural activity characterised the minimal use of often low quality inputs, low turnover and simple short market chains into sustainable commercial production systems that employ high quality inputs with longer and more diversified value chains (see figure 1).

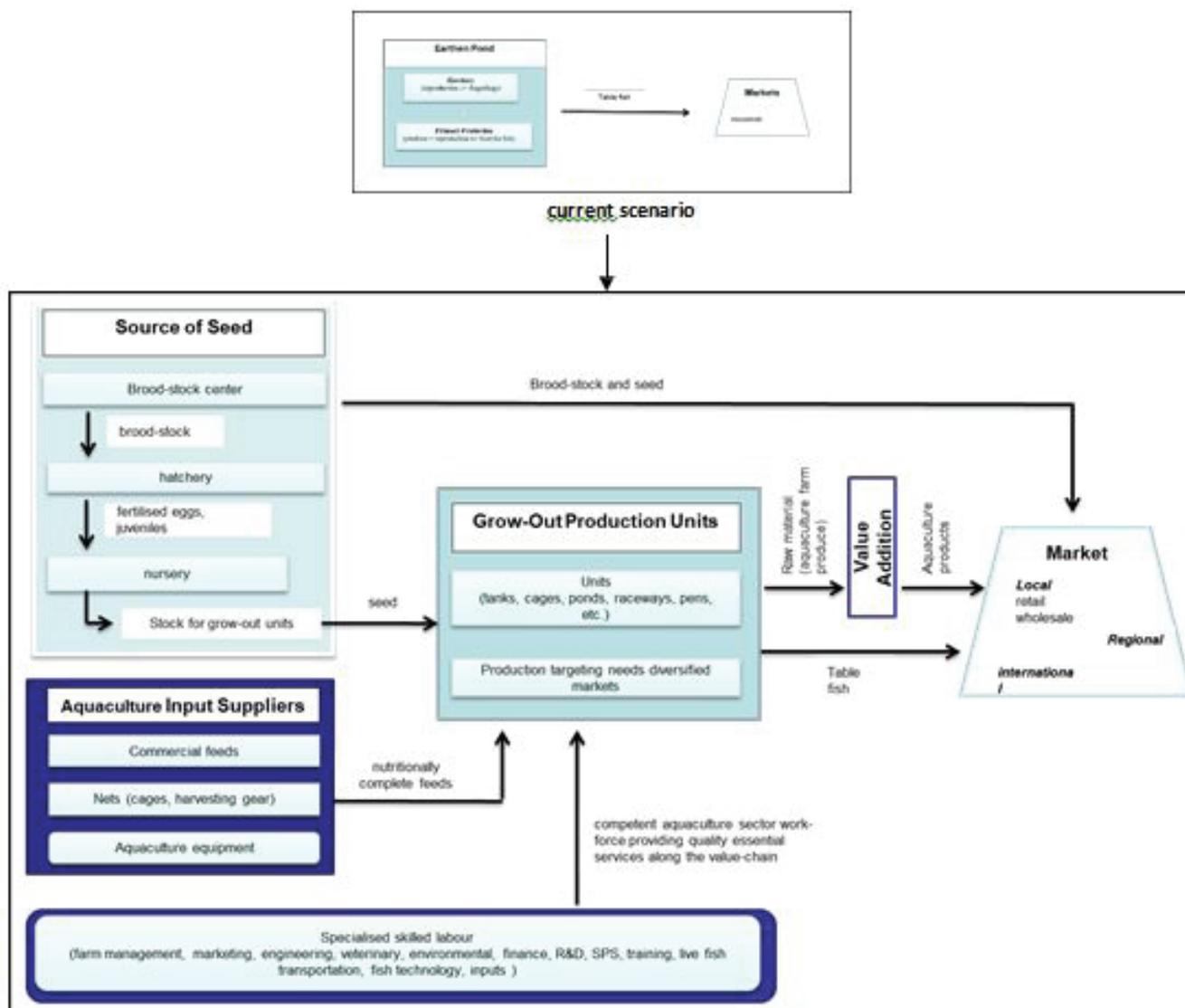


Figure 1. Transformation envisaged from smallholder activity into private sector driven sustainable industry that offers a wider scope of opportunity for production, products, employment and trade.

The objective of this consultative workshop on aquaculture business and extension were to:

- i. Review and identify, through sharing of experiences, the key constraints and factors of success for commercial aquaculture development and the provision of the appropriate extension services.
- ii. Deliberate on the requirements for developing aquaculture value-chains and subsequently identify/develop appropriate business models with matching extension guidelines to support the development of commercial aquaculture value-chain(s).

The expected outputs of the workshop were:

- i. Share lessons and experiences within and without the continent on best practices on commercial aquaculture business and extension services.
- ii. Draft business models as guidelines to support sustainable commercial aquaculture development in Africa.

- iii. Draft guidelines for extension strategies to support sustainable commercial aquaculture development in Africa.

The workshop was conducted with the following tools:

- i. Key presentations.
- ii. Sharing of experiences (some participant presentations to help stimulate discussions).
- iii. Group discussions to identify propose models and Best Practices for on business and for extension services.
- iv. Plenary discussion to compile outputs from different group discussions.

4.2.2. Position Paper: Enhancing Aquaculture through Business Planning – E. Hinrichsen, AquaEco, South Africa.

While significant growth has been registered in Africa’s aquaculture, its relative contribution to global aquaculture production and economies is significantly low (figures 2 and 3). The African sector was born out of the necessity for food security. The sector is subsequently characterized by simple value chains if at all, which limits the ability with which African aquaculture can penetrate regional and global markets and benefit from the value adding prospects these value chains present. The sector is poorly resourced particularly in terms of skills, finance, inputs and technology. A paradigm shift from an agricultural farm activity of little commercial value will definitely enhance the capacity of the sector to mobilize resource the sector and its transformation into one that contributes significantly to Africa’s socio- economic development and food and nutrition security.

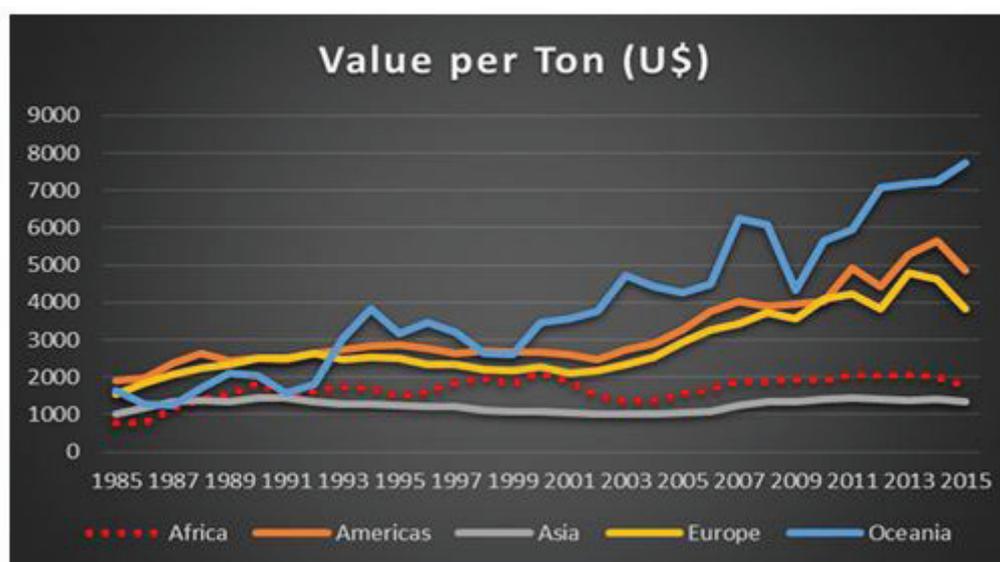


Figure 2. Trends in the value of global aquaculture production

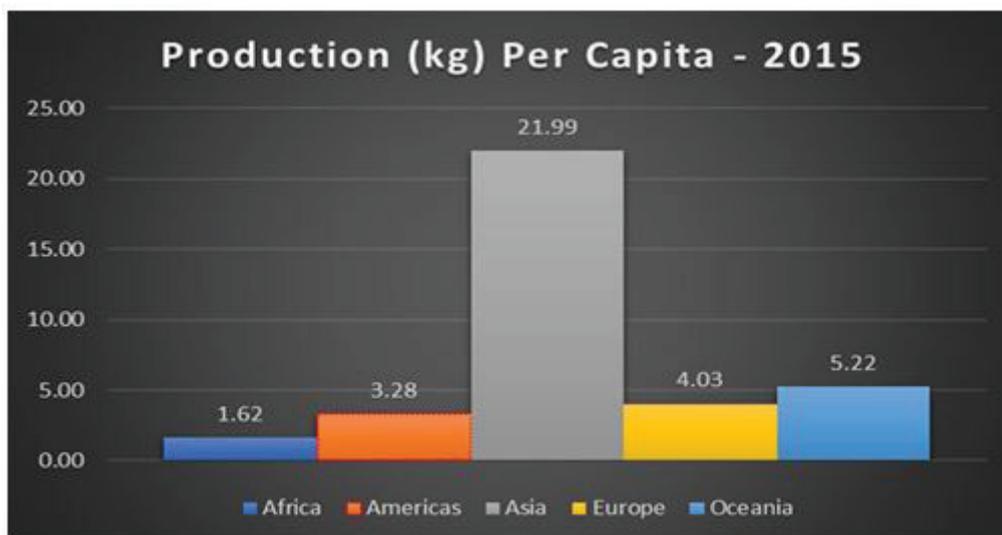


Figure 3. Per capita aquaculture production

Transformation into a private-sector driven sector with a strong orientation towards addressing market needs competitively in line with ecosystem sustainability indices, is seen as the most promising way forward bearing in mind Africa’s CAADP goal. A business orientation entails factoring in the core elements for aquaculture business encompassing its enablers, **The Core Elements of Aquaculture Business**

The core resource enablers for aquaculture business are water, production systems, climate, skills, finance, stock species and feed. Running an aquaculture business entails the optimum utilization of these multiple resources while at the same time mitigating against any risk that may cause loss within any given designated production system in order to achieve optimum yields and returns. In optimization the ability to balance these resources given their interdependencies within the production process within the context of the prevailing of the production and market value-chains is critical as using more feed to increase production, does not necessary lead to increase production, sales and profits. Likewise stocking more fingerlings does not directly result into larger and better markets. Better species does not always lead to better profit and so on. Thus the constituent elements of the value chain need be systematically addressed in a comprehensive manner rather than in isolation to promote sustainable commercial aquaculture development.

The robustness of value-chains thus comes into play. The major elements that would weakening the robustness of aquaculture value chains in Africa include inadequate knowledge and skills, biological and environmental factors (such as disease, drought), cultural and social dimensions and access to finance. Successful business growth hinges on robust more diverse value chains and planning (see table I).

Table 1. Comparison between robustness of simple vs. complex value chains

Simple Chains	Complex Chain
Easy to manage robustness	Hard to manage robustness
Mostly subsistence and local markets	International market reach
Local benefits	Regional and continental benefits
Limited scope to increase profits	Much scope to increase profits
Skill and Knowledge needs are medium to low	Skill and Knowledge needs are medium to high

Transforming Africa’s Aquaculture Business Planning and Models Ethos

Africa has many simple value chains for aquaculture and a few complex multinational or corporate chains. The missing gap is the middle, comprising a critical number of medium to large scale locally owned and resourced projects. Furthermore, the status quo whereby the majority of Africa’s aquaculture value chain elements operate in silos is detrimental to the sectors sustainable growth because impetus for transfer of skills and knowledge, feed improvement and capital transfer is curtailed. A paradigm shift from the current status quo whereby the profile of sector players is characterized by smallholder semi-subsistence producers and a few foreign projects into one that encompasses more comprehensively the broader profile of African entrepreneurship with Governments and the financial sector playing a catalytic role (see figure 4). The paradigm shift would enable Africa harness its unique advantage arising from its vast natural resource base to competitively produce and supply an array of aquatic products for national, regional and globally markets.

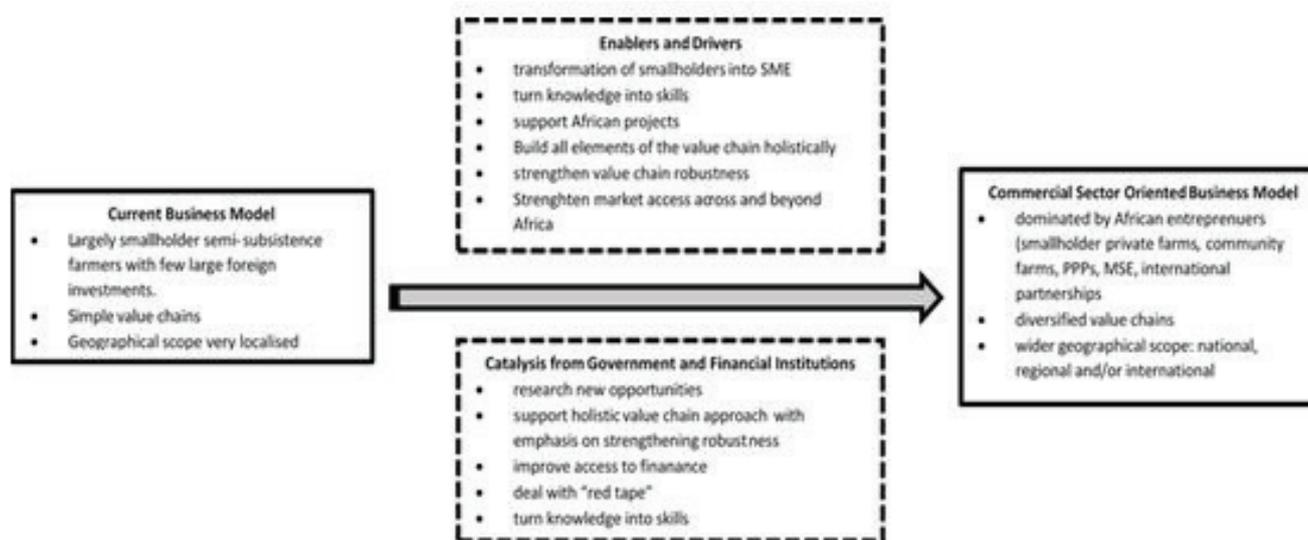


Figure 4. Transformation of Africa’s Aquaculture Business Model

4.2.3. Position Paper: Enhancing Aquaculture through Aquaculture Extension – E. Hinrichsen, AquaEco, South Africa.

Extension, thus aquaculture extension, is the transfer of knowledge and skills to new entrants and existing participant's right, taking into account their specific needs across the value chain in an accurate and timely manner that can contribute to success. The how, what, who and when are critical in consideration of each actors business objectives and enterprise needs as well as within the broader framework of meeting food security and new market needs.

Knowledge in itself is not a comprehensive farming skill unless it is transformed into an informed practice. Production is only achieved where productive assets are utilized based on the skillful application of knowledge (figure 5). Knowledge can thus exist without skill, but skill exists with knowledge, be it academic or indigenous. Small-scale and new entrants are more skills driven whereas larger more commercial enterprises are more knowledge driven. To get change, aquaculture practitioners, irrespective of their level of training or respective roles in the value chain, should be encouraged to pursue skills based deliverables. Thus rather than focus on natural science based training and acquisition of jobs as desk-based technocrats, training of practitioners from producers to managers should be re-oriented towards producing personnel with practical knowledge and skills with competence for sustainable commercial aquaculture. For example politicians, financiers and academia need to understand the aquaculture process within the context of the prevailing opportunities and risks to avoid drawing unsustainable expectations. Thus, in addition to the natural sciences, personnel would therefore require skills on key aspects of social sciences, business, life skills and specific component segments that comprise aquaculture value chains. Rather than through written manuals only, future extension workers will need be linked to networks through which they can access a wider array of resources to sustain their competence in this very dynamic field. Examples of the benefits of this approach can be drawn from the Far East and other sectors.

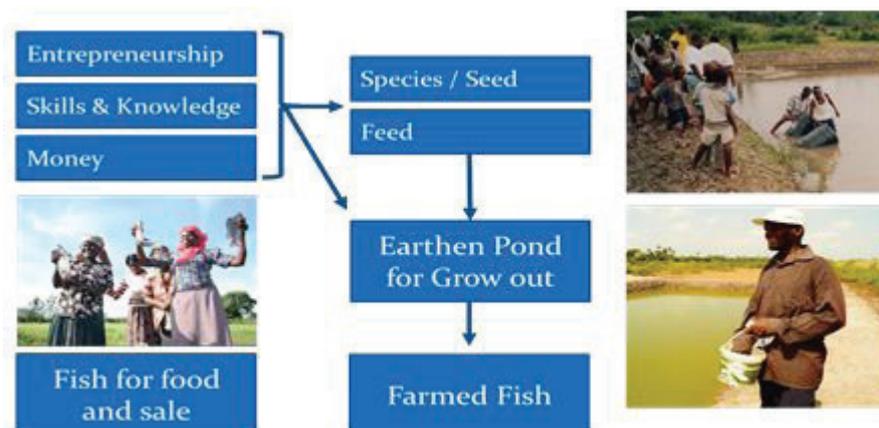


Figure 5. Extension throughout the value chain

Across the value-chain, extension may follow or comprise a mix of the following basic models. The pros and cons of the different models and opportunities they present for the various enterprises and scales of production differs. Undertaking prior client needs assessments to determine the most appropriate options is therefore a pre-requisite.

1. Government officer to farmer model

- Traditional model
- Has its disadvantages (as illustrated)
- Little innovation and problem solving

2. Universities / NGO's or development agencies to farmers

- Capacity constraints
- Logistical constraints
- Often knowledge driven (lacking skills)

3. Association to farmer

- Familiar environment
- Funding (membership fees)

4. Commercial farmer to entrant/small scale farmer (passive or active)

- Bias (to benefit commercial farmer)
- Mostly limited in extent
- Passive – through opportunity
- Active – Social Corporate / condition of tenure / license

5. Farmer to farmer

- Lacks advantages for the “giver”
- Skills centered (not a bad thing)
- New information can be lacking

6. Feed (fish buyer) company to farmer

- Bias
- Limits independence
- Passive – through opportunity
- Active – Social Corporate / condition of tenure / license

7. Vocational training model

- Expense, time and logistics
- Alignment to actual needs can be poor

8. Internship model

- Internships are rare
- Great model for experience
- Internships lead to “employment” and not new farms

9. Skills Clusters

- Needs to be set up by external party

10. Centers of Excellence / Knowledge Hubs

- Can be knowledge centers (lacking practical skills)
- Costs

11. Demonstration Projects

- Cost
- Relevance match

Social media today offers a good opportunity for information dissemination. However, with respect to extension challenges for effectiveness for producers and the extension service provider arise from information overload, discerning irrelevant and wrong information (fake news!), moderation, ascertaining the credibility of information and limitation of transmitting hands-on skills.

All-in-all, aquaculture extension services should be results oriented, bent on building practical skills and knowledge, easy to access, accurate and relevant.

4.2.4. Stages and Blocking Points in Aquaculture Production – D. Gasnier, CARDNO TA to AU-IBAR, France.

The following presentation gives a broad overview of the aquaculture production process as well as general challenges for aquaculture development as a basis for the group discussions. To establish an aquaculture farm, one must have a suitable site, know the species and be in position to control its breeding process, finance, market(s), source of juveniles and feed. For aquaculture development, all stages of the value chain from production to the marketing and distribution of products, as well as the potential for advancement and sustainable growth need be taken into account

Secure ownership and access to designated suitable site by the producers is essential for a least 20 years, considering the capital investment costs required right from the acquisition of land to develop and commission a facility. Farm planning and knowledge of appropriate equipment necessary is another important aspect. Small farmers, therefore will need help to develop their farms through extension and/or credit to leverage their capability to upgrade their facilities and operations so that they can produce larger volumes of aquaculture produce/products more competitively. Government support, for example through provision of guarantees, shall initially be crucial as an incentive for banks to provide credit for smallholder aquaculture enterprises.

The supply of inputs (feed, seed, and equipment) also needs to be streamlined. The benefits of specialization in the production and supply of key inputs and services will benefit the sector given the need for increased volumes of guaranteed quality, reliability in supply and the price competitiveness of inputs; the latter being a function of suppliers economies of scale and efficiencies of production and distribution. Thus the additional challenges associated with appropriate technology, hatcheries, feed manufacture, skilled labor, intensification, biosecurity, extension services, product development and access to markets need to be resolved.

Government support through pro-active policy and aquaculture development plan that enable secure access to land, environmental protection, facilitate logistics for aquaculture (e.g. roads, electricity, ice supply, etc), supporting fiscal initiatives including for the importation of essential non-locally produced inputs and equipment, aquaculture production and marketing infrastructure, etc), R&D, biosecurity and technical training cannot be understated. The promotion of associations and cooperatives to reduce the cost of supply, facilitate market access and provide for joint investments or PPP projects is essential.

Actions should additionally promote access and trade of aquaculture products in local, regional and export markets.

4.2.5. Public Private Partnerships as Options for Sustainable Aquaculture Development – S. Agamah, Consultant, Nigeria

4.3. Sharing of Experiences

a. Business Models

4.3.1. Catfish Farming In Nigeria – O. Rotmi, Chairman, Catfish Association of Nigeria, Nigeria

The Catfish and Allied Fish Farmers Association of Nigeria was founded as a private-sector driven Non-Governmental Organization in 2006. Currently it has branches twenty-two of Nigeria's states with its headquarters situated in Lagos.

Goal, Objectives and Structure of the Association

The overall goal of the association is to develop the aquaculture industry. The focus of the association is catfish and its specific objective is to produce farmed catfish fish for both local consumption and export. The administrative structure of the association comprises the members

as the core, a board of seven trustees one of whom is designated to be female, a seventeen member national, six zonal councils respectively, and twenty-two state executive councils.

In addition to the contribution from its members, the organization also collaborates with and has received both financial and technical support from the Nigerian Government, FDF, USAID, Winrock, etc.

Services provided to the Members

The following services are provided by the association to its members: (i) cooperative and credit society, (ii) development of a fish farming estate, (iii) community and social responsibilities, (iv) training and (v) development of a housing estate. The specific production related activities and services that members of the association are engaged in include is manpower development, production of seed to table fish, value addition, exhibitions and tours and collaboration.

4.3.2. Sharing of Experiences in Processing and Trade of Farmed Fish Products – L. Kobusingye, KATI Farms, Uganda.

Aquaculture was introduced to Uganda as a non-traditional farm technology in the late 1950's. The major species farmed in the country are *Clarias gariepinus*, *Oreochromis niloticus*, *Cyprinus carpio* and *Tilapia zillii*. Production is done in earthen ponds, cages and tanks. By 2012, Uganda Government estimated the national aquaculture production at 100,000 tons.

Adding Value to Aquaculture Products

KATI Farms Ltd was established in 2011 as an agro fish-processing enterprise. The main focus was to produce and add value to farmed fish, which at the time was largely sold whole as live or fresh fish. The market opportunities for this product were challenging as urban consumers expressed the need for a processed and portable product. The product developed then to fill this niche were farmed fish sausages that still are the company's major product. KATI Farms has progressively grown since, from producing 100 kg to 500 kg of fish sausages per day. It now directly employs 38 people and the company's total value has grown to USD 400,000.

The business model of KATI farms centers addressing the marketing challenges faced by fish farmers in the region by adding value to farmed fish produce. This has entailed exploring market needs as well as product development and diversification to deliver competitively priced wholesome quality aquaculture products of assured quality to the market. Thus the company has invested in branding, building relationships and networks within both the public and private-sector and establishing new market chains (see figure 6 and table 2).

Kati Farms' value chain: More fish by and for the poor*

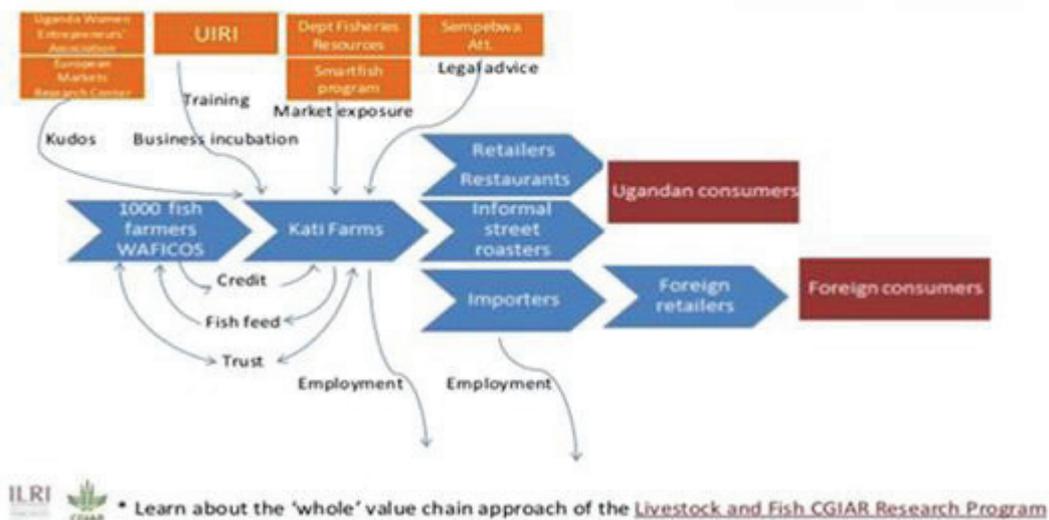


Figure 6. Linking farmers to market and developing market value chains

Table 2. KATI FARM's Public Sector Partners

Agencies	Information sharing	Activities
Government Institutions	Fisheries Department under MAAIF National Bureau of standards (UNBS)	Capacity building and quality control
Research Organisations	Abi Zonal Agricultural Research and Development Institute (Abi ZARDI) National Fisheries Resources Research Institute (NaFIRRI)	Research on Nutrition profiling, Value addition, Capacity building

KATI Farms range of products has also been expanded to include more species including from wild caught fisheries customized to different consumer tastes (see figure 7). Functional partnerships with public institutions have been instrumental in product development, meeting standards and for quality assurance. The latter, are key for the success of our business as they are anchors for penetrating new markets and building customer confidence.



KATI FARM's Farmed Fish Products



Ready to eat Brycinus nurse (Onangang) snacks



Fish sausages from Tilapia, Nile Perch and Alestes barmose (Angara)



Salted sun-dried Angara



Ready to eat Angara snacks

Figure 7. KATI Farm's Farmed Fish Products

4.3.3. The Business of Aquaculture: A Personal Comment– R. Ball, South Africa

The presentation was given in two parts: an overview of aquaculture in South Africa that was prepared by Roger Khron, the Chair of the Aquaculture Association of South Africa and the latter, the personal experiences as a business man in the sector by Mr. Ball.

An Overview of Aquaculture in South Africa

The potential for aquaculture worldwide is increasing given the threats to wild populations from unsustainable fishing practices and pollution. South Africa's aquaculture industry essentially began about 20 years ago where the industry's potential bears on the country's water bodies for production, expertise, export markets, local markets, logistics, legislation and health services in place. South Africa seeks to harness the opportunities that have been created by worldwide consumer increase, (especially Asia), the financial strength of Asian economies, the growing popularity for seafood as well as the fact that aquaculture is a labour intensive industry with a high potential downstream job creation hence the potential for creating rural employment for South Africa. South Africa is therefore well placed to develop a thriving aquaculture industry.

South Africa's major commercial species include abalone (*Haliotis midae*), marine finfish (notably dusky kob, Salmon, trout, yellow tail and ornaments), freshwater fish (trout, tilapia, ornamentals and catfish), oysters, mussels and seaweed that is mainly cultured for abalone feed. Experimental species include sea-run trout, salmon, sole, yellowbelly rockcod and scallops.

Currently, Abalone production comprises 90% of South Africa's aquaculture industry. The abalone value chain is characterised by an average of 2,000 tons are produced annually, 2000 employees, 4000 downstream jobs in the Western Cape and generates foreign exchange earnings of about R950m (EU68m). The dusky kob (*Argyrosomus japonicus*) industry on the other hand

is predominantly in the Eastern Cape. This high value fish are raised in re-circulatory systems for the local market where it is replacing wild caught fish in the market. Present production is estimated at about 150 tons valued at 7 million South African Rands (R62.50/Kg (5 Eur per kg)

Rainbow and brown trout, South Africa's major freshwater finfish species, are predominantly produced in the Western Cape and Mpumalanga. Production estimates are 800 tons from each of the regions where trout are raised in cages and raceways (ponds). The export of disease free trout eggs is becoming a significant component of this industry. Sea-run trout production is currently under experimentation. Koi is emerging for export.

There is also a strong local demand for imported ornamentals. Catfish production (currently about 20 tons/month) is targeted to the local Nigerian market.

The potential for Tilapia farming is good and is growing and is based mainly in Mpumalanga, North-West and Gauteng. The challenges for tilapia production in the country are associated with South Africa's temperate climate that necessitates temperature control in production units. Production is done by smallscale or pilot producers. There are no full scale large commercial operations yet. Furthermore, obtaining permits for *Oreochromis niloticus* is a challenge because the species is not native to south Africa. This places challenges for the competitiveness of South Africa's farmed tilapia against cheaper imports from Zimbabwe and China.

Oysters are grown on longlines in baskets in the Western Cape for the local market mainly. The export market is growing rapidly. Current production is estimated at 6 million oysters pa (R18 M) and the sub-sector employs 200 people. The potential to expand oyster production in the Western Cape is significant. The potential for an export market of 10 million oysters valued at an estimated R90m is feasible. Water available in Saldanha Bay.

Mussels are produced exclusively in Saldanha Bay, Western Cape on ropes and rafts. Current production is estimated 1,800 tons supplying the local market and about 220 people are derive livelihood from the mussel value-chain. Producers have sought to protect this emerging industry from cheap New Zealand mussels. The potential for expansion in the Western Cape is big (figure 8).



Abalone Farm in the Western Cape



Oyster Production



Trout Production



Tilapia Production



Mussel Production



Figure 8. Profile of Commercial Aquaculture in South Africa

South African aquaculture would benefit from the following if sector performance and growth are to be sustainability achieved:

- i. Research support and co-ordination
- ii. A single aquaculture policy
- iii. Support for health services
- iv. Support for Molluscan Shellfish Monitoring Programme
- v. Protection from government against competition in the market from dumping of inferior products onto market (such as confiscated poached abalone)

Mr. Ball's Personal Comments

Aquaculture development policy must revolve around wealth creation. The sector need be aware of theoretical studies and take time to assess what actually works. Following successful approaches, even if it entails improting expertise to build capacity for their implementation can be beneficial. Successes provide leadership examples. It's important to stay close/closely track target markets and study the competition and focus on building upon one's competitive edge with a focus on measurable outputs, metrics and indices.

Real businesses need profit to be sustainable. The profit motive drives investment, employment, development and wealth. A real business generates a surplus. Zombie businesses on the other hand absorb funding, effort, and often squeeze out real business. To succeed, businesses must be competitive; and this involves risk taking without which there can be no reward.

The bedrock requirements for sustainable business constitute:

- i. Security of assets that encompass rights of private property and contract; recourse, legislation and courts and a business-friendly supportive environment which are described by the World Bank Ease of Doing Business Index and <http://www.doingbusiness.org/rankings>
- ii. Return on Investment that are a function of revenue stream security, a competitive cost structure and the enterprise/sector risk profile.

The key elements of a conducive business environment are:

- i. Incentives and support
- ii. Predictable policies that govern (a) permit secure access to resources (e.g. through ownership or leasehold); (b) on taxation, imports and shareholdings; and (c) additional burdens notably administrative, social
- iii. Stable policies for a longterm business entailing due process, the social contract and fair and equitable compliance requirements.

Assurance for returns on investment is another key element for a conducive business environment.

The following are key factors that determine returns on investment:

- i. The revenue streams that exist, competitiveness of production and the value chain; access to markets, continuity of business and presences of risk factors that determine the Hurdle Rate which ideally should not be more than 15%.
- ii. Cost factors notably land, labour and capital; licence and other governmental fees; and costs of compliance.

Financing is another major challenges. Small business live in a special world and obtain much of their finance from personal savings, family, friends and/or their customers. They may working under an existing successful business. Large financing institutions on the other hand prefer to see book and some kind of structure before providing financial support.

The Pan-African Fisheries And Aquaculture Policy Framework And Reform Strategy provides a sound start for creating an enabling environment for a private-sector driven aquaculture industry. Greater recognition of the Private-Sector is however needed on the continent and the role of the private sector must be reiterated in the African Voice. Its time now to develop metrics, a time-frame and for better clarity on roles and responsibilities.

4.3.4. A Case Study Trout Smallholder Community Project – H. Stander, Stellenbosch University, South Africa

SU piloted a community project aimed at building capacity among smallholder in commercial aquaculture in the hinterland of the university. The specific objectives were to:

- i. Improve the standard of living of rural communities regarding income, training & skills.
- ii. Provide opportunities for participation in economic activities through job creation and small business development.
- iii. Sustainable utilization of resources (people, water, land, infrastructure) to the advantage of rural communities.

The pilot program took a market-oriented approach right from species identification, production process, value-addition to marketing. In addition to technical skills, participants in this pilot were equipped with entrepreneurial and business skills and were linked to financial institutions (figure 9).

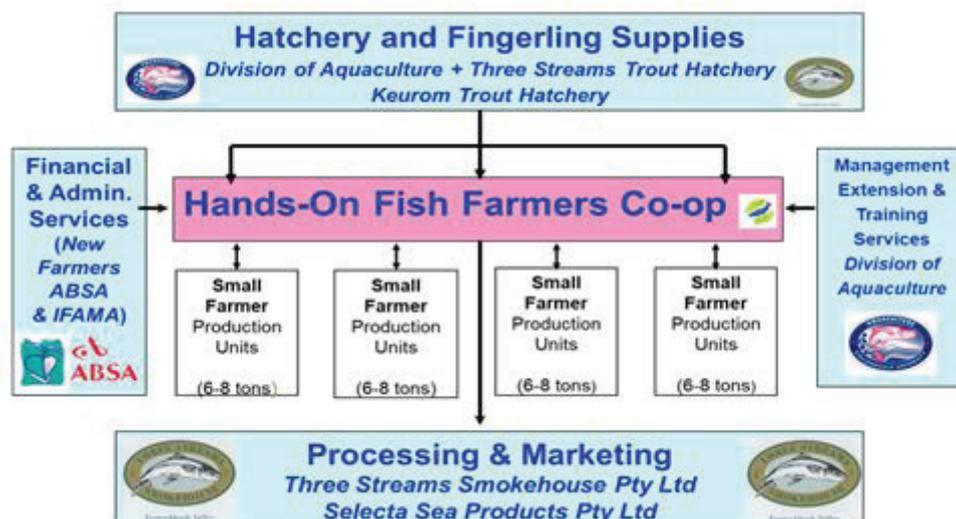


Figure 9. SU's Smallholder Aquaculture Pilot's Business and Operations Model

The production system piloted centered on cage culture to enhance the benefits derived from irrigation dams. A total of 35 cages were set each stocked with 3,000 trout at an average stocking size of 150 to 200 grams. The production cycle spanned six months over the production season from May to November. This ordinarily is during the winter rainy season. Fish were fed daily with nutritionally complete extruded slow sinking pellets.

The elements of the training and skills transfer for participants of the program comprised a two day live skills course, the Adult Basic Education and Training Program, a two day business orientation course, a 5 day aquaculture technical course and respectively one day water quality, feed management and fish health workshops. The board of the community group also underwent a two day specialized training for board members and a strategic planning session. A total of 300 members participated in these training activities (figure 10).



Figure 10. From production to market

The support for this pilot program was obtained from USAID Farmer to Farmer Support Programme (2008); the NGO's Woord & Daad, Swiss Contact and Shared Interest; local service providers Lingu Lethu, Media Works, Ethical Leadership Institute, Head Up Business Solutions. A full-time technical manager was hired whose role was providing support for on farm training, day to day tasks, size grading of fish, feed management, water quality monitoring, disease diagnostics, administration and record keeping.

Experiences from the Case Study

Marketing was done as a cooperative and the fish was supplied to a commercial processor, Three Streams Smokehouse. A 200 ton marketing uptake agreement was made with the processor. Farmer's supplied based on the processors set quality criteria. This approach revealed an added future opportunity for diversification, value-adding and branding of a smallholder product that would be marketable in markets other than those supplied by the designated processor.

The project has been in operation for six years. In 2008, initial production was 140 tons. Supply of juvenile trout is a problem, which has contributed to the dormancy of 7 individual smallholder enterprises. The best business produced 8.5 tons (1.4 kg average size).

Underperforming enterprises have closed down.

Major challenges have arisen due to site selection of individual business, level to which skills have been transferred and adopted by farm workers, logistics for service delivery and transport of produce and inputs, water quality management, feed management, product quality, funding and juvenile trout supply (150 – 200 grams).

The key lessons that have been learnt from this outreach approach were:

- i. Site selection is a very important factor.
- ii. Smaller groups (4 – 12) were operating more successfully.
- iii. Continuity of staff is very important for stability.
- iv. Proper feed management was the key to financial success.
- v. The role of the implementing agency was crucial and required a medium to long-term role.
- vi. Projects must be economically viable and successful to make the cooperative sustainable in the long-term.

Recommendations for the future include:

- i. The cooperative must become economically sustainable and generate its own income stream.
- ii. The cooperative need own a pre-processing facility to have more control on product quality

and limit expenses.

- iii. Establishment of a trout recirculation system would better secure juvenile trout supply.

The contribution of all the role players for making this project viable is duly acknowledged and special thanks to the Department of Science and Technology in South Africa for their financial support.

4.3.5. Commercial Marine Aquaculture in Morocco : Strengths and Weaknesses – A. Orbi, Consultant, Morocco

Morocco is Africa's leading fishery producer. In 2014 the country produced 1.3 million tonnes of fish worth USD 1 billion. The fisheries are a major contributor to food and nutrition security. Average fish consumption rates in the country rose to 18 kg from 13.3 kg/inhabitant/year between 2013 and 2008.

The Status of Commercial Aquaculture in Morocco

Commercial aquaculture in Morocco, introduced to Morocco around 1990. The natural resource potential for aquaculture in Morocco, is for marine aquaculture that accrues from favorable environmental conditions that encompass both the Atlantic and Mediterranean façade traversing 3000 km of shoreline on the Atlantic Ocean and 500 km on the Mediterranean.

The principle species farmed to-date are oysters, sea bass (*Dicentrarchus labrax*) and sea bream (*Sparus aurata*). Marine fish production averaged 200 tons / year of sea bass while that of shellfish (mainly oysters) averaged 600 tons/year. An estimated 400 tonnes/year between 2011 and 2014. In 2014, the total value mari-culture production was estimated at 20 million dirhams (USD 2,200,000). Morocco's major marine aquaculture during this period were oysters (65%) and Sea Bass (35%).

Despite the significant investments made and the level transfer of technology and know-how, growth begun to slack from about 2005 due to the following major factors that had a negative impact on farmers profitability (figures 11 and 12):

- i. Value added tax
- ii. High cost of fish feed
- iii. Reliance on the importation of fry
- iv. Concession fee that result in double taxation
- v. Insurance costs
- vi. Fall in market prices



Figure 11. Trends in Aquaculture Production, Morocco

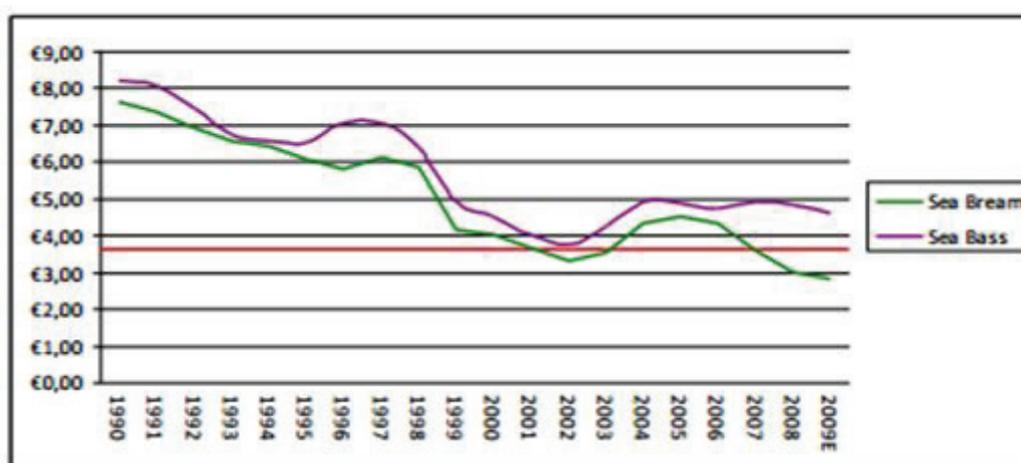


Figure 12. Trends of value of Sea Bass and Sea Bream in Morocco (1990-2006) versus average European market prices

The VAT applied on aquaculture inputs are as follows: locally produced feed 10%, imported feed 20%, imported fry 20%, imported nets 10% and cages, packaging and miscellaneous purchases 20%. On average fish feed represents 50% of total operational costs. The total volume of locally produced fish feed in Morocco is estimated at 700 tons. The needs of the company Aqua- Mdiq is 400 tons, some of which is imported and the other is bought locally. The 2016 finance law provided for a reduction of the import duties on fish feed to 2.5% instead of 25% for 2016 and 2017, the import VAT remained 20%. This measure made it possible to import feed and improve the competitiveness of Moroccan farmed fish.

The cost of the fry is 0.98 Euro per kilogram, price from hatchery. By the time of this presentation, fry are not produced in Morocco. The import duties are certainly zero for fry, but the import tax of fry is 20%, this charge is not recovered. Thus if fry were to be produced in Morocco, the load will drop by 45% being less 20% VAT from feed and less 25% from shipment costs.

Concession fees for an aquaculture farm in Morocco constitute 3 000.00 dh per hectare (USD 330 per hectare) to the Ministry of Equipment and 500.00 Dirhams per hectare (USD 55 per hectare) and 1 per thousand of turnover to the Ministry agriculture and marine fisheries.

Insurance for aquaculture, falls under what is generally termed 'livestock insurance'. The relatively high costs of livestock insurance for aquaculture are due to risks associated with storms, predator attacks and pollution and contracted reinsurance from abroad. The latter costs Morocco 27% more than insurance contracted abroad. Predicted increased likelihood risks of storms and predation as well as on the likelihood of farm (or part production) disappearance as a result of climate change do not help matters. The establishment of more farms would permit the pooling of risk among producers and increase farmers bargaining power. Efforts by the State to encourage for investors into aquaculture will therefore be beneficial.

With respect to shellfish, production in Morocco consists mainly of oysters and averages 600 tonnes/year from the Lagoon of Oualidia and Dakhla Bay. At present, Morocco does not produce oyster seed. These are imported from France. The capacity of the national oyster market appears to be in the order of 600 to 1000 tonnes. Due to food-safety barriers Morocco faces difficulties with exporting its oysters to European, Russian and American markets.

The New strategy for the development of aquaculture in Morocco

The 'Halieutis Strategy' that was adopted in 2009, provides for aquaculture development as the sector's engine for growth. It facilitated the creation of the National Aquaculture Development Agency (ANDA) that undertakes the master planning for aquaculture development. Since ANDA's inauguration, mari-culture zones have been defined in the Dakhla-Oued Eddahab, Mediterranean and sub-Massa Draa region. Expressions of interest to establish facilities within these zones have been received. Support has been obtained from FAO to advance the current strategy into a strategic framework for the development of aquaculture by 2030.

4.3.6. Young Agri-preners For promotion of aquaculture enterprises in DRC – Jerome Mulumbu, IITA, DRC

The IITA Kalambo Youth Agriprenuers (IKYA) is a group of young people, both men and women from different backgrounds with a common interest in agribusiness. Members of the group are engaged in several commercial agriculture commodity value chain related activities notably horticulture, cereal production, dairy and aquaculture.

Aquaculture is among the group's priority activities given the DRC's has huge potential for commercial aquaculture. The estimated total demand for fish in the country is about 700,000 tons per year, well above the country's average annual production of 100,000 tons of per year. The DRC's population growth is estimated at 3% per year. As a result of this large and growing gap in supply, an estimated 150,00 tons of fish per year is imported into the country which is

still insufficient for the country's needs. Despite this potential, Congolese aquaculture is still largely subsistence with tilapia being the dominant farmed species (FAO, 2005). The DRC's total aquaculture production has subsequently remained low with average pond yields of about 1 ton per hectare per year.

Following the increase of the Congolese population by 3% per year, the demand for animal protein has increased; This has led to a huge import of 150,000 t/yr of fish for the whole country and 48 tons per year for South Kivu from foreign countries such as China, South Africa, etc.

IKYA's is involved in both catfish and tilapia pond and cage culture respectively with a view to:

- Generate employment
- Offer a fresh and quality fish products to consumers,
- Produce high quality fry commercially to support the expansion of aquaculture in the DRC
- Produce and supply fish feed
- Motivate other young people adopt aquaculture as a business
- Reduce fish imports to improve the economy of the DRC.

The graphs and pictures below provide an overview of IKYA's activities and progress in aquaculture (figures 13, 14 and 15).





Figure 13. A profile of IKYA's activities

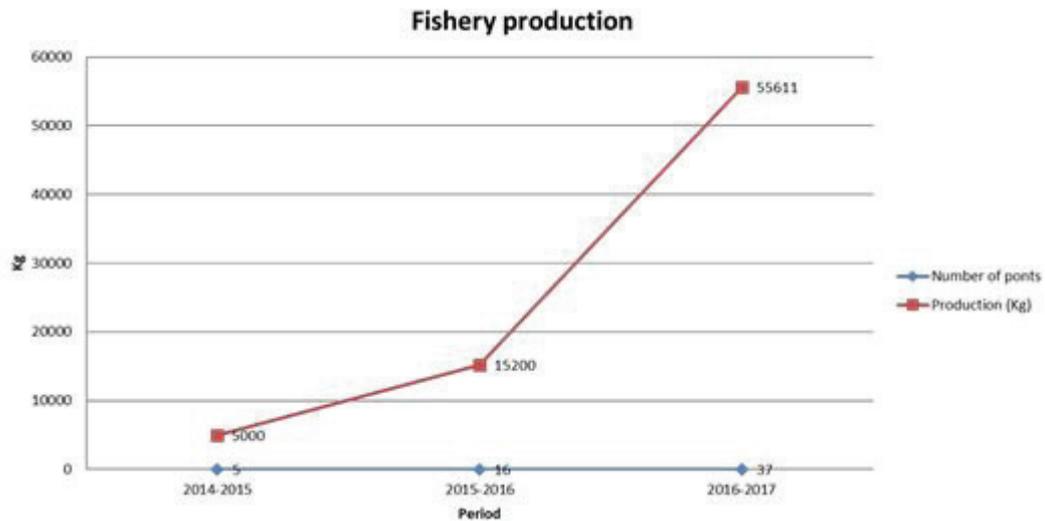


Figure 14. Total aquaculture production from IKYA members

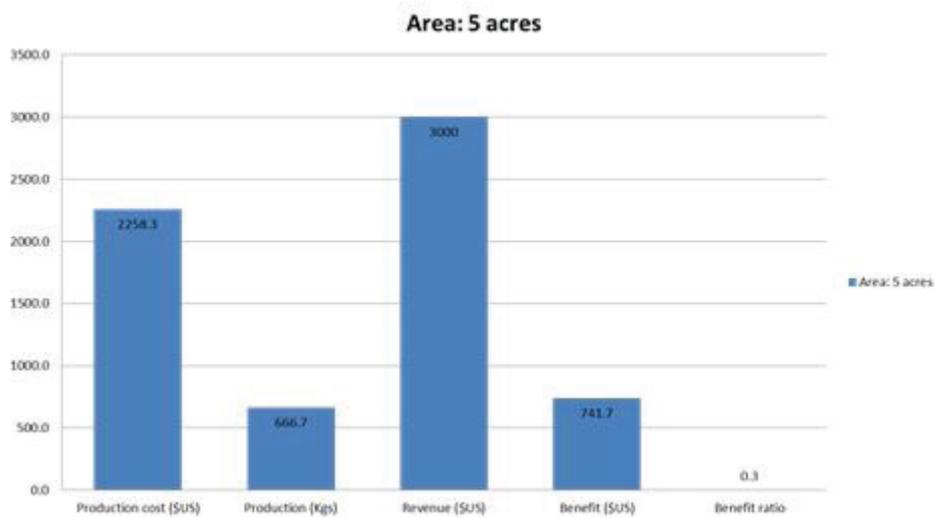


Figure 15. Average Enterprise Cost:Benefits of IKYA's Aquaculture Entrepreneurs

Prospects and future plans

Given the positive results so far, IKYA proposes to:

- Increase the number of fish ponds
- Increase the number of cages
- Work with more young people engaged in pond aquaculture
- Improve access to fish markets for youth groups working with IKYA
- Construct a hatchery for fry production

4.3.7. Aquaculture Production: Opportunities, Challenges And Prospects For The Financial Sector – Paul Atsu Fiawoo, General Manager, Bonzali Rural Bank Limited, Ghana.

Bonzali Rural Bank Limited began its operations in Ghana in April, 1990. The bank has a community based orientation whose focus is to meet the needs of the rural community.

Thus, over 70% of the Bank's clientele base are agrarian, because agriculture is the major economic activity for Ghana's rural community. Aquaculture has consequently not been overlooked and is considered among rural enterprises. Given its broad objective, the bank has subsequently developed products that are most friendly to its customers within the rural settings.

The Bank currently has eight (8) branches and two (2) microfinance units serving ten (10) districts in the Northern Region of Ghana. Through its microfinance activities, fifty-two (52) of its microfinance loan beneficiaries who are rural aquaculture entrepreneurs. Collectively, these have benefitted to a tune of about Three Hundred Thousand Ghana Cedis (USD equiv 2017).

Opportunities for the Financial Sector

Deposit Mobilization: Current indications are that over 70% of the Ghanaian population is unbanked. Reaching out to the population, and aquaculture producers who in most cases are rural folks, indirectly helps reach out to the unbanked, thus increasing deposits for the Bank.

Financial Literacy: Every financial institution has the responsibility for providing financial literacy to the people within its operational area. Doing business with people in aquaculture provides such an opportunity to educate aquaculture and other rural based entrepreneurs on basics of financial transactions such as providing training and support in keeping proper financial records for their business. Invariably, economic activities in the sector is become enhanced and the traditional rural semi-subsistence farmer thus progressively obtains the skills and capability to transform into an SME.

Challenges in the Provision of Financial Services to Fisheries and Aquaculture Stakeholders

Migration: Most of the bank's clients in fisheries and aquaculture live along the River Volta, stretching across three districts namely Kumbungu, Tolon and Gonja North. Unfortunately, the men whose principal economic activity is fishing, frequently relocate with their wives, which wives are our client Fish Mongers, to remote communities that often can be far from the reach of banking services as the men's fishing activities dictate. They either travel along the River or other fishing zones in Ghana relocating to very remote communities from their original area of operation where they registered and had access to banking services. This affect their dealings with the Bank which greatly increases the rate of defaults in credit banking hence, discouraging banks from doing business with people involved in the fisheries.

Seasonality: A serious challenge affecting rural fisheries and aquaculture enterprises is its seasonal nature. Bonzali currently operates in an area where fish ponds are not common. People do direct fishing from the river and sell to either fish mongers or those who are into frozen stores businesses. Such activities at a point during the year are curtailed due to insufficient availability of fish in the river.

Product Packaging

The Bank sees providing fish farming 'Credit with Education' as a better package for the aquaculture. Through this package, fish producers are encouraged to construct fish ponds in groups. A credit facility is given after they have done some amount of deposits into the bank. The community saving group to which they belong, then serves as a guarantee for the product. Loans are only disbursed after series of educational meetings. The education aspect comprises suitable topics that are carefully selected to educate the clients on issues ranging from simple arithmetic, politics, and family planning to book keeping. Hence, the package is branded 'Credit with Education' package in fish production. This enhances their capability to establish and run more stable in businesses, reduce their rate of relocation and manage more organized forms of business that increase their likelihood of qualifying for and accessing credit as would be necessary based on their business plan and growth.

Enterprise Financing

Individuals' with enterprises in aquaculture are encouraged to save over a period of six months after which there are given loans to expand their businesses. Among the success of this approach is an individual who has benefited from the bank has over time became one of Bonzali Bank's ten largest customers in 2016.

4.3.8. Overview Of The Aquaculture Village, Yenegwe, Yenagoa, Bayelsa State, Nigeria - Ebinimi Joe Ansa - Special Adviser on Aquaculture and Fisheries to the Governor of Bayelsa State, Nigeria.

Bayelsa State is located in the Southern part of Nigeria. It has a long coastline of 200 km and is endowed with abundant freshwater, mangrove wetlands and marine habitats as well as oil and gas (figure 16). The State also has human resources and access to capital. The potential for aquaculture development is consequently high. Commercial aquaculture offers the state an opportunity to increase farmers' incomes and have a multiplier effect of improving livelihoods both directly and indirectly if strong value chains that are linked to the larger Nigerian market for fish are developed.



Figure 16. Location of Bayelsa State within Nigeria

Bayelsa State has therefore embarked developing an aquaculture village covering 127 hectares with the ultimate of purpose of triggering a production of the critical volumes of farmed fish from a specified location that can stimulate and support the development of a commercial value-chains inclusive of service businesses. The purpose of this is to sustainably increase fish farmers' and entrepreneurs' incomes.

Bayelsa State Aquaculture Village Business and Operations Plan

The proposed components of this project's global business plan feature:

- Operation as a cluster fish farm village
- Host communities are IGBOGENE, YENEGWE, AKENFA in Yenagoa Local Government Area of Bayelsa State
- Establishment a hatchery with the capacity of producing 5 -6 million fingerlings per annum
- Produce 600 tons of high quality fish feeds monthly
- 500 earthen ponds aimed at producing 5,000 tons of fish annually
- A feed mill with capacity to 20 tons of high quality floating fish feeds daily complete with laboratory and adjoining offices

- A fish processing factory
- Produce 820 tons of smoked fish annually
- Agricultural tourism
- Recreation center with restaurant at the Epie Creek water front
- Administrative complex
- 600 tons storage capacity warehouse (figure 17):



Figure 17. Glimpse of Bayelsa State Aquaculture Village

Farmers in the village are expected to form cooperative societies and work as teams. Facilities such as electricity, potable water, and major farm machinery will be jointly shared. It is expected that the groups would be gender balanced.



Figure 18. Organisational Structure

The proposed criteria for the selection of beneficiaries that is done through community lays emphasis on those interested in fish farming as a business and women and youth involved in fish farming. Nominees are undertaken through a comprehensive performance evaluated skills development course on aquaculture as a business that comprises 3 months of practical pond management through one production cycle, 4 days introduction to fish farming and a 3 day aquaculture enterprise management course based on the Nigerian Agricultural Enterprise Curriculum (NAEC).

The enterprise operational model to help jump-start participants business has three main foci:

- Central Bank of Nigeria launched the Anchor Borrower Program with an off-taker, the Anchor Company, to buy up farm produce from fish producers. They will also receive money to support the day to day running of the farm
- Fish farmers are given feeds and fingerlings for one production cycle. The Anchor processes and sells the fish and the production cycle continues.
- Input loans made available to farmers and input suppliers (i.e. hatchery operator, feed- miller, equipment seller).

The current challenges this model faces arise from the fact that when production and processing started, there was no bankable feasibility in place. Furthermore, developing a realistic feasibility plan requires market research. Thus there are apprehensions on the level of success, sustainability and environmental and social impacts of this aquaculture development approach

As the way forward, the local government is thus seeking funding to undertake the above mentioned studies, including ESIA, train beneficiaries and build public-private partnerships (PPPs) for the long-term success of the Aquaculture Village. Establishing PPPs in this case is considered

vital in view of the current state of Nigeria economy (i.e. on-going recession), in the midst of which employment, income generation and constructive youth engagement must be ensured and are essential for long-term socio-economic development.

b. Extension

4.3.1. Stellenbosch University Aquaculture Training Program - H. Stander, Stellenbosch University, South Africa

Stellenbosch University (SU) has expanded and strengthened its aquaculture program into one that addresses the social and environmental needs of society through innovative, interdisciplinary research and education at vocational, undergraduate and graduate level. This distinguished program is one of excellence that is innovative, accessible and self-reliant, and whose purpose is to develop these skills of its students, staff and the communities holistically bearing in mind the multidisciplinary nature of aquaculture as a practice. SU’s aquaculture program is tailored address the current human capacity bottlenecks affecting aquaculture development, in South Africa and beyond particularly with respect to context relevance, improving competence of extension workers and other practitioners and sector-orientation rather than solely as a scientific discipline (figure 19).

The program comprises teaching for knowledge and skills transfer, research for technology development as well as to ensure knowledge is appropriate for the sector and up to date and services as part of cooperate responsibility to communities and continued skills development in the working environment for staff and students.

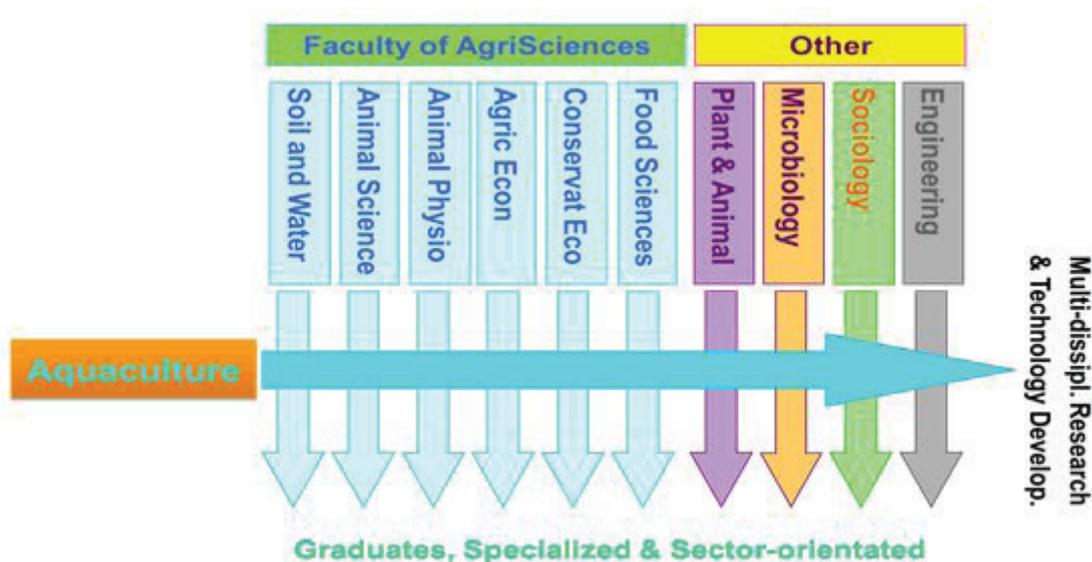


Figure 19. Components of the SU Aquaculture Program

The services provided by the aquaculture department are broadly grouped under information exchange (i.e. extensions, consultancy and provision of information) and analysis and evaluation (i.e. water quality, disease, feeds and aquaculture product development).

Vocational training and extension is species focused and is undertaken at SU's demonstration center and other facilities with a bias on hands-on training to build practical experience (Table 3 and figure 20). Examples of the commercial aquaculture species handled at the faculty include trout, tilapia, Abalone (perlemoen), ornamentals, cob (kabeljou), yellowtail and the African catfish. While most of the operational costs of this center are from the University, it is projected that they could be subsidized from the sales of products and the minimal charges to learners for sustainability. SU intends to develop its demonstration center as an independent and economically sustainable unit.

Table 3. Training and Research Facilities at SU

Facility	Capacity
Jonkershoek	<ul style="list-style-type: none"> • Hatchery • Performance Testing Facility • Cage Culture System
Welgevallen	<ul style="list-style-type: none"> • Fresh & Seawater Climate Control Units • Recirculation Systems x3
Laboratories	<ul style="list-style-type: none"> • Access to Analytical Services
Animal Sciences	<ul style="list-style-type: none"> • Range of analytical equipment

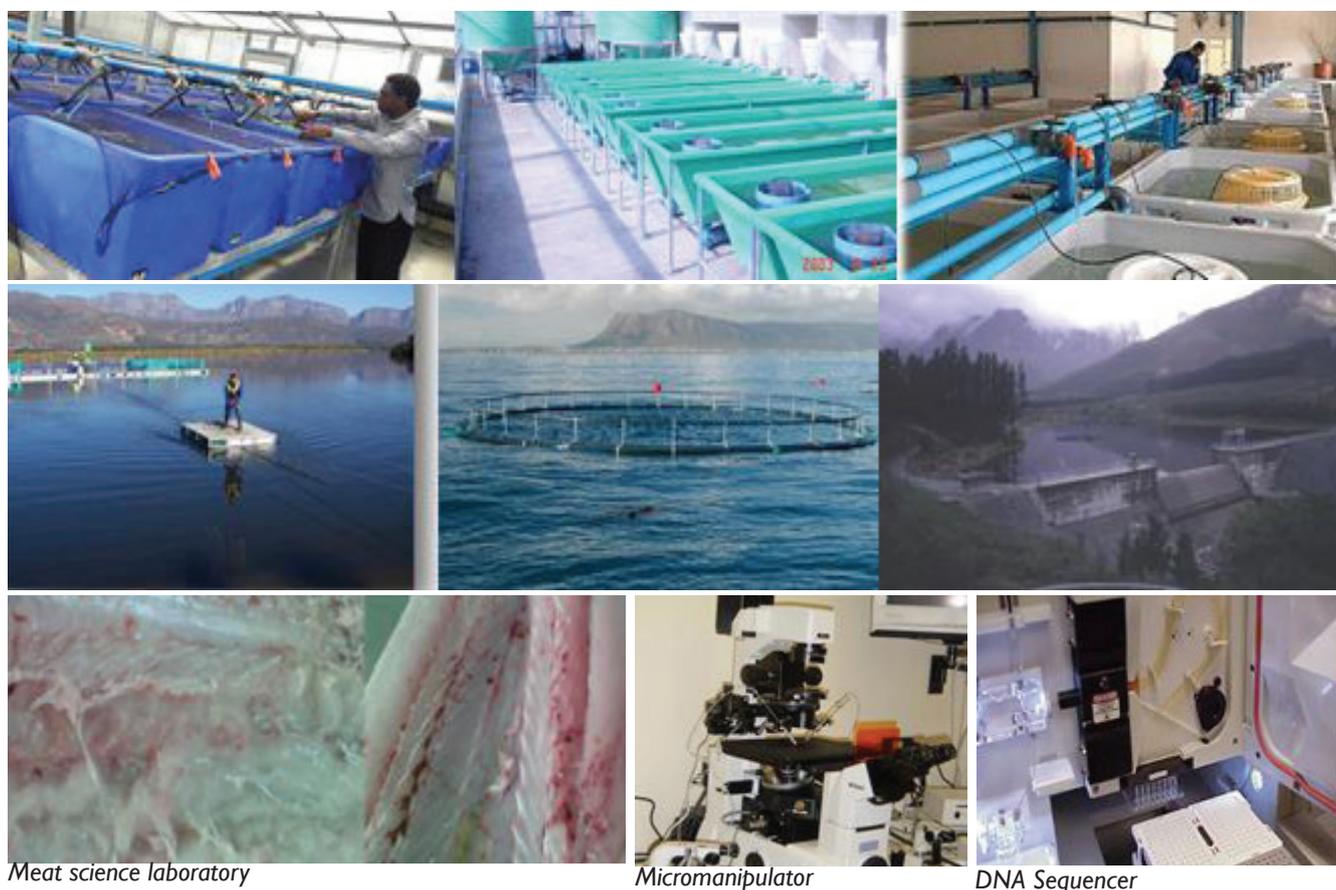


Figure 20. Example of some of SU's facilities for aquaculture training, research and development.

SU's local collaborating partners include the respective Government of South Africa departments; the Universities of Fort Hare, Limpopo, Rhodes, UWC and UCT; NGO's notably WWF, ASNAPP and producer associations. Its international collaborators include Katholieke Univ. Leuven, Belgium; Ghent University; Stirling University, Scotland; CIRAD, France; University of Auburn, USA; Asian Institute of Technology, Thailand; Wageningen University, the Netherlands; University of Malawi and the Aquaculture and Fisheries Research Institutes of Nigeria, Tanzania, Ghana, Uganda and Namibia.

4.3.2. Business Model for Stellenbosch's Aquaculture Institute for Vocational Training and Business Development – H. Stander, Stellenbosch University, South Africa

Aquaculture is the farming of aquatic organisms including fish, mollusks, crustaceans and aquatic plants. Farming implies some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated. Closed life-cycle aquaculture includes control of reproduction.

The objectives and approach of the program are in line with SU aquaculture program as illustrated in figure 19 above. In addition, the institute seeks to provide the skilled personnel in line with the South Africa Government's Operation Phakisa that seeks to unlock the economic potential of South Africa's oceans that have an estimated potential to contribute one hundred and seventy billion Rand to the country's GDP by 2033. A well trained workforce equipped with the skills to harness the oceans and other aquatic resources in sustainable manner is among the critical factors for the success of this policy.

The specific objective of the proposed institute are:

- i. World Class Aquaculture Training Academy
- ii. Centre of Excellence for Aquaculture in Africa
- iii. Situated in the community for the community
- iv. Offering Aquaculture vocational training for learners on NQF levels 3 & 4
- v. Hands-on practical training and business development

It is envisaged that the institute shall provide the following incubation model aquaculture enterprise services:

- i. Institutional Structuring for operating aquaculture business and business related entities
- ii. Market procurement and quality management support
- iii. Administrative support to private enterprises in order to perform above breakeven

- iv. Financial Management Services
- v. Logistics support in post-harvest technology
- vi. Training
- vii. Technical Support to ensure maximum production output

Currently, South African aquaculture comprises several marine and freshwater species. The marine species are of greater economic importance (figure 21 and table 4). Training shall be provided for the commercial production following a value-chain approach to market.

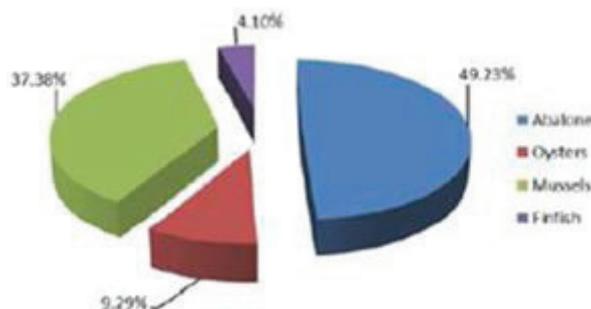


Figure 21. Profile of South Africa's Commercial Aquaculture

Table 4. Profile of South Africa's Commercial Aquaculture

	<p>Abalone</p>
	<p>Bivalves:</p> <ul style="list-style-type: none"> • Mussels • Oysters • (Clams, Scallops, Periwinkles, Pipsis/White mussel, Cockles)
	<p>Finfish</p> <p>Salmonids:</p> <ul style="list-style-type: none"> • Atlantic Salmon • Sea Trout/Steelhead Trout <p>Marine Finfish:</p> <ul style="list-style-type: none"> • Tilapia (Aquaponics) • Dusky cob • Yellow tail, White stumpnose, Grunter, etc.

The Institute's Model

The institute shall comprise administrative offices, training center with classrooms, conference hall, kitchen, water ecology laboratory, learner accommodation (50-60 per annum), cafeteria, small processing facility, parking and aquaculture training systems. The production throughput capacity of the facility is estimated as constituting abalone (75 000kg, 0.5ha), Atlantic salmon (500

000kg, 1.5ha), mussels (10 000kg, 5ha sea site), tilapia/Aquaponics (2 ha), buildings (1ha) and 25 permanent staff.



Figure 22. Architectural Impressions

Project site requirements are about 5 hectare total land area, availability of water, correct quality and quantity (3 mil liters of seawater per hour), accessibility and centrally located for learners, safe and secure (security is important), availability of infrastructure including access, electricity, bulk services and potable water, EIA for Aquaculture (permit regulations), biodiversity considerations - not in Marine protected area, economically viable, transportation and market and the training facilities and farm site as close as possible from each other.

SU is currently seeking to secure a site and the resources to implement this proposal. Only strong collaborations, including with the private sector will be needed if this proposal is to materialize and become successful.

4.3.3. African Regional Aquaculture Center's Experience in Aquaculture Extension – D. Bekibele, Center Manager, ARAC, Nigeria

The African Regional Aquaculture Center (ARAC) was proposed at the Aquaculture Planning Regional Workshop in Accra Ghana in 1975. The pilot operation phase started in 1979/ 80 with the assistance of FAO/UNDP and the project took off in 1980. It was operationally completed on 31st August 1987. Thereafter, the Federal Government of Nigeria took charge and officially handed it over to the Nigerian Institute for Oceanography and Marine Research (NIOMR), Lagos as an Aquaculture Centre providing research and training using a multilingual approach in 1987.

ARAC major objective is to impart practical skills and knowledge. The center provides long term training programs in affiliation with Rivers State University for post-graduate diploma and MSc. Degree in Aquaculture. So far, 200 aquaculturists from 25 countries that include Haiti have graduated from the center. ARAC also provides short term training programs in hatchery management and fingerling production, feed formulation and production, and other

Aquaculture skills. Over 5000 farmers have received short-term training since the center's inception. These includes women and youth empowerment training program ARAC has also progressively become a centre for industrial training for aquaculture undergraduates from various Universities. About 2,150 undergraduate students from various higher institutions go through three to six months of industrial attachment at ARAC.

ARAC is involved in 'Monthly Technical Review Meetings' that are geared to transferring research findings and new technologies to subject matter specialists who are extension workers of ADPS.

The major bottlenecks affecting effective delivery of practical training to cater for the needs of the aquaculture value chain hinge upon adequate financing and whether or not recipients actualise what they have learnt as a consequence of limited practical training. Collaborative training programs with sponsors would help alleviate this challenge.

4.3.4. University Training In Aquaculture: The Case Of Lagos State, Nigeria – A. Martins, University of Lagos, Nigeria.

The University of Lagos, is a state owned university regulated by the Nigeria University Commission (NUC) that was established in 1983 State owned. It admits students from all over the world and provides graduate and post-graduate courses in the various natural and social sciences fields.

The strength of University Education, including in this case the Department of Fisheries and Aquaculture, as most universities, is in imparting knowledge. The challenge that needs to be overcome for the sector is in ensuring the applicability of the knowledge imparted as well as of appropriate skills that are marketable and critical to operations and subsequently for economic development. To address this challenge, Lagos State University has established an enterprenuerial center that provides practical skill-based options in science, medicine, engineering, environment, humanities and art.

Vocational Courses in Fisheries and Aquaculture

Analysis of the fisheries and aquaculture value chains in Nigeria and other Countries in Africa indicates that one of the major constraints in sustainable fisheries development is lack of skilled middle level manpower at all levels of the value chain. In response to these challenges the Department of Fisheries and Aquaculture in collaboration with the university's Centre for Entrepreneurial Studies in 2017 launched two-month certificate courses. This course integrates entrepreneurship training and hands on training that cut across the sector's needs, targeting: trawl fisheries operators, port captains, operation managers, processing plant managers and supervisors, fish importers and exporters, fish traders, fish farm owners, managers and supervisors; ministry workers (extension officers in local, State and Federal Government); would-be investors in fisheries and aquaculture; potential entrepreneurs at retirement; fish feed manufacturers and marketers; facility inspectors; interior decorators and landscape personnel; trainers of middle level manpower and legislators and decision makers.

Specific certificate courses are available in aquaculture on: aquaculture value chain; Public Private Partnership in Aquaculture (PPP); brood-stock development and management; fish fingerling production and transportation; fish feed manufacturing and management; fish product business; aquatic food processing; local and International fish business; environmental management in aquaculture; shrimp farming business; fish health; ornamental fish business; fish farming business; fish farm clusters management; water quality analysis and management and aquaculture cooperative/associations (APPS). The following are the entry requirements for these courses ND, NCE, HND and University Degree. SSCE with relevant experience may be considered. The execution of the above mentioned courses is done in partnership with respective private and public sector establishments. Students performance is assessed through written reports and oral seminar presentations. .

4.4. Group Discussions

The following is a summary of the deliberations from the different groups. The Terms of Reference for the group discussions and constitution of the different groups are attached in annexes 4, 5 and 6.

4.4.1. Group One

a. Aquaculture Business

The group selected to deliberate on the drivers and attributes that led to the successful development and growth of aquaculture in Africa's leading aquaculture producers, Nigeria and Egypt.

Catfish Farming in Nigeria

Demand: When the traditional supply of catfish, Lake Chad, became grossly insufficient to meet growing demand in the 1990's, the need for an alternative source became crucial.

During this time, the market price for catfish in the country shot up.

Political Support: Addressing this demand through aquaculture was strongly advocated for by the sitting President of Nigeria then and the Government through the following actions:

- i. The President himself became a catfish producer.
- ii. The hosting of the “fish for all summit” in Abuja, Nigeria during which time the country advocated for aquaculture and identified catfish as its species for commercial aquaculture development.
- iii. The summit served as a forum that greatly increased public awareness on aquaculture as a potential enterprise, including for smallholders.
- iv. Public awareness campaigns of the positive health benefits derived from eating catfish. The campaigns gradually influenced national catfish consumption patterns and further increased local demand for catfish.

Choice of Species and Technology: The decision to focus on catfish whose production technology was simple and could easily be undertaken within the budget framework and other production constraints of local producers. The African catfish is a hardy and highly adaptable species which meant it could be produced profitably with basic management approaches in rural and/or backyard farms in either ponds or tanks.

Marketing: The domestic drive and the fact that the fish could actually be bought alive boosted the competitiveness of farmed catfish in the Nigerian market.

Farmer Associations: Strong producer associations where small businesses come together and cooperate has been among the strengths for Nigerian aquaculture.

In summary what Nigeria got right for its aquaculture business model was:

1. Focussed on a species whose profit potential was high and investment needs low.
2. Educated the public by promoting the good nutritional value of catfish.
3. Chose species which can easily be cultured and produced
4. Market accessibility was good
5. The high level of commitment from political leaders and government.

The Egyptian Model

Tilapia has been a traditional fishery in Egypt. The turning point for its development as an aquaculture species was mainly driven by private entities, SME farmers with average land holdings of about 5 hectares. The low livestock production in Egypt which results in high prices and low availability of other animal protein on the market made fish the cheapest animal protein on the market. Furthermore, research to improve the viability of tilapia farming notably genetic improvement and use of monosex tilapia, improving access to quality feed, desert farming whereby warm water is pumped and used for production during the winter months has had a significant positive impact on production. The development of Egyptian aquaculture has attracted foreign investors such as feed mills. Most of the tilapia produced is locally consumed, with only a very small amount being exported to the Gulf countries. High fish export taxes discourage the export of tilapia in favour of local consumption thus local food and nutrition needs. As a result, the fish both highly competitive on the local market and is affordable for low income households.

Appropriate business models

The following African context specific issues were noted by the group for consideration:

1. Small business coming together through strong associations- small businesses was among the strengths that propelled growth in Nigeria's aquaculture.
2. The bigger business can be vertically integrated having their own hatchery/processing plant/facility to pump their own water which was not possible for small businesses
3. Strategies would need to be put in place to enable smaller businesses benefit positively from the presence of larger ones.
4. Enterprises further up the value chain such as feed factories can help the small business to develop.
5. Contractual farming was among the possibilities whereby smallholder supply larger companies with produce for processing, even the big company can give credit to the small ones
6. Proposition that land owners lands can put the infrastructure and lease it to somebody else and give the person a chance to start his business and if this does not work, after some time, the land can be leased to somebody else.
7. The establishment of gazetted aquaculture parks and zones for bothland and water based farming would be beneficial for upscaling and increasing volumes of aquaculture production.
8. Cluster based approaches need be promoted, especially for small holder.
9. Risks are still high for capital investment into aquaculture.
10. The practical command of aquaculture and aquaculture related enterprises by operators needed to be strengthened.

Group I Recommendations

1. There need be a mixture of different models proposed in the business guidelines.
2. The choice and application of model will depend on country situation.
3. There need be training material for each business model for example, to choose a few priority models then develop a training material and pass it on to other countries
4. Marine aquaculture need be considered.

b. Aquaculture Extension Service Delivery

Most of all extension services, both delivery and policy, should be market-orientated, innovative and entrepreneurial in nature. Africa's aquaculture extension need reflect the 'transfer of accurate and timely knowledge; know how, skills and information relevant to aquaculture'.

The table 5 summarises Group One's deliberations on aquaculture extension service delivery in Africa. It was also noted that social media currently was the most accessible means of communication and should be utilised in extension. Caution however, would need to be taken to ensure due diligence and that information prior to loading is filtered by experienced subject matter specialists through a moderator to avoid information overload with wrong or irrelevant information. A significant proportion of the information shared should preferably be generated by members of the sector themselves. Information for specific skill sets could be relayed through videos, interviews and information

Table 5. Group One's Considerations for Strengthening of Aquaculture Extension Service Delivery in Africa

Model	YES/ NO	WHY	WHO DRIVES	MEDIUM OR MATERIALS	TARGET
1. Government officer to farmer model	YES	<ul style="list-style-type: none"> • It is cheap • It brings government into aquaculture management • It can actually be improved • Government officers have some level of technical knowledge and experience and provide a pool of skilled extension workers 	<ul style="list-style-type: none"> • Two way (there should be demand and supply) 	<ul style="list-style-type: none"> • Physical visits • Appropriate media (Public service announcement, radio) • visual aids • phone • posters 	<ul style="list-style-type: none"> • Small and medium scale aquaculture farmers
2. Universities / NGO's or development agencies to farmers	YES	<ul style="list-style-type: none"> • They provide interface with research and academia • Large pool of research, innovation, technology and human resource • Reduce the cost of extension 	<ul style="list-style-type: none"> • Research institutions/ academia/ NGO/small scale farmers 	<ul style="list-style-type: none"> • Physical visits • Appropriate Media • Funding for research • ICT 	<ul style="list-style-type: none"> • Small, medium and large scale farmers

Model	YES/ NO	WHY	WHO DRIVES	MEDIUM OR MATERIALS	TARGET
3. Association to farmer	YES	<ul style="list-style-type: none"> Key for enforcement of standards They can be used to break literacy barriers Help improve knowledge and skills They can apply peer pressure to get attention from policy makers 	<ul style="list-style-type: none"> Association members 	<ul style="list-style-type: none"> Association meetings Constitution or memorandum Appropriate Media 	<ul style="list-style-type: none"> Association members
4. Commercial farmer to entrant/ small scale farmer (passive or active)	YES	<ul style="list-style-type: none"> Support outgrower schemes Support knowledge and schemes Cost effective and sustainable Ready market for small scale farmers 	<ul style="list-style-type: none"> Commercial and small scale farmers farm 	<ul style="list-style-type: none"> Physical visits Appropriate media 	<ul style="list-style-type: none"> Commercial and small scale farmers
5. Farmer to farmer	YES	<ul style="list-style-type: none"> Effective skills acquisition and transfer between farmers Cost effective Sustains continuity of trust 	<ul style="list-style-type: none"> Farmers on both sides (experience farmers and possible new comers) 	<ul style="list-style-type: none"> Physical visits Meetings Appropriate media 	<ul style="list-style-type: none"> Farmers
6. Feed (fish buyer) company to farmer	YES	<ul style="list-style-type: none"> Feed companies want to promote their feed and the farmer needs feed 	<ul style="list-style-type: none"> Feed companies and farmers 	<ul style="list-style-type: none"> Physical visits Meetings Appropriate media 	<ul style="list-style-type: none"> Feed companies and farmers
7. Vocational training model	YES	<ul style="list-style-type: none"> Important when transferring specific skills and technology New entrance 	<ul style="list-style-type: none"> Vocational training institutions Farmer associations Individual farmers New entrance into aquaculture 	<ul style="list-style-type: none"> Training materials Appropriate media Physical institutions Online medium for training 	<ul style="list-style-type: none"> Vocational training institutions Farmer associations Individual farmers New entrance into aquaculture
8. Internship model	YES	<ul style="list-style-type: none"> Have knowledge but need skill Low cost labour 	<ul style="list-style-type: none"> Interns Farmers Academia 	<ul style="list-style-type: none"> Farm On the job training 	<ul style="list-style-type: none"> Interns Farmers
9. Skills Clusters	YES	<ul style="list-style-type: none"> Encourages farmer to farmer skills transfer and other residents skills Supports low cost operation 	<ul style="list-style-type: none"> Cluster farmers Service delivery people 	<ul style="list-style-type: none"> On the job training (supports look and learn training) 	<ul style="list-style-type: none"> Cluster farmers
10. Centres of Excellence / Knowledge Hubs	YES	<ul style="list-style-type: none"> One umbrella that has the aims and objectives of aquaculture value chain 	<ul style="list-style-type: none"> Government Development partners Private sector 	<ul style="list-style-type: none"> Physical visits Appropriate Media Funding for research ICT 	<ul style="list-style-type: none"> Farmers Centres Development partners Government

Model	YES/ NO	WHY	WHO DRIVES	MEDIUM OR MATERIALS	TARGET
11. Demonstration Projects	YES	<ul style="list-style-type: none"> Improve credibility with farmers Encourages investors, financial services 	<ul style="list-style-type: none"> Development partners Government Suppliers Academia 	<ul style="list-style-type: none"> Physical farms 	<ul style="list-style-type: none"> Development partners Government Suppliers Academia
12. Others Model farms	YES	<ul style="list-style-type: none"> Improve credibility with farmers Encourages investors, financial services To establish standards of production 	<ul style="list-style-type: none"> Development partners Government Suppliers Academia 	<ul style="list-style-type: none"> Physical farms 	<ul style="list-style-type: none"> Development partners Government Suppliers Academia

4.4.2. Group Two

Group Two's deliberations are summarised in the table 6 below:

Table 6. Group Two's Business Model Options and Comments

Model	Appropriateness	Comments
Small scale Household	Not recommended	Not profitable, not sustainable because income is very low, Family labour not quantified
Small scale Private	Recommended	Entrepreneurial oriented, Swift and fast decision making, Management simple and easy, Easy in product management, Easy marketing and trading
Small scale Community	Not Recommended	Not easy to manage, decision making very difficult, No ownership
Large Scale household	Not recommended	Not profitable, not sustainable because its not business oriented, Family labour not quantified
Large Scale Community	Not recommended	Not profit oriented, Not easy to manage, decision making very difficult, No ownership
Public Private Partnerships	Recommended	Opportunity for Synergy ,With good policies better and easy to manage, Checks and balances can be easily instituted
Cooperatives	Recommended	Pool resources together, Bulk purchases, Supports accessing of funds, Experience sharing,
Multinationals (Africa)	Recommended	Possibility of partnership, access to capital and knowledge, Access to regional and continental market
Multinationals (Global)	Recommended	Possibility of partnership, access to capital and knowledge, Access to Global markets
Franchise	Not recommended	This is a marketing system and not production system
Supplier supported	Recommended	Reduces the burden of working capital,
Market supported	Recommended	Facilitates access to market, credit , facilities like fish markets, Encourages growth in business
Full value chain exploitation	Difficult to implement	Not easy to coordinate, No Specialisation in products,
Associations	Country based	Not viable in many countries
Contract farming model	Recommended	Similar to Market or supplier supported
Cluster farming	Recommended	Able to regulate environment, regulation of production, experience sharing, facilitates extension and service delivery
Nucleus out grower farming	Recommended	Easy access to input and marketing, minimal risk to out growers, Reduction of financial burden

4.4.3. Group Three

Group Three’s basic synthesis of business model options is summarised in table 7 and the illustrations below (figure 23).

Table 7. Group Three’s Proposed Business Model Options

Business Models	Small	Medium	Large commercial
Small/ large scale private (household)			
Small/ large scale community			
PPP			
Cooperatives			
Multinationals (Africa)			
Multinationals (Global)			
Franchise			
Supplier supported (e.g. feed) supported)			

The following characteristics were considered as being necessary for sustainable business models:

- i. Ownership
- ii. Governance or administration
- iii. Profile of the actors
- iv. Scale of production above break-even points
- v. Appropriate production systems
- vi. Viability of models (vii)Legislation of policies

The elements and linkages within the value chain that needed most attention for business development were:

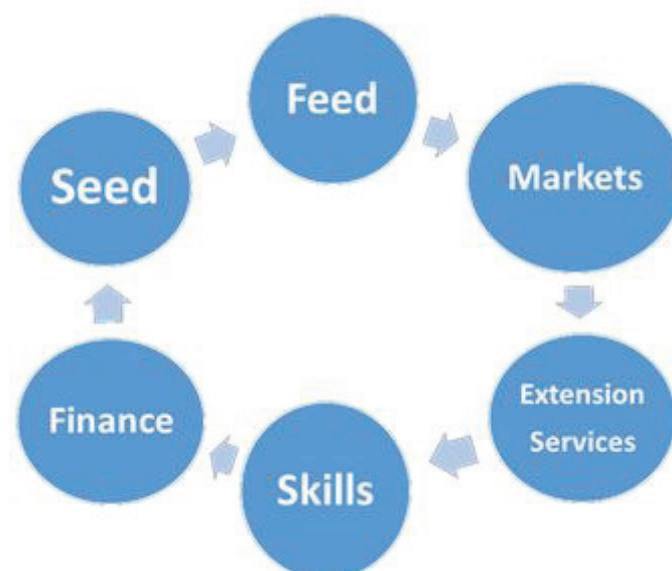


Figure 23. Aspects of the Value Chain needing Business Models

5.0. OUTCOMES OF THE WORKSHOP

The following is a summary of the outcomes from the workshops:

5.1. Aquaculture Business Models

- i. The wide array of stakeholders and stakeholder needs vis-à-vis the status of aquaculture and aquaculture-value chains in the different countries was presented. Hence, rather than a single model, a range of options were proposed. It was indicated that each model should be characterised to provide appropriate guidance to Member States and Stakeholders.
- ii. The proposed models should include those aimed at smallholder (individual and community), medium and large holdings, multinational entities and cooperatives.
- iii. Establishing partnerships between the public and private sector (PPP), as well as other entities is important. Such models should be adopted and piloted.
- iv. Disaggregation of business models to match all value chain components.
- v. Innovative approaches to securing financing should be investigated and included as part of the model components in addition to traditional sourcing through commercial financial institutions. Notably, non-monetary mechanisms should be investigated.
- vi. Risk reduction and mitigation mechanisms should be considered in the models, both at the enterprise and value-chain levels.
- vii. Characteristics for sustainable business models needs to be considered in the business's ownership, governance or administration, profile of the participants, scale of production, production systems, sustainability of models, legal and policy dimensions, as well as markets.
- viii. Business models that will enhance the expansion and improving of the robustness of value chains should be identified and supported.
- ix. The elements of the value-chain that needs most attention are feed, seed, markets, extension services, financial services and skills development.

Best Practices for Aquaculture Business

- i. The development of appropriate business models for aquaculture will depend on a range of best business practices. These were identified to include better credit provision, better risk management, better business planning etc.
- ii. The models should be supported by the development of further best practices.

5.2. Aquaculture Extension Services

- i. Extension services should be market-oriented, innovative and entrepreneurial in themselves.
- ii. Aquaculture extension services and dissemination of information should strive for timely transfer of relevant know-how (knowledge and skills) to enable new entrants and existing participants to successfully establish and run aquaculture enterprises, as well as positively change attitudes to the sector.
- iii. In view of the wide-array of needs, several models should be available and selected based on their appropriateness for the local situation, and tailored to specific private and public stakeholder needs across the value-chain. Models proposed and discussed, included government extension services, universities, NGO's, farmers associations, larger commercial farmers and/or value-chain entities (e.g. feed manufactures, seed producers), farmer-to-farmer pathways, vocational training, internships, skill clusters, Centres of Excellence/knowledge hubs, demonstration projects and model farms.
- iv. The drivers for these extension options were identified. Among the drivers were producers, government, competent authorities, value-chain entities (e.g. feed, seed companies), tertiary training institutions, research entities, markets and NGO's.
- v. The role of social media for communication in view of its cost and reachability attributes, was recommended. However safeguards would have to be made against information overload, fake news and to ensure relevant information was disseminated. Know-how could be disseminated through step-by-step instructions coupled with video clips and other visual aids. Stakeholders would also need to be guided on how to use these to access the extension materials referred to.
- vi. Youth and gender interests and needs should be catered for.

Best Practices for Delivering Relevant Extension Services and for Information Dissemination

- i. The development of appropriate extension models for aquaculture will depend on a range of best practices. These were identified to include better transfer of knowledge to skills, means to support indigenous knowledge, use of social media and more.
- ii. The extension models should be supported by the development of further best practices.

6.0. RECOMMENDATIONS FROM THE MEETING

- i. Smallholder producers should not be left out of the equation because they constitute the majority of Africa's aquaculture producers and allied aquaculture service related businesses. They play a meaningful role in ensuring food security. The implementation of appropriate business models and extension actions, tailored to their needs, will enable transformation into more viable entities.
- ii. The wide array of stakeholders and stakeholder needs vis-à-vis the status of aquaculture and aquaculture-value chains in the different countries was presented. Hence, rather than a single model, a range of options were proposed. It was indicated that each model should be characterised to provide appropriate guidance to Member States and Stakeholders.
- iii. Generic models based upon the size of business, individual/co-operate ownership, hierarchy and level of integration in the value-chain, were identified and comments given on their appropriateness. These included smallholder, community, cluster farming, cooperatives, and large and medium scale enterprises.
- iv. The content describing the proposed models in the 'Guidelines' should spell out the elements of the model, as well as critical points and issues that would be addressed for successful implementation.
- v. The definition for aquaculture extension has been revised to incorporate timely delivery of accurate information, by appropriate means.
- vi. The role of social media (and mobile phone opportunities) should be investigated for extension and the delivery of other services.

Annexes

ANNEX I: CONCEPT NOTE

BACKGROUND

The Joint Conference of Africa ministers of agriculture, rural development and fisheries and aquaculture in 2014 recognized the potential of the aquaculture sector to generate wealth, social benefits and contribute to the development of the African economy. This recognition stems from Africa's natural resource potential for aquaculture and the rapidly increasing demand for fish amid declining fishery yields. Among the factors hampering the full realization of the continents aquaculture production potential are inadequate skills and technical know-how, inappropriate policies, poor knowledge on business skills for commercialization enterprise development and a gross absence of reference to environmental consideration. Furthermore, most aquaculture production in Africa is done on small-holder subsistence farms. Consequently despite positive trends in growth aquaculture production is still low contributing to only 2% of the continent's total fish production that is estimated to be about 10 million mt.

Africa's total fish production does not meet the Continents food fish requirements. Africa has an estimated population of 1.6 billion people. The continents current food fish supply is estimated at about 9 kg per capita per annum while the global average has risen to approximately 20 kg capita per annum. The likelihood that capture fishery production can significantly be increased over the next 20 years to meet demand is low because most of the commercially important fish stocks are reported to be fully exploited or overexploited (FAO 2009). It is not a surprise therefore that over past five years Africa has become a net importer of fish. Aquaculture currently provides the most sustainable option for the continent to expand its fish production. Consequently, The Policy Reform Strategy for Fisheries and Aquaculture in Africa, Africa's blue print for the sector, aims to create an enabling environment that shall lead to the transformation Africa's aquaculture into a sustainable market-oriented private-sector led commercial agricultural activity that meets the CAADP objectives. The example of Asian aquaculture shows this goal is achievable where a conducive environment exists.

However there are still challenges to be surmounted to meet benchmarks for commercial aquaculture for increased sustainable contribution to fish supplies and socio-economic development. To achieve this, a shift in approach from smallholder largely subsistence focused at household needs to market-oriented production focused at the populations needs is necessary.

This shift in approach requires transformation in the aquaculture value chain whereby enterprise viability, market access and the competitiveness of aquaculture products, goods and services become key performance indicators. Furthermore, the different and inter-dependent businesses and actors within the value-chain should be independently and collectively viable and profitable if there is to be sustainable growth and expansion of the sector.

Within the scope of the PFRS, accomplishing this entails the creation on an enabling environment that supports the development and the expansion of viable integrated value chains right from primary production to the consumer. The guidance for the transformation to sustainable

commercial aquaculture development cannot effectively be done in the absence of appropriate business models and extension services.

OBJECTIVES OF THE MEETING

The objectives of the consultative meeting therefore are to:

1. Review and identify the key constraints and factors of success for commercial aquaculture and the provision of extension services for aquaculture in Africa.
2. Deliberate on the requirements for developing aquaculture value-chains and subsequently identify/develop appropriate business models with matching extension models as guidelines to support the development of commercial aquaculture value-chain(s).

EXPECTED OUTPUTS OF THE MEETING

1. Share lessons and experiences within and without the continent on best practices on commercial aquaculture business and extension services.
2. Draft business models as guidelines to support sustainable commercial aquaculture development in Africa.
3. Draft guidelines for extension strategies to support sustainable commercial aquaculture development in Africa.

ANNEX 2: PROGRAM OF THE WORKSHOP

DAY ONE - Monday 24 th July, 2017		
08.45 – 09.00	Registration	AU-IBAR
09.00 - 09.10	Welcome remarks by Head APU	AU-IBAR
	SESSION 1: THE STATUS OF SUSTAINABLE COMMERCIAL AQUACULTURE DEVELOPMENT IN AFRICA	
09.10 – 09.20	Background and objectives of the workshop	AU-IBAR
09.20 – 09.35	Aquaculture Species Value-Chains	D. Gasnier
09.35 – 10.05	Position paper: Enhancing Aquaculture through Business Planning	E. Hinrichsen
10.05 – 10.30	General discussion, thirty minutes	D. Gasnier
10.30 – 11.00	<i>Tea-Break</i>	
	SESSION 2: STAKEHOLDER EXPERIENCES OF PRIVATE-SECTOR COMMERCIAL AQUACULTURE PRODUCTION AND POST-HARVEST ASPECTS	
11.00 – 12.00	Sharing of experiences of private-sector farmers, farmers organizations and service providers in commercial aquaculture production, post- harvest and marketing aspects <i>A. Ansah, O. Rotmi, E. Were, L. Kobusingye, R. Ball, Bonzali Bank</i>	Participants
12.00 – 13.00	Group discussion to identify prospective business models to support market-led sustainable aquaculture development in Africa	AU-IBAR
13.00 – 14.00	<i>Lunch</i>	
	SESSION 3: STAKEHOLDER EXPERIENCES OF PUBLIC-PRIVATE PARTNERSHIPS TO PROMOTE COMMERCIAL AQUACULTURE	
14.00 – 14.15	Public Private Partnerships as Options for Sustainable Aquaculture Development	S. Agamah
	Sharing of experiences of PPP experiences to support commercial aquaculture development <i>J. Mulumbu, H. Stander, A. Orbi, V. Rahantarimalala, L. Kobusingye</i>	
15.00-15.30	Session discussion	AU-IBAR
15.30– 15.45	<i>Tea Break</i>	
15.45 – 16.30	Group discussion of the collective experiences shared to identify/propose best practices in aquaculture business as examples to guide market-led sustainable commercial aquaculture development in Africa	AU-IBAR
16.30 – 17.00	Wrap Up plenary	AU-IBAR
DAY TWO – Tuesday 26 th July, 2017		
	SESSION 4: GROUP DISCUSSIONS	
08.45 – 09.00	Registration	AU-IBAR
09.00 – 09.30	Position paper: An Overview of Aquaculture Extension Strategies and Practices <i>E. Hinrichsen</i>	
09.30 – 09.40	Discussion of Position Paper	
	Sharing of Private and Public Sector Experiences in Aquaculture Extension	
09.40 – 09.50	Marine Aquaculture Training Centre, University of Stellenbosch	H. Stander
09.50 – 10.00	ARAC – Overview, successes, challenges, future plans	D. Bekibele
10.00 – 10.10	University of Lagos	A. Martins
10.20 – 10.30	Session Discussion that includes sharing of experiences of private-sector provision of extension services to clients	
10.30 – 11.00	<i>Tea Break</i>	
11.00 - 12.30	Group discussions to identify/formulate models/strategies for the provision of aquaculture extension services to support market-led sustainable aquaculture development in Africa	Participants
12.30 – 13.00	Groups wrapping up and compiling their outputs	AU-IBAR
13.00 – 14.00	<i>Lunch</i>	

	SESSION 4: DEVELOPMENT OF REGIONAL FRAMEWORKS – Drafting Guidelines for Regional Frameworks	
14.00 – 15.00	Groups discussions to Identify Best Practices for the provision of aquaculture extension services to support market-led sustainable aquaculture development in Africa.	ECOWAS
15.00 – 15.30	Plenary compiling group outputs	AU-IBAR
15.30 – 16.00	<i>Tea Break</i>	
16.00 – 17.00	OFFICIAL OPENING OF ALL THREE WORKSHOPS Group Photo	

ANNEX 3: LIST OF PARTICIPANTS

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ANNEX 4: TERMS OF REFERENCE FOR GROUP DISCUSSION ON BUSINESS MODELS

Background

The aquaculture policy objective in the PFRS seeks to jumpstart market-led sustainable aquaculture development based upon sound evidence-based strategies and implementation plans to increase aquaculture's contribution to the CAADP, ie. wealth creation, food and nutrition security, employment, rural development and growth of the sector; hence of the agricultural sector at large. A value-chain approach, focusing at improving the environment to stimulate the transformation of African aquaculture from being largely a smallholder subsistence farm activity into a private-sector driven commercial agricultural sector capable of significantly contributing to both national and regional food/nutrition and socio-economic needs. This overall objective shall necessitate:

- i. A tremendous increase in the volumes of aquatic animal produce and products from aquaculture (e.g. 50% of Asia's fish production is now from aquaculture).
- ii. Diversification and expansion of the aquaculture value-chain beyond the farmer immediate environs into one that supports a wider array of more viable production systems and service related enterprises meeting the needs of production, post-harvest and marketing to ensure right quality products get to the various markets competitively.
- iii. Environmental biosecurity is taken care of to ensure sustainability.

As such, the Guide for the Implementation of the PFRS stipulates the following key indicators to guide the transformation of the aquaculture sector:

- i. Producing fish and fish products at the right place and price to meet the market demand and requirements
- ii. Aquaculture infrastructure
- iii. Investments and finance strategy for aquaculture
- iv. Quality assurance and standards
- v. Skills development plan
- vi. Research and extension

This workshop therefore seeks to identify business and extension options that would support the PFRS goals. Specifically, as stated in the Concept Note for the meeting, the objectives of the meeting

- i. Review and identify the key constraints and factors of success for commercial aquaculture

and the provision of extension services for aquaculture in Africa.

- ii. Deliberate on the requirements for developing aquaculture value-chains and subsequently identify/develop appropriate business models with matching extension models as guidelines to support the development of commercial aquaculture value-chain(s).

The expected outputs of the workshop are:

- i. Share lessons and experiences within and without the continent on best practices on commercial aquaculture business and extension services.
- ii. Draft business models as guidelines to support sustainable commercial aquaculture development in Africa.
- iii. Draft guidelines for extension strategies to support sustainable commercial aquaculture development in Africa.

The Terms of Reference for the group discussions on business models are thus:

- i. Identify prospective business models to support market-led sustainable aquaculture development in Africa

What do we mean by a business model?

An aquaculture business model, is the way an aquaculture enterprise generates revenue and makes profit based on its specific set of activities. A business model is a clear, concise way of picturing how a business operates, i.e.. target group (producer vs. market), business process, business resources, value proposition (SME, MSE), prospective business partners, its market, innovation. A business model is sometimes confused with business plan. A business model is a section of the business plan. The plan is a detailed presentation of the strategies that will be used to implement the model, the resources needed including people and capital, and has detailed projections of the envisaged results from implementing the model. A business model may change during the course of operations subject to the performance and needs of the business. It's the guide to help design the business strategy and plan.

Some Key Questions to Guide Group Discussions on Business Models

What are the most appropriate business models for all levels of aquaculture in Africa:

- Small / large scale private (household)
- Small / large scale community
- Public private partnerships
- Cooperatives

- Multinationals (Africa)
 - Multinationals (Global)
 - Franchise
 - Supplier supported models (e.g. feed supported)
 - Market supported models
 - Model that expands full value chain
 - Other
- ii. Group discussion of the collective experiences shared to identify/propose best practices in aquaculture business as examples to guide marketled sustainable commercial aquaculture development in Africa.

What do we mean by a Best Practices for MarketOriented Aquaculture?

Best practices for market-oriented aquaculture enterprise in this context is viewed as the considerations, procedures and protocols designed to foster an efficient and responsible market-led and private-sector driven aquaculture sector (based upon technically sound principles, economically viable for all components of the value-chain, takes into account community socio-economic needs and ethical values e.g. animal welfare) that help ensure the supply of quality services and safe consumable products to the market - while at the same time protecting and improving the environment.

Some Key Questions to Guide Group Discussions Identify Best Practices for Market-Oriented Aquaculture

- In Africa, which are the elements of the value chain that needs most attention.
- How are value chains made more robust?
- How are transactional costs in the value chain minimized?
- How to create better access to finance and funding (credit / collateral)?
- How can access to markets be improved?
- Dealing with volume and quality requirements in new markets

What regional and national policies would create a supportive environment for the private sector to implement the proposed business models successfully?

- What other Best Practices in Business

ANNEX 5: TERMS OF REFERENCE FOR GROUP DISCUSSION ON EXTENSION MODELS

Background

The aquaculture policy objective in the PFRS seeks to jumpstart market-led sustainable aquaculture development based upon sound evidence-based strategies and implementation plans to increase aquaculture's contribution to the CAADP, ie. wealth creation, food and nutrition security, employment, rural development and growth of the sector; hence of the agricultural sector at large.

A value-chain approach, focusing at improving the environment to stimulate/enhance the transformation of African aquaculture from being largely a smallholder subsistence farm activity into a private-sector driven commercial agricultural sector capable of significantly contributing to both national and regional food/nutrition and socio-economic needs. This overall objective necessitates:

- i. A tremendous increase in the volumes of aquatic animal produce and products from aquaculture (e.g. 50% of Asia's fish production is now from aquaculture).
- ii. Diversification and expansion of the aquaculture value-chain beyond the farmer immediate environs into one that supports a wider array of more viable production systems and service related enterprises meeting the needs of production, post-harvest and marketing to ensure right quality products get to the various markets competitively.
- iii. Environmental biosecurity is taken care of to ensure sustainability.

As such, the Guide for the Implementation of the PFRS stipulates the following key indicators to guide the transformation of the aquaculture sector:

- i. Producing fish and fish products at the right place and price to meet the market demand and requirements?
- ii. Aquaculture infrastructure
- iii. Investments and finance strategy for aquaculture
- iv. Quality assurance and standards
- v. Skills development plan
- vi. Research and extension

This workshop focuses at working out business and extension options that would support the PFRS goals. Specifically, objectives of the workshop are:

- i. Review and identify the key constraints and factors of success for commercial aquaculture and the provision of extension services for aquaculture in Africa.
- ii. Deliberate on the requirements for developing aquaculture value-chains and subsequently identify/develop appropriate business models with matching extension models as guidelines to support the development of commercial aquaculture value-chain(s).

The expected outcomes of the workshop are:

- i. Share lessons and experiences within and without the continent on best practices on commercial aquaculture business and extension services.
- ii. Draft business models as guidelines to support sustainable commercial aquaculture development in Africa.
- iii. Draft guidelines for extension strategies to support sustainable commercial aquaculture development in Africa.

Consequently, the Terms of Reference for the Group discussions on extension delivery are:

- i. Identify and/or formulate models or strategies for the provision of aquaculture extension services to support market-led sustainable aquaculture development in Africa

What do we mean by aquaculture extension?

Agricultural extension is the application of scientific research and new knowledge to agricultural practices through farmer education. Extension improves the capabilities of the various actors in the value-chain to understand their problems and utilize their resources based upon scientific knowledge to overcome these and improve the performance of their enterprises. Its key elements are dissemination of information to, training of and adoption/adaption by the targeted audience.

The basic model of Extension system consists of six components, notably:

- A body of new and useful knowledge,
 - Farming communities who need the knowledge,
 - An extension agency to link the two,
 - A set of extension educational methods,
 - Infrastructure and support services,
 - Dissemination strategy
- ii. Identify Best Practices for the provision of aquaculture extension services to support market-led sustainable aquaculture development in Africa.

What do we mean by best practices in aquaculture extension?

Best practices in extension services that are often considered as those that promote:

- More market-orientated extension services => meeting needs of target group,
- Mechanisms that enable farmers to have more of an influence e.g. on quality of extension delivery.
- Use technologies and methods that enable more efficient delivery and reach larger numbers of farmers at lower costs.
- Effective utilization and involvement of other related resources or parties (such as other groups / associations), will encourage interaction and sharing information that is known to be of value, including to the private sector. The private sector often understand market demands best and may be willing to financially contribute, and sometimes are doing extension already.

Most of all extension services in delivery and in policy should be market-orientated, innovative and entrepreneurial in themselves.

GROUP QUESTIONS

1. Devise a new definition for aquaculture extension in Africa:

Transfer of aquaculture value chain know-how (knowledge and skills) to new entrants and existing participants in an accurate and timely manner that can contribute to success.

2. Which extension model should be pursued for Africa and why?

	Model	YES / NO	WHY	WHO DRIVES	MEDIUM OR MATERIALS	TARGET
1	Government officer to farmer model					
2	Universities / NGO's or development agencies to farmers					
3	Association to farmer					
4	Commercial farmer to entrant/small scale farmer (passive or active)					
5	Farmer to farmer					
6	Feed (fish buyer) company to farmer					
7	Vocational training model					
8	Internship model					
9	Skill clusters					
10	Centres of Excellence / Knowledge Hubs					
11	Demonstration Projects					
12	Other					

3. Can social media play a role in extension?
4. Can we address the following social media aspects (how):
 - a. Information overload
 - b. Irrelevant and wrong information (fake news!)
 - c. Who moderates information
 - d. Who generates information
 - e. How does social media deal with the “skills” aspects?

ANNEX 6: DISCUSSION GROUPS

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2. Bhishnee Mungur- Ministry of Ocean Economy(Rapporteur)
3. Eschete Dejen- IGAD
4. Richard Ball- SAPTIA
5. Solomon Agamah-B-Consulting
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7. Paul Mwera- Lake Harvest
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Group Two

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