

Business Cases for Aquaculture Investment in Ghana



Client:

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Facts and Figures of the Aquaculture Sector in Ghana

Ghana has an annual deficit of over a half million metric tonnes of fish and fishery products. With declining fisheries and reducing fish imports, the country can only sustain the demand of animal proteins from fish (60% of dietary animal protein) through the development of aquaculture to maintain the current per capita fish consumption (25 kg/person/year). Tilapia (*Oreochromis niloticus*) is the most preferred fish species for farming, market and consumption. Price of Tilapia (farmed and wild) in Ghana is high (US\$2,50 to over US\$3,00 per kilo) compared to other animal products such as meat and chicken and is almost double the world market price. Cage farming of Tilapia mainly in Lake Volta, has developed fast between 2009 and 2014 as a commercial activity with an average annual growth of 73% (Figure 1) and contributes nearly 90% of the total production from aquaculture. The demand for fresh Tilapia is high with preference to the size range from 250-350 g. Bigger size fish are hardly sold out.

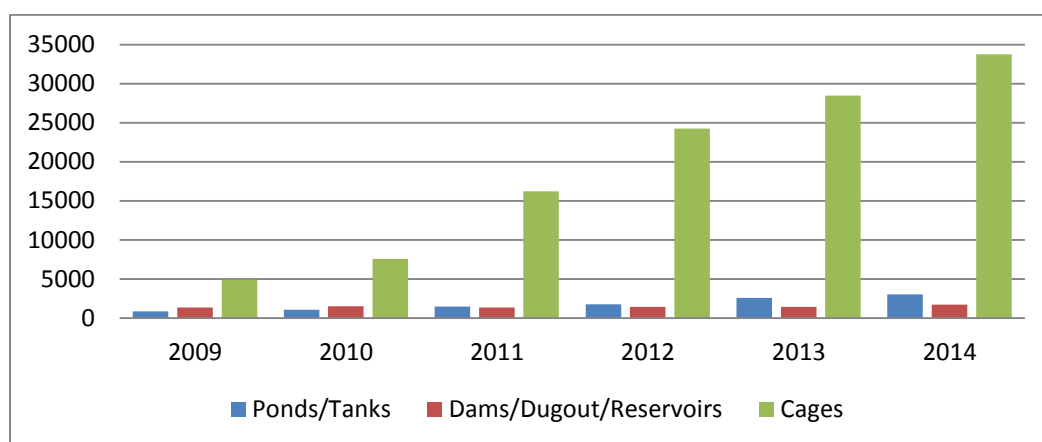


Figure 1. Annual aquaculture production in Ghana between 2009 and 2014.

To stimulate local fish farming, the government has banned the import of frozen Tilapia and embarked on a highly ambitious National Aquaculture Development Plan (GNADP) with a production target of 100,000 tons of farmed fish at the end 2016. With only a total production of 38,535 tons out of which 33,760 tons were produced in cages in 2014, business opportunities exist in fish farming, input supply, technology and knowledge transfer in which the Dutch Aquaculture industries can get involved to fast-track improvements and to increase the fish production in the country. For this reason, three business cases have been developed alongside an analysis of the aquaculture fish value chain in Ghana and are presented.

Business case 1: Fish Feed Mill

Feeds constitute up to 70% of the total production costs and are responsible for the high production costs in Ghanaian fish farms. Imported feeds are 30% more expensive than locally produced feeds. The major local feed manufacturer (Raanan) produces annually 25,000 tons of fish feed for Ghana and 5,000 tons for the sub-region. The feed mill is currently running at its maximum capacity after several upgrading. There is a market for additional 30,000 tons per year of local feed production.

Business case 2: Hatchery

Despite an increase in number of private hatcheries stimulated by the development of cage farming and the total production of 130,127,500 fingerlings in 2013, 50 million fingerlings are estimated to be lacking annually. The Akosombo strain is the only Tilapia strain that is legally authorised for cultivation today.

Business case 3: Training and Education.

Small- and medium-scale cage fish farms lack skilled employees and managers which affect the economic performances of these farms.

Introduction

The Dutch government actively supports private sector involvement in the agro-food sector in Africa in order to enhance food security as well as to stimulate economic development. The Embassy of the Kingdom of the Netherlands in Accra (EKN) is interested to support the Dutch businesses in the aquaculture subsector in Ghana. During a field mission to Ghana in February 2015 conducted by Wageningen UR (IMARES, LEI), CSIR-WRI and Aquaculture Experience, a comprehensive aquaculture Value Chain Analysis (VCA) was carried out to identify business opportunities and to develop business cases where Dutch companies could play a role.

1.1. Business case 1: Fish Feed Mill

Background

It is projected that Tilapia cage farming output in Ghana will increase with several thousand tons per year. Current production is app. 40,000 tons. With an FCR of app. 1.7 a total of 68,000 tons of feed is required to produce 40,000 tons of Tilapia. There is only one specialised local aqua feed mill, namely Raanan. This company produces 25,000 tons annually for the Ghanaian market. However Raanan is currently producing at its maximum capacity. This implies that 43,000 tons of feed is imported and produced locally by non-dedicated feed mills and on-farm by the farmers. However the locally produced feeds are very poor in quality as they are not extruded for example. Imported feed is app. 30% more expensive than locally produced Raanan feed so importation does not offer a solution. On average the costs for Tilapia farming in Ghana consists of 70% of feed cost.

Market needs

To facilitate the growth in Tilapia farming and to reduce the production costs, the industry needs more feed with reliable volumes, a stable price and of a good quality. In the near future a new feed mill is needed in order to meet the feed demand from Tilapia farming. Potentially there is already a market of 20-30 thousand tons, the amount of feed that is currently imported. With cheaper locally available high quality feed, fish production is going to be boosted.

For hatcheries there is a specific need for high protein feed (45%). Coppens is currently importing this type of feed into Ghana for a relatively high price. A local feed mill would also introduce more competitiveness in feed production as Raanan is currently having a monopoly position in the market and in spite of its much lower selling price than imported feeds operates with very high gross margins on its sales. Ceteris paribus, more competitiveness will lower the feed prices which will be in favour of the hatcheries and cage farms.

Cost/benefit analysis

In the table 1 below we project a feed mill with effective capacity of 4 tons per hour (extruder of 5 tons per hour). Annually, at full capacity, the output of the feed mill will be app. 30,000 tons. The investments are best estimates of the installation costs of a production plant utilising modern (Western) equipment amounting to 4,2 million US\$. Operational costs are based on experience in running such a facility, adapted to local conditions and costs. The margins are determined based on model formulations, current market prices for ingredients and present market prices for the final product. Gross margin used in the calculation is app. 60% of the estimated actual margins of Raanan feed.

Table 1. Calculations of the Fish Feed Mill

	Production in tons/Yr	Total sales US\$	Cost of goods sold US\$/ton	Gross margin US\$/ton	Total Gross margin US\$/Yr	Total Operational costs US\$/Yr	Marketing expenses US\$/Yr	Admin. costs US\$/Yr	Net Operating Income US\$/Yr	Working capital in US\$	Interest US\$/Yr	Deprec. 20 yrs US\$/Yr	Net profit US\$/Yr
1 shift (8 hrs)	8,000	5,600,250	700	250	2,000,000	984,000	100,000	25,000	891,000	1,400,000	560,000	210,000	121,000
2 shifts (16 hrs)	16,000	11,200,250	700	250	4,000,000	1,566,000	150,000	35,000	2,249,000	2,800,000	700,000	210,000	1,339,000
3 shifts (24 hrs) 5d/wk	25,000	17,500,250	700	250	6,250,000	2,166,600	200,000	40,000	3,843,400	4,375,000	857,500	210,000	2,775,900
4 shifts (24 hrs) 5d/wk	32,000	22,400,250	700	250	8,000,000	2,683,200	200,000	45,000	5,071,800	5,600,000	980,000	210,000	3,881,800

SWOT analysis

In the table 2 below a short SWOT analysis is presented. From table 1 we can conclude that the need for feed is certainly there and that an additional feed mill is for sure a very good business opportunity. However the success of an additional feed mill depends on the local availability of quality feed ingredients and bottlenecks further in the value chain. The first most important bottleneck is a reliable quantity and quality of fingerlings. The second most important bottleneck is the lack of knowledge and skills with locally owned farms.

Table 2. SWOT analysis Fish Feed Mill

Strengths	Weaknesses	Opportunities	Threats
Calculations illustrate need for feed mill	Quality and quantity of fingerling production	High demand for Tilapia in Ghana	Fluctuations in local currency
Dutch Aquaculture Experts and Foot Tech Africa are strong public-private partnerships, eager to do business in Africa	Highly dependent on import of expensive ingredients	Raanan feed mill already at full capacity. Cannot meet future demand	No reliable quantity and quality of local ingredients
Infrastructure and research facilities available at CSIR-Water Research Institute	Only few professional foreign owned farms.	Imported feed is 30% more expensive than local feed	Legal uncertainties and bureaucracy with respect to decision making and investments
Available local feed expertise and labour	Lack of knowledge and skills with locally owned farms	Aquaculture likely to grow in the region (e.g. Nigeria). Potential for exporting feed.	Competition with parallel fish feed investors
Stable democratic governance and Government's conducive policies and support	Lack of infrastructure hampers development of new farms and influences transport	5 years Tax holidays for agro-business start-ups	
Available Fertile lands and Existing strong farmer cooperatives for out-grower schemes of feed ingredients (e.g. maize, soybean, cassava)			

Next steps

To bring this business case to the next level it is proposed to share the current case with Dutch private companies active in feed production.

1.2. Business case 2: Hatchery

Background

Currently there is no reliable supply of good quality fry and fingerlings to the outgrowing farms. The VCA illustrates that existing hatcheries cannot meet the market demand in terms of quantity and quality of fingerlings due to a lack of knowledge and experience, lack of equipment and logistics that are not optimised. This is one of the major bottlenecks to boost the Tilapia farming in Ghana.

Market needs

To facilitate the growth in Tilapia farming outgrowing farms urgently need a reliable supply of good quality fry and fingerlings. Presently it is estimated that there is a lack of 50 million fingerlings. There is an excellent opportunity for a new hatchery that can produce these quantities reliably.

Cost/benefit analysis

For the business case two options were developed. One focusing on ponds (Table 3) and another focusing on Recirculation Aquaculture Systems (RAS) (Table 4). Specifically the second case considers the option of introducing fully controlled conditions of producing improved tilapia strains in Ghana. In the tables 3 and 4 below a 50 million pieces per year fingerling production is projected in ponds and RAS, respectively.

The investments are best estimates of the installation costs of a hatchery & nursery utilizing modern equipment in the RAS option. Investment costs for a pond based hatchery is estimated at 1,3 million US\$ and the RAS option at 3,1 million US\$. Operational costs are based on experience in running either a pond based farm or a RAS respectively, adapted to local conditions and costs. For both options the total sales are projected based on current market prices for 5 g Tilapia fingerlings.

Table 3. Hatchery and grow-out using ponds

	Number of fingerlings per year	Total sales US\$	Total Operational costs in US\$/Yr	Marketing expenses in US\$/Yr	Net Operating Income in US\$/Yr	Working capital in US\$	Interest 10% US\$/Yr	Depreciation US\$/Yr	Net profit US\$/Yr
Grow-out (5 g)	50,000,000	3,030,303	1,271,560	50,000	1,758,743	500,000	134,500	103,462	1,520,781

Table 4. Hatchery and grow-out using RAS

	Number of fingerlings per year	Total sales US\$	Total Operational costs in US\$/Yr	Marketing expenses in US\$/Yr	Net Operating Income in US\$/Yr	Working capital in US\$	Interest 10% US\$/Yr	Depreciation US\$/Yr	Net profit US\$/Yr
Grow-out (5 g)	50,000,000	3,030,303	1,296,485	50,000	1,733,818	500,000	366,250	263,542	1,104,026

In the projections the profitability of RAS is lower due to a much higher investment. However, the level of control and biosecurity in the RAS farm is also higher.

SWOT analysis

In the table 5 below a short SWOT analysis is presented. From table 1 we can conclude that the need for feed is certainly there and that an additional feed mill is surely a very good business opportunity. However the success of an additional feed mill depends on the local availability of quality feed ingredients and bottlenecks further in the value chain. Other important bottlenecks are the shortage in reliable quantity and quality of fingerlings and the lack of knowledge and skills of locally owned fish farms.

Table 5. SWOT analysis Hatchery

Strengths	Weaknesses	Opportunities	Threats
Calculations illustrate need for a hatchery	Only few professional foreign owned cage farms.	High demand for Tilapia in Ghana	Legal uncertainties and bureaucracy with respect to decision making and investments
Dutch Aquaculture Experts (DAE) and FoodTechAfrica (FTA) are strong public-private partnerships, eager to do business in Africa	Lack of knowledge and skills with locally owned cage farms. Production is low.	Low quality and quantity of current fingerling production	Competition with parallel hatchery investors, own hatchery setups by commercial farms
Infrastructure and research facilities available at CSIR-Water Research Institute	Hormone use for sex reversal poses a risk for human health and impacts immune system of Tilapia	High unemployment of youth	
Stable democratic governance and Government's conducive policies and support	Lack of infrastructure hampers development of new farms and influences transport	5 years Tax holidays for agro-business start-ups	
Conducive Land and available water resources			

Next steps

To bring this business case to the next level it is proposed to share the current case with Dutch private companies active in hatcheries, nursery and/or have a more general interest in fish farming in Ghana.

1.3. Business case 3: Training and Education

Background

From the report it is clear that especially local cage farmers experience a lack of knowledge and skills in order to work towards profitable Tilapia farming. This constraint is partly responsible for the app. 1,200 empty cages recently abandoned in the Volta Lake, which were formerly owned by local producers. Knowledge base and skill training of fish farmers is strongly being advocated by MOFAD.

Market needs

Relative to other agribusiness sectors, very few Ghanaians are involved in the fish farming enterprise. Official statistics from the 2010 Ghana Housing and Population Census indicate that only 0.22% of the Ghanaian population is involved in fish farming as an agricultural activity. This situation has arisen because, firstly aqua farming business is fairly recent, and secondly, the interest of prospective and present fish farmers in Ghana remains grossly underserved despite the high numbers of individuals and private companies that have expressed interest in training and investment schemes in fish farming. However, the interest of Ghanaians into fish farming keeps growing yearly as evident in the growth of aqua farms and aquaculture production in recent years (Figure 1). It is for this reason that the Government of Ghana in collaboration with some local institutions and development partners has over the years initiated a number of policies, regulations and programmes to promote and develop the aquaculture industry in Ghana. As Government places much importance of aquaculture to its GDP growth and the provision of food to meet food security needs, many new entrants are expected into the industry, while existing players will need strengthening of their capacities to ensure increased aquaculture production. At the recent stakeholder meeting with MOFAD, Research and Industry in Accra on 26th February 2015, it was recommended that training of farmers take center stage in order to ensure a desirable growth and development of aquaculture in the country. Four hundreds cage fish farmers can be trained each year (Table 6). In Table 7, a short SWOT analysis of the training and education is presented.

Cost/benefit analysis

Table 6. Training and Education

	Number of farms/Yr	Number of farmers/Yr	Training costs (US\$)	Gross Revenue (US\$)	Net Income (US\$)
Skills Development	100	400	400,000	850,000	450,000

SWOT analysis

Table 7. SWOT analysis Training and Education

Strengths	Weaknesses	Opportunities	Threats
Dutch Aquaculture Experts and Foot Tech Africa are strong public-private partnerships, eager to do business in Africa	From a business perspective Training and Education are less attractive to invest in. Partly dependent on government funding/subsidies.	High demand for Tilapia in Ghana	Funding challenges by Farmers
Local knowledge, Infrastructure and research facilities available at CSIR-Water Research Institute		Also small-holders using pond systems can be included in a Training and Education programme	
Identified bodies of fish		National program support	

farmers e.g. Ghana Aquaculture Association (GAA) and Asuogyaman Zone Fish Farmers Association (AZOFFA)	e.g. Ghana Youth Employment and Entrepreneurial Development Agency (GYEEDA), for youth in agriculture/aquaculture
	Establish a cooperative organisation where local and foreign farmers can exchange skills and knowledge

Next steps

To bring this business case to the next level it is proposed to share the current case with Dutch private companies and knowledge institutes such as Wageningen UR active in training and education, capacity building and skills development, transfer of technology and knowledge.

1.4. Follow-up and implementation of the business cases

Companies interested in any of these business cases can contact the Economic and Agriculture department of the Dutch Embassy in Accra or the authors of these business cases to develop a proposal and to conduct a more detailed in-depth study of that specific business cases. Such a proposal may firstly focus on the feasibility of the business case, identifying opportunities and constraints for the implementation.

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Funding Instruments

Interested companies can also use one of the funding instruments available in The Netherlands:

- The DHK subsidy of RVO to carry out a feasibility study (<http://www.rvo.nl/subsidies-regelingen/subsidieregeling-voor-demonstratieprojecten-haalbaarheidsstudies-en-kennisverwerving-dhk>),
- The Dutch Good Growth Fund (DGGF) for Dutch SMEs with interests to invest in emerging economies (<http://www.rvo.nl/subsidies-regelingen/dutch-good-growth-fund-dggf>),
- The public private partnership (PPP) of the Top Sector Agri&Food (<http://www.tki-agrifood.nl>).