

# The Challenges and Prospects of Fish Farming in Ghana: A Project Management Perspective

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**ABSTRACT:** *Prospects and challenges are identified in order to understand the fish farming operations in the African Child vision 2020 which was used as a case study and to be able to suggest better ways for the environmental best practice for fish farming in Ghana. Although, the practice of fish farming started in Ghana in the 1950s the production is still below expectation while a lot of challenges are faced with high fish demand and over exploitation of the fishery resources. Semi-structured interviews were conducted with relevant experts in the field. Findings include that the challenges of fish farming in the African Child transcends from similar challenges across Ghana despite fair efforts of the Government, the challenges continue to spread rapidly thus making it inherently arduous for the fish farmers to cater for the lot in Ghana. Despite the challenges such as lack of funding upon first attempt, the paper concludes that there are growing prospects as noticed in the case of the African Child where oils where gotten from harvested fish could be put on a commercial scale and as such provide an alternative source of importing cooking oil. It is therefore recommended that fish farming should be encouraged as there are lots of prospects in the space; but that its potential and prospects are limited unless more support is rendered by the Government for start-up fish farmers.*

**KEYWORDS:** *Aquaculture, Fish farming, Challenges and Project*

## I. INTRODUCTION

Fish has always been an important source of protein in the human diet and on a global scale, fish and fish products are the most important source of protein and it is estimated that more than 30% of fish for human consumption comes from aquaculture [1]. Over the past three decades, aquaculture has developed to become the fastest growing food-producing sector in the world. A large proportion of fish products come from small-scale producers in developing countries. More than 80% of global aquaculture products are produced in fresh water. From its early development in Asia, aquaculture has undergone huge development and is today highly diversified. Project management provides an organization with power tools that improves its ability to plan, implement, and controls its activities as well as the ways in which it utilizes its people and resources.

Project management has emerged because the development of society becomes more complex and diversified. The PMI, *Project Management Institute*, (PMBOK, 2004), defines project management as the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project.

Fish contributes about 60-70% of the animal protein intake of Ghanaians with a recommended per output consumption of 45 kg. Generally, many Ghanaians are encouraged to take more of this fish protein than meat, since fish is more nutritious and healthy [2]. According to the Ministry of Fisheries, the total annual fish requirement for Ghana is estimated to be 880,000 metric tons (mt) but annual production averages 420,000 mt. This leaves a huge deficit in demand of 460,000 mt, part of which is met through imports and increasing aquaculture productions. Thus, project management has become a center piece for enhancing performance of and organization.

Fish farming is geared towards the improvement of nutritional standards of the people and to create self-employment opportunities for Ghanaian communities. Secondly, fish farming has become more appropriate to developing countries because of the opportunities for waste recycling and integration with crops and animal farming [3]. These opportunities have not been fully utilized in Ghana where fish is most needed. This is because the increasing population places pressure on the demand for fish supply [4]. As a result, the national fish requirement has grown from 676,000 tonnes in 1975 to 840,000 tonnes in 2007.

Although, works have been done in fisheries aquaculture in Ghana, there is need for further research on the management systems practiced by fish farmers to assess the prospects and challenges. This is because farmers have been advised to discuss their problems and challenges for better ways in order to be able to contribute to fish deficit supply of about 400,000 metric tonnes as expected [2]. Secondly, research priorities have been set by the Water Research Institute (WRI)

through consultations conducted internally as well as with other stakeholders while keeping in mind issues such as problems faced by fish farmers [5]. These are plans for better utilization of the country's potential to increase its fish production and availability through aquaculture as well as integrating with agriculture.

Therefore, this research work was undertaken to explore the prospects and challenges for fish farming in Ghana, a case of African child fish pond farm. Generally, small-scale farmers' aquaculture projects provide more employment opportunities per unit of capital investment than those with larger farms. In addition, they have the advantage of being more widely distributed geographically and are locally owned, enabling income distribution among the population [3]. The African Child Vision 2020 which was used as a case study is a non-profit organization established to help less privileged children in Ghana by providing access to free basic education, clean drinking water, healthy nutritional meals and proper health care.

#### **A. Fish Farming in Ghana**

Fish farming started in Ghana in 1953 by the former Department of Fisheries. Thus, it served as hatcheries to support the then culture-based reservoir fishery development programme of the colonial administration. In 1957, the government of Ghana adopted a policy to develop fish ponds for farming within all irrigation schemes in the country [5]. There was a boost in early 1980s, following a nation-wide campaign by then military government. Subsequently, the first experimental fish farm was established in the Upper West Region in 1985. During the period of 1982 to 1985, the number of fish ponds increased from 578 to 1,390. Gradually, the number rose to 1,400 in 1986; covering an average surface area of 685 m square. In order to increase further, research collaboration between International Centre for Living Aquatic Resources Management (ICLARM) and the Institute of Aquatic Biology (IAB), Accra, Ghana, began in 1991 to investigate the development of aquaculture on smallholder farms [6].

Furthermore, between the 1950s and the early 1970s, the country started stocking fish in small reservoirs and dugouts [8]. Generally, the types of fish farming practices include small-scale subsistence farming and commercial farming in larger farms. Majority of farmers are small-scale farmers that practiced extensive farming systems and semi-intensive farming systems. Within the various systems some practiced polyculture while others practiced monoculture and mono-sex culture. In these culture systems, farmers reared different types of fish species, example tilapias and Clarias sp. being the most common. The maintenance of these fish highly dependent on manufactured feeds and farm made types using local ingredients. Generally, the farming units are very small and highly dispersed with various earthen pond sizes from 15 m<sup>2</sup> to about

0.48 hectares [5]. Normally, these ponds are maintained on schedule maintenance and drainage. Naturally, their water sources include rivers, streams, underground and rainfall. However, the fertility of these ponds is maintained mainly through the use of organic manure and inorganic, in rare cases.

#### **B. Socio-economic importance of fish farming in Ghana**

In 2004, Ghana Directorate of Fisheries estimated aquaculture fish production for human consumption, at 950 tonnes [5]. Specially, among the fish produced, both tilapia and North African catfish sell at 1 cedi and 50 pesewas (\$1.63) per kilogram in Kumasi, as the second largest city. In Accra, cage culture farm sells tilapia at 3 cedis and 50 pesewas (\$3.80) per kilogram at its sales outlets, while Clarias sells for 5 cedis (\$5.44) per kilogram. On the average, from the farm gate, farmed fishes are sold at 1 cedi and 50 pesewas (\$1.63) per kilogram. Usually, the majority of small-scale fish farm operators depend on these sales for their income and also provide jobs for their family members (FAO, 2005). However, information and data are not available on the contributions of fish farming to food security, employment and poverty alleviation in Ghana [5].

## **II. RESEARCH METHODOLOGY**

The researcher involved the Project Manager, administrative personnel and other staff under him in the African child company. Thus twenty (20) workers were considered as the size of the population.

According to Frimpong & Nguerenomo sampling is the way of limiting the number of participants in a population deliberately [7]. The process involves selecting a number of individuals for a study in such a way that the individuals selected represent the larger group from which they are selected. In this study the researchers used convenience sampling method to select the sampling size of seven (7) including the project manager.

Due to the high cost and time involved in probability sampling, a non-probability sampling procedure using convenience sampling was adopted for this study. The study was largely based on primary data. Valuable information was collected using semi-structured interviews. The interview was structured with open questions. The open – ended questions were used to elicit information on opinions, attitudes and beliefs of the respondents towards challenges and prospects of fish farming.

The data and information from instruments discussed above was administered and analyzed and interpretations of research results were devoted to qualitative data analysis. The data collected were analyzed using tables to group respondents in order to

establish percentages of the groups and interpreting those percentages within the conceptual framework.

### III. RESULTS AND DISCUSSION

	1	2	3	4	5	6	7
There are challenges and prospects in fish farming	x	x			P	X	x
Proper project management practice is a part of the solution to the challenges of fish farming	X	x	P	P	x	X	x
Project management practice could help improve the perception of fish farming in Ghana	x	x				P	P
Implementing Project Management practices is hard for fish farmers, making the economic potential of the fish farming limited	x	P					P
Funding is difficult for fish-farming start-ups	X	x		P	x	X	x
Sustainable development of fish farming should be the core of development in the Ghana		x	P				P
Proper project feasibility and planning should be the core of every fish farmer	x	x			P		P
Fish farming needs more diverse start-up funding options	x	x			x	X	X
The most pertinent challenge for aquaculture in Ghana today, asides developing better feed, with cheaper and easier access to feed, is to start breeding for disease resistance.			P	P			P
Commercial fish farming should be preferred and practiced to subsistence fish farming	P	P		x		X	
More fish farmers are needed	x	x	x	x	x	X	x
NGOs are important for fish farming to become more lucrative	x	x	x		P	P	

Table 1: Table of major themes raised in interviews. Green = agreement, Yellow = partial agreement

This part begins with a short and easily-accessible table of some of the main points raised by both the interviewer and interviewees. It is a brief visual guide to points raised and to how many of the respondents agreed with each one (although merely not saying something is clearly not the same as disagreement).

#### A. Farm resources

Farm resources include land, water and other resources that are available with the fish farmers. In the African Child, land is acquired differently: inherited, bought, borrowed and remain under the responsibilities of the fish farmers. Furthermore, these lands have different locations, topography and soil types. The facilities available on these lands are mainly fish ponds, tanks and reservoirs. The fish farmers keep their culture fish in these facilities. However, reservoirs are also part of

the water bodies found in the Eastern Region (Asikum). These water bodies serve as the main source of water supply for fish farming in the area.

In the area operated by the African Child, other resources include the types of manufactured feeds that are commonly used by the fish farmers. Secondly, the farmers give additional local feed ingredients obtained from their vegetable gardens and field crops. Subsequently, tree products from moringa, palm oil and cocoa are also given as fish feeds. Apart from crops, the farmers keep livestock and use their manure to fertilize the fish ponds and this was observed on some farms. The availability of these resources enables the farmers to practice effective fish farming under the African child.

### **B. Land location, topography and soil types**

The sitting of the fish farm is located at Asikuma, the Eastern Region of Ghana. According to the respondents, the fish farm is in a flat plain area which serves as an advantage. This is significant for three reasons: because it is easily accessible to water, in the event of less water availability, it is easier to dig out a water source and it is less prone to fish diseases. Respondents highlighted however, that some fish farmers around the area have lands located in the lowlands. Although, lands in the lowland areas are most common but there are many disadvantages. Normally, in such environments the underground water is closer to the surface which makes it favorable to parasites such as fish lice. Secondly, such places are more exposed to floods and during the processes the runoffs wash wastes from grazing animals as well as chemicals from the surrounding fields. Eventually, these places become very fertile which are normally breeding grounds for fish lice. The land size operated by the African Child according to the Project Manager who is two (2) acres of land. The respondents were of the opinion that the soil on which the land is located is a sandy soil. As a matter of fact, most of these lands around the area is predominantly sandy soils, although with a few clay soil type around as well as loam soil. Loam soil alone is not recommended. Among these soils, the best types are clay or sandy clay because they are considered suitable for pond construction. Furthermore, they have adhesive properties and can retain nutrients for organic production in the ponds.

### **C. Water resources for fish farms**

Every respondent was of the opinion that the major water source is from the Volta Lake which is at the Volta Region. The Project Manager however stressed that every operation is conducted at the Volta Lake. He further stressed that the Akosombo dam is located at the same region which makes it quite easy to have access to easy and readily available water supply. Two respondents however, were of the opinion that some other fish farmers around got their water source from the underground. Two other respondents laid an emphasis on the usage of stream by some fish farmers around the area. One respondent was quick to further stress that some other fish farmers make use of rainfall as a water source as well as some having boreholes. The respondent also indicated other possible sources of water used by fish farmers as rivers, wells as well as reservoirs are used by some fish farmers. Nearly all of the fish farmers (92%) were benefiting from underground water supply while 72% received from streams and 56% used the rainfall runoff. Similarly, boreholes were used by 40% of the farmers and only 8% had well water. Although, rivers are found in many parts of Asikuma, only 8% used the water as an additional source.

The Project Manager asserted that the water gotten from the Volta Lake is accessed using cars, motor bikes

and in very rare cases pedal bikes, as he indicated that it could only occur in the worst of situations. In addition, it is vital to note the type of water supply or irrigation practiced at the fish farm and the Project Manager stated that the type of water supply is by seepage. One respondent however, noted that in the event of rainfall, a runoff method is used. Thus it becomes much easier for the water to get in. Two respondents in addition made mention of the duration of the rainfall. They were in agreement that the rain could take up to an hour when it falls which could be of a great use to the ponds. When asked the mechanisms other fish farmers around get water supply, some respondents said naturally, groundwater flows directly into the ponds without any technical support. Two other interviewees responded that despite, some of the farmers used pumping machines; some others relied on the gravity force by nature. Other means mentioned were runoffs from rains and spring. However, gravity can also facilitate the movement of runoff but as the force accelerates there are chances of high silt contents. Secondly, the ground water supply makes it rather impossible to be able to dry the ponds. It is necessary to dry the ponds after every harvest in order to prepare for the next crop.

### **D. Challenges faced by fish farmers**

The interviewees were eager and enthusiastic to express their thoughts about fish farming in Ghana and the challenges they themselves face. These challenges waved across locating a site for the fish farm, as well as getting a water supply from a good source and the oxygen content present in the water available as this poses a great challenge also. An issue raised in a couple of interviews is the issue of theft. The project manager addressed this issue in rancor. He said the cases of theft are usually on a frequent basis although this depends on the security. The project manager said the issue of theft is a dilemma and needs a resolution. Respondents were not united in proposing solutions to the resolution of such issue as some of them have been involved in the theft cases. Ideas offered included, additional security at the location of the fish farm, increased level of volunteering with proper vigilance during harvesting of the fish and the concept of 'sacking' when anyone is caught in the act.

Every informant asserted that suppliers of the fingerlings could be problematic and as such poses a huge challenge on fish farming. One interviewee maintained that suppliers of fingerlings could be unreliable as they could reduce the amount of fingerlings supplied as opposed to what was paid for. This thus becomes a huge challenge in getting a reliant and trustworthy supplier of the fingerlings.

### **E. Project Management Perspective**

The project management perspective entails applying aspects of project management to the fish farming process to enhance its production and sustainability. It is becoming increasingly rampant across industries to



include project management practices and perspectives in managing any form of project and this also includes the aquaculture space. Therefore it is important to emphasize and examine the project management perspectives as it is in the African child Ghana. The following highlights the response of interviewees who have insight and knowledge in the area of project management and its perspectives.

#### **F. Project Initiation**

The significance of the project initiation is in line with the feasibility of the fish farming in the Asikuma area of the Eastern Region. The feasibility of the project was conducted at the initiation phase by the African Child as well as the possible citing of the fish farm. All these were taken into consideration whilst the project was being commenced according to the project manager. After a feasibility study was conducted, it was then agreed to site the fish farm at the Eastern Region, Asikuma. In addition, the project manager emphasized that funds were immediately made available prior to the planning phase of the project. The other interviewee asserted the stand of the project manager and also added that the siting as part of the feasibility study carried out was significant for three reasons: first off due to the proximity of the location to the village area of Asikuma as well as the capital Accra, because of its closeness to a lake for where the fingerlings will be bred, to reduce transportation cost as its quite assessable to reach the village area as well as the capital within a minimum time.

#### **G. Project Finance**

On completion of the initial feasibility study of the project, project funds were released for commencement of the project. Projects funds released so far since beginning of the project according to the project manager has amounted to a range of about hundred and sixty thousand Ghana cedis to a hundred and eighty thousand Ghana cedis (Ghc 160,000 – Ghc 180,000). This initial outlay of project funds caters for the cage, the fingerlings and the feed for their consumption. When asked if the amount has been sufficient and sustainable and also what revenue have been gotten from the initial outlay, the project manager intimated that no project usually receives a very sufficient amount as expected however they have been able to utilize the available project funds and sustainably too. On the revenue generated from the project after harvest of the fish, the project manager was ecstatic to mention that a revenue of range two hundred and sixty thousand to two hundred eighty thousand Ghana cedis is generated (Ghc 260,000 – Ghc 280, 000).

#### **H. Prospects of fish farming in Ghana**

Every respondent was of the opinion that fish farming has a role to play in the hoped-for future economic regeneration of Ghana. This is significant for three reasons: because of its universal acceptance, and people believe it provides for their needs, careers and provision

of individual income, and because it implies that all interviewees feel there is unavailability of fish that can take care of the entire populace and as such needs to be addressed (something which all-bar-one respondents openly and assertively declared).

The project manager as well as asserting the opinions of the other interviewees in line with the prospects of fish farming emphasized that fish farming is lucrative and has huge prospects however it depends on the management of the fish farmer. He further said that when a fish farmer invests in the farming business, he/she could break-even in the first or second harvest and with the third and fourth harvests, there would be more profit generation. He further aligned with the opinion of others by adding that it helps individual families by providing finances for their day to day needs. This prospect according to the project manager may be individualistic, thus he asserted that there are other prospects that can better the economy of Ghana in general. He further said that the women who cut the fish when the harvesting is done cut off the intestine as well as parts of the fish and in the process separate the oil gotten from these parts and use it for cooking and frying. He buttressed this saying in the Volta region these oils gotten are used to fry their yam and other items. When asked if this practice could be commercialized and to what extent, the project manager nodded in affirmation. He however stressed that it largely depends on the size of the farm. With a large farm that has about three hundred to four hundred cages and harvests daily, the oils could be collected in large quantities and commercialized. But for farms like his that harvests every six months, it may not be feasible to commercialize the oil gotten from the fish.

#### **V. CONCLUSION AND RECOMMENDATIONS**

Prospects and challenges are identified in order to understand the fish farming operations in the African Child and to be able to suggest better ways for the environmental best practice for fish farming in Ghana. Although, the practice of fish farming started in this country in the 1950s the production is still below expectation while a lot of challenges are faced with high fish demand and over exploitation of the fishery resources. Consequently, the government of Ghana, targeted fish production through farming in order to counter the current fish deficit supply. This has become the main agenda of this research which examined details of the farm resources, challenges faced by fish farmers, a view point from a project management perspective and prospects of fish farming in Ghana.

Therefore, the following recommendations will help the fish farmers to be able to improve the modus operandi of the fish farm in relation to the local conditions and resource-base of the African Child:

1. The African Child should locate better sites within their empty space of farm lands to enable them practice the operations effectively as well as where the water quality is of low particle concentration and high oxygen content.
  2. To enhance operations of the African Child, transport facilities needed to be enhanced so as to ensure better performance of the project. Also, due to the exorbitant prices purchased for the materials, there should be proximity to where relatively less expensive materials could be purchased.
  3. There should be proper care taken in selecting fingerling suppliers due to the fraudulent nature of some of them. The chosen fingerling suppliers should be properly scrutinized until it is asserted that they could be relied upon to supply the required amount of fingerlings with the right sexes as opposed to their practice.
  4. In relation to the commercialization of the oils gotten from the fish after harvest, there should be a collaboration effort of the African child as well as other fish farmers and the Government of Ghana in ensuring that the cooking oil could be well commercialized for economic generation of Ghana.
  5. More research on the adoption possible fish farming prospects and performance of aquaculture also need to be conducted.
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