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CHEMICAL ENGINEERING

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FEASIBILITY STUDY REPORT ON FISH

FARM PROJECT AT UMUAKA, NJABA

L.G.A. IMO STATE

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1.0 INTRODUCTION / EXECUTIVE SUMMARY

Nigeria like most of the developing countries suffers from protein deficiency in the diet of the people. This problem is becoming more and more acute with the increase in population. Increase in fish production through Aquaculture could be an important source of animal protein. The successful implementation of an aquaculture project depends upon a number of parameters, such as proper selection of site, soil and water quality, project management on scientific lines etc. The present report has been prepared keeping all these parameters in view.

1.1 Purpose

The purpose of the study is to assess the viability of the establishment of a fish farm at Umuaka in Njaba Local Government Area, Imo State, Nigeria by attempting to provide data for the following:

- The entire concept of the project
- The most viable dimension of the project including construction and structures
- The production technology
- The cost and revenue estimates for a year period
- Expansion/development and implication schedule
- Cash flow and financial plan of the project

1.2 Project description

- The fish farm project is for the purpose of producing fish (catfish) for sale. The project would be located at Umuaka and would produce fish and fingerlings.

□ The labor required would be available, particularly the unskilled, which are readily available in the project area. Manual construction would be adopted for the construction of the fishponds because of the economic advantages. There is abundant unskilled manpower in the project environment. The market existing in the area, surrounding the project has not been exploited. The project market is therefore unlimited and all fish produced would be a ready market. The demand for fish exceeds the supply.

- Required electric power would be supplied by a 5 KVA generator. The electric supply would be used in pumping water from the borehole.
- The project is financially viable and at the envisaged scope of operation (5 years). A short term loan of N 13,500,000 (Thirteen million five hundred thousand Naira), is to be raised. From the second year, the project would generate sufficient cash to sustain production. The loan would be defrayed in the third year of the project.
- The project is socio-economically viable. It would create employment and has no discernible hazardous impact on the environment.
- There would be no difficulty in the introduction of the technology to be adopted for the project. The manager of the project will be an adequately trained personnel with skills in fish farming.
- The projections for the project take care of bills payable from the first year and even at that the profit would be high.

2.0 PROJECT BACKGROUND AND CONCEPT

Umuaka is a village in Njaba local government area of Imo state. Njaba is one of the local government in the Orlu senatorial zone in the state located between Owerri and Orlu. It has a population of over 87,000 people. Umuaka is a major town along the Owerri-Orlu Highway and it has a prominent market that attracts travellers. It is bordered by several towns which include Amazano, Isiozi, Ugbelle, Achara, Ibelle, Okwudor, Nkume, Attah, Amucha, and Egwedu. It is situated along the bank of the 9.2km long Njaba river, which flows into the Oguta lake.

However, due to various activities which are carried out in the river, its quality has declined over the years and this has resulted in a drop in fishing activities. The river is a source of water supply to several car wash services which carry out their business by the river, releasing detergents and other potentially hazardous substances into the river. Sand excavation is carried out along the

stretch of the river from its source in Isunjaba all the way to Awomama and this affects the turbidity of the river. The prolonged re-construction of the Okwudor bridge over the river has taken over 3 years and has also impacted the ecosystem negatively. The physicochemical characteristics of the river are not conducive for breeding of aquatic organisms. As a result, fish production in the river has dropped and fishing in the river has declined as catch per unit effort is reduced. In order to meet up with demand in the community, fish traders purchase fish from other towns and markets as there is no fish farm in the area.

2.1 Fish market

The fish farm proposed is expected to supply fish to Umuaka and its neighboring communities at affordable prices. The town is close to two of the largest cities in the state, Owerri and Orlu. The demand for fish in both towns is huge and some of the fish from the farms can be transported to these places for sale to increase the market for the product.

2.2 Project location

Prior to the determination of site suitability, a careful consideration has been given to the easy accessibility of sufficient quantity of water, easy accessibility to the site, proper climatic conditions, easy availability of production inputs, socio-economic aspects, marketing channels etc. The project would be located on a 100 x 200m piece of land at Umuaka close to the Njaba river. The water table at this location would be higher and make it easier to drill a borehole. Presently, there is no fish farm in the area and the main decision to locate the proposed fish farm at Umuaka was based on the fact that the market for the product is large and can be profitable. The cost of the land is considerably low because it is presently not used for any major economic venture.

3.0 PROJECT TECHNICAL FEASIBILITY

The project would be in two separate compartments: Fish production unit and a hatching unit. The fish production section would be concerned with the production of table size fish for consumption. The layout of production would start with 2 production ponds measuring 25m² each. In the 1st year of operation, the ponds would be constructed and stocked. The two ponds would have a stocking density of 6,000 catfish fingerlings each, per culture period. The 2 initial production ponds would therefore have total fish density of 12,000 catfish fingerlings when fully

stocked. It is expected that total yield would be increased per unit of production. In the second year, 2 additional production ponds measuring 25m² each would be constructed.

The bio-technical feasibility of the selected species is given as follows:

The catfish belongs to the family Clariidae. This family is divided into two genera: Clariidae and Heterobranchius. Clariidae have 8 major species while the latter has 3 species in the southern zone of Nigeria. The former has a single rayed dorsal fin extending almost to the tail; the latter has a rayed dorsal and adipose fin. The Clariidae family would be used for the project because they feed on wide variety of food ranging from weeds and planktons to insect larvae, snails crustaceans, worms and shellfish. The Clariidae species can accept a wide variety of agricultural by-products, brewery and flourmill wastes which are available locally. When catfish are stocked at the stocking rates described; with proper feeding, they can grow to an average of 1000 g in a year.

The hatchery section starts in the second year of production. At this time, all the fingerlings required for the production ponds would be supplied from the hatchery. In the hatchery, catfish would be artificially induced to spawn by hormonal treatment using pituitary hormone within the hatching units. Catfish matures after 7-10 months at a weight of 200- 500 g. However, spawning would not take place since the final stimulation associated with the rise in water levels and the inundation of marginal areas would not occur. In the hatchery, four female brood fish each weighing 500 g can produce 10% body weight of eggs. The rate of hatchability is estimated at 50% and the survival rate of fry to fingerling at 30%. This means that the hatchery can produce 20,000 fingerlings from the 4 brood fishes, sufficient to meet the fingerling requirements of the production ponds after the initial cropping.

3.1 Project execution plan

When the project is fully implemented, a total of 1 brooder pond and 2 nursery transition ponds would be constructed. The brooder ponds measure 4×4 m (16 m²) and the nursery/transition ponds measure 3×4 m (12m²). 4 production ponds would also be constructed and stocked for the production ponds, measure 5×5 m (25 m²).

3.2 Risks /challenges

Power -Umuaka town is located in a rural area and the supply of power to the area is poor. For the project to be successful, it would rely largely on power supply from the generator which could increase the operational cost.

Water - During the dry season, the water table in the area drops to a low level. This would put a lot of stress on the pumping machine and could result in frequent break downs which would increase the operational cost of the project.

Security -There are security challenges in the area which may result in losses if not properly managed. However, this can be managed by using locals who are conversant with the environment as security personnel.

4.0 ECONOMIC /FINANCIAL PLAN

Table 4.1: Cost of land and fish farm infrastructure development

Activity	Amount (=N=)
A. Cost of land and land development	
Land acquisition	2,000,000
Survey of land	100,000
Pond construction	1,000,000
Total	3,100,000
B. Fish farm infrastructure development	
Cost of farm house / office	2,000,000
Fencing of the farm	1,500,000
Fish shade building	500,000
Generation of power (5 KVA)	100,000
Water pump	60,000
Bore hole	1,000,000
2 800Litre tanks	500,000
Total	5,660,000
C. Fish production and hatchery materials	
Equipment (Nets, water analysis kit etc)	1,000,000
Total	1,000,000
D. Salaries and wages of staff	
Project /farm supervisor	600,000
2 Farm assistants	480,000

Security	240,000
Total	1,320,000
E. Variable inputs	
12,000 Fingerlings	360,000
Feed	400,000
Organic fertilizer	20,000
Other chemicals	20,000
Transportation	500,000
Total	1,300,000
F. Other operational costs	
Fuel	
Maintenance on pond	100,000
Maintenance on equipment	200,000
Stationery	50,000
Total	350,000
Grand total	12,730,000

The land required for the project was acquired from the community for a cost of =N=2,000,000 and the perimeter and topographic survey have been carried out. The design of the farm has also been completed. The constructions of the ponds were estimated at =N=1,000,000. The construction would be undertaken manually, because, it would be more expensive to transport earth moving equipment from the state capital to site. The method of construction would also provide opportunity for greater participation by the unskilled unemployed labor force in the project area. With close supervision of the construction work, it is expected that the time schedule for the implementation of the project would be easily met. A farmhouse would be required in the site to secure the project. It would provide areas where farm equipment would be assembled and maintained. A small office and a store would be constructed as part of the building to enable adequate control of the staff activities on the project site. In view of the high cost of building materials and transportation of such materials to site, it is estimated that it would cost =N= 2,000,000. All other equipment such as generator, tanks and other equipment

would be procured from established companies. The total cost of all infrastructure for fish farm, would cost =N=5,660,000.

4.1 Operational costs

The operational costs for the fish farm include the cost of the day-to-day management of the hatching, the wages and salaries of staff and procurement of other operational inputs. The purchases for all the materials making up the hatchery equipment will be made from Owerri and transported to the project site.

4.2 Salaries and wages

The estimated total annual expenditure on wages and salaries is estimates at =N=1,320,000.

4.3 Variable costs

The total variable costs of the project amount to =N=1,300,000 for procurement of fish fingerlings, feed ingredients, inorganic fertilizer, inorganic fertilizer and other chemicals.

4.4 Amortization of cost

All of the capital expenditure would be made in the 1st year of implementation of the project. Already, land acquisition, land surveying and fish designing have been completed. It shows that the 1st year of the project, a total expenditure of (=N=12,730,000) would be made to take care of the operating costs of the project. A total of =N=2,970,000 would be needed for the operational expenditure of the project. After that, the project would be capable of generating sufficient funds to take care of all the operational expenditures.

5.0 ESTIMATED REVENUE

For the purpose of this feasibility report, the revenue expected is restricted to the operation of the production ponds. It is however necessary to mention that the hatchery ponds would produce the fingerlings required for the production ponds after the 1st year of operation. The production ponds when fully stocked would have a total fish density of 12,000 fingerlings, making provision for mortality at 50% mature fishes. The fish harvested would be 6,000 kg. It is expected that catfish would sell for =N=900 per kg. Sales and total estimated revenue for the 1st year of production would therefore, is =N=5,400,000. With a modest estimated annual increase in the prices of fish of 10%, the estimated revenue accruing from the project for the first 5 years would be as shown in Table 4.2.

Table 4.2: Estimated revenue accruing for the first 5 years.

Year	Income (=N=)
1	5,400,000
2	5,940,000
3	6,534,000
4	7,187,400
5	7,906,140

The Farm /project supervisor would be trained in fisheries and have acquired skills to provide technical and specialized leadership needed for the management of the fishponds. He would be personally responsible for the day to day running of the fish farm. The positions of the farm assistants would be occupied by men/women who have acquired some form of formal or informal experience in fish farm management. It is also expected that they would be trained practically on the job.

Table 5.1: Condensed income/expenditure of fish farm project

Activity	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	5,400,000	5,940,000	6,534,000	7,187,400	7,906,140
Costs of sales	9,760,000	-	-	-	-
Gross profit	(4,360,000)	5,940,000	6,534,000	7,187,400	7,906,140
Operating cost	2,970,000	2,780,000	2,400,000	2,560,000	2,700,000
N.P.B.T.	2,403,000	3,160,000	4,134,000	4,627,400	5,206,140
Tax 45%	-	1,422,000	1,860,300	2,082,330	2,342,763
Proposed loan repayment	780,000	880,000	1,000,000	1,150,000	90,000

Table 5.1 shows the Principal =N= 13,000,000 + interest 30 % = N 3,900,000.

6.0 CONCLUSION

The fish farm, when in full operation would have tremendous economic and socio economic well-being of the people in Njaba local government area and the entire Orlu zone. Fish has become a very scarce commodity because of the ecological changes due to changes in climate. The scarcity has also made fish very expensive and unaffordable to majority of the population in the area. This has resulted in serious deficiency in the intake of protein by the people in the area. The prices of fish produced in the farm would be cheap relative to the present supply. This can

aid the increased intake of protein by majority of the people as it would be affordable and accessible. The project would provide direct employment for people for this operation. This is a significant contribution to the economic well being of the people and social improvement of the project environment. The fish farm would be a highly profitable project which would generate sufficient cash to sustain production from the second year. The profits from the project would be able to repay the loan and interest within the first 5 years.