A METHODOLOGY FOR ECONOMICS OF FISH CULTURE IN NIGERIA: CASE STUDY OF TWO FISH FARMS IN LAGOS STATE

Ogunbadejo, H.K., Jim-Saiki, L.O. and Adeogun, A. O.
Nigerian Institute for Oceanography and Marine Research,
Victoria Island, P.M.B. 12729, Marina Lagos

ABSTRACT

This paper deals with cost structure and financial analysis of Ameso and Kaboom fish farm projects in Lagos State. During the period under study, (year 2000), Ameso fish farm's return on total asset was 86.1% while total asset turn over was 1.6. For Kaboom fish farm, return on total asset was 50.9% whereas total asset turn over was 1.1. Profit (after tax at 35%) of N192, 523.87 and N293, 738.09 were realized by the fish farms respectively. The percentage of net profit to gross revenue was 35.7% and 27.7%, while the ratio of net profit to variable cost were 1.9:1 and 1.5:1 for Ameso and Kaboom fish farms respectively.

INTRODUCTION

With the present fish demand in Nigeria of about 1.5 million tons and domestics productions of about 0.5 million tons (Amiengheme, 2002), a critical percentage of shortfall already exists. Reliance on fish importation to offset the gap between demand and supply has not been an easy road to tread. This is due to the declining value of the naira in the foreign markets, the dwindling foreign exchange earnings and the increasing population of Nigeria. It becomes necessary to look "inward" for other processes of increasing domestic fish production towards achieving self-sufficiency and food security for Nigeria. Fish farming, a process of increasing domestic fish production is also an efficient means of producing animal protein. Its role in improving human diet was well as generating rural employment has been recognized and is being pursued in Nigeria and most African countries (Arowosoge et al, 1986). Generally, the fishing industry in Nigeria is expected to serve as a source of domestically produced food, a role that is vital in the process of seeking not only balanced diet, but also balanced economic development.

The objective of a project depends on the point of view of the entity for which the project is undertaken. The over-riding objective of a private fish farmer is profit maximization. Therefore, its economic viability is a very important requirement for the adoption of fish farm project for economic benefits.

METHODOLOGY

This study was based on two selected fish farms in Lagos State. These are Ameso and Kaboom fish farms in Ikorodu and Epe respectively. Field surveys were conducted and further information was gathered by use of questionnaires, interviews and compilation from the records of the two farms.

The output Structure: The output from a fish farm project is a function of the inputs applied in the production process. The level of output depends on environmental factors (soil, pH, water salinity, etc), stocking rate, supplementary inputs (feed, fertilizer, etc), labour, managerial expertise and the underlying technology used (Smith, 1981). The relationship between inputs and outputs is commonly referred to as the production function. The general mathematical form of production is:

Y = f (L, K, F); where Y = Output, L = Labour, K = Capital and F = Feed.

Output is a function of variable and fixed inputs. Fish farmers will maximize profits if limited resources (e.g. capital) is optimally utilized such that the marginal returns from the various activities are equal. In this way, the opportunity cost of capital (i.e. the cost of the alternative forgone) does not exceed its value in the use chosen.

The Cost Function: The cost of production of any enterprise is measured in terms of the total fixed and total variable costs (Akinwumi 1970 & Olayide et al 1982). The fixed cost as the name implies does not change with the level of production in the short run. The cost of producing one unit of output normally depends on the price of the factors used and the scale of the producing enterprise (Olayide et al 1982). The variable cost is expenditure that is actually incurred in the course of production and this varies with the quantity produced. In this case, cost of fingerlings, fish feed, salaries and wages, etc. The total cost (TC)

TC = TVC + TFC ..... (2.1)
Where TVC = Total Variable Cost and TFC = Total Fixed Cost

A production function can be derived, if the total cost is expressed as a function output since; cost is a mirror image of the production function (Tisdel 1972). This can be stated as:
TC = TC(Q) ..... (2.2)

When equation (2.2) is made explicit, the marginal cost can be derived. The marginal cost and marginal revenue are important production economic parameters for deriving the necessary and sufficient profit maximization condition of the firm (Koutsoyannis 1985).

The Revenue Function: The total revenue (TR) is the total receipt from the sale of the firm's products. It is the product of price (P) and the output (Q). This can be represented as follows:
TR PxQ (i.e. P (Q) ..... (2.3)

But price, from economic theory, usually varies with the level of output. When price is made a function of output, we obtain the demand function thus: P = D = P(Q) ..... (2.4)
Substituting equation (2.4) into (2.3) we have TR = P (Q)xQ ..... (2.5)

The Profit (π) Maximisation Condition: The profit/loss is the different between receipts and costs and this can be expressed as π = TR TC ..... (2.6)
Where π = Profit/loss. TR>TC = Profit; TR<TC = Loss. Substituting, profit becomes π
P(Q)xQ ..... (2.7)
Partial differentiation of equation (2.7) with respect to output (Q) as we have:
?/dQ = dTR(Q)/dQ dTC/dQ = 0 ..... (2.8)

Then we have MR MC = O. The necessary condition for profit maximization is when MR =m MC.

Break-even Analysis: Break even occurs when total revenue equals total cost. That is, when the firm makes zero profit. In break-even analysis, the break even sales in naira or units is determined. From equation *=(2.6), π = TR TC.

When TR TC>O (profit); TR TC<O (loss); TR TC=) (break even).

But R = P.Q. where R = Revenue, P = Price per unit and Q = Number of units sold

C = Mq + b Where C =Cost, m = variable cost per unit, q = number of units produced and b = fixed cost.

Mathematically, we can substitute in equation 2.6 as follows:

π = R-C

= Pq (mq+b)

= Pq mq b

= q(P-m) b = O

At break-even point, profit equals zero i.e., Q(P-m)-b=O q-(P-m) = b or q = P-m

Where q is the break even quantity and Pq mq is known as condtribution (i.e. sales variable cost).

RESULTS AND DISCUSSION

Financial Analylsis for Year 2000 – 2003: Ameso and Kaboom Fish Farms

Ameso	Kaboom	
Acquisition of land	(2 plots) 100,000	(3 plots) 240,000
Surveying (topographic)	32,500	50,000
Sub-Total	132,500	290,000
Pond Construction:		
(i) Land clearing	15,000	22,000
(ii) Concrete Ponds (construction)	120,000 2(30x10m)	180,000) 5 x 5m 4 x 4m 8 x 5m
(iii) Earthen ponds (construction		180,000) 2nos
Sub-total	135,000	370,000

Equipment/Plant

(a) Nets	20,000	20,000
(b) Rakes, cutlasses, shovels	1,500	2,500
(c) Weighing Balances	10,000	10,500
(d) Pumping machines (5HP)	-	40,000
(e) Deep Freezer	20,000	25,000
Sub-total 51,500	98,000	

Farm Management

Farm Manager (salary PA)	-	84,000
Farm Attendant (PA)	60,000	60,000
Fishermen (wages/labour)	10,000	40,000
Pre-operational expenses	20,000	30,300
Fuel & other expenses	28,100	50,000
Sub-total	118,100	264,300

Operational Cost

(a) Fishery Sector		
Fingerlings (4,500 @ N10)	45,000	56,200 7025 @ N8
(b) Feeds 1 bag of 25kg/month	14,400	18,000 (10 months)
(c) Fertilizers 2 npk bags	3,500	3,500
Sub-total	82,900	77,700

Revenue:

Clarias:- 2.7 tons (N200/kg) = ₦540,000 (5.3t @ ₦200/kg) = ₦1,060,000

Cost, Revenue and Returns:

Variable cost	Ameso	Kaboom
Fingerlings	45,000	56,200
Feeds	14,400	18,000
Fertiliser	3,500	3,500
Hired labour	10,000	40,000
Fuel & other expenses	28,100	80,300
Total Variable Cost	102,000	198,000

Fixed Cost

Amortisation	-	225,409.84
Depreciation of poonds & tanks (7yrs)	17,142.86	51,428.57
Depreciation of facilities (3yrs)	17,166.67	32,666.67
Land clearing/surveying	47,500	72,000
Salary	60,000	144,000
Total	141,809.53	496,105.08
Total cost (Fc+Vc)	243,809.53	694,105.08
Gross Revenue	540,000	1,060,000
Returns		
Operating profit	438,000	862,000
Net income	296,190.47	365,894.92
Net profit	192,523.81	237,831.70
Return on capital investment	38.5%	22.4%
Return on total assets	86.1%	50.9%
Total asset turn over	1.6%	1.1%

a. Operating profit = Gross revenue – Variable cost
b. Return on total assets = PBIT/Total Asset x 100
c. Total asset turn over= Sales/total Assets

PROFIT AND LOSS ACCOUNT

	Ameso	Kaboom
Sales		
Fish (A)	540,000	1,060,000
Direct Cost of Production:		
Fingerlings	45,000	56,200
Feed	14,400	18,000
Fertilizer	3,500	3,500
Hired labour	10,000	40,000
Sub total (B)	72,900	117,700
Indirect Cost of Production:		
Sales	60,000	144,000
Depreciation	34,309.53	84,095.24
Other expenses	76,600	152,300
Interest on Loan	-	110,000
Sub total (c) 170,909.53	490,395.24	

Profit before tax A-(B+C)	296,190.47	451,904.76
Less tax @ 35%	103,666.66	158,166.67
Profit after tax	192,523.87	293,738.09
ROCE	38.5%	26.7%
% of net profit to gross revenue	35.7	27.7
Ratio of net profit to variable cost	1.9:1	1.5:1

Loan Amortisation:

$P = A[1 -(1+I)^{-n}]/I$ where P = Principal, I = Interest, N = Number of years, A loan armortisation.

If P = 440,000, I = 25%, n = 3 years, then
$440,000 = A[1-(1+25)^{-3}].25$
440,000 = A (1.952)
A = 440,000/1.952 = ₦225,409.84

Loan Amortisation schedule: (Kaboom Farm)

Year	Principal amt owing b/f	Interest @ 25% P.A.	Installment Payment	Principal Payment	Principal Amount owing c/f
1	440,000	110,000	225,409.84	115,409.84	324,590.06
2	324,590.16	81,147.54	225,409.84	144,262.3	180,327.86
3	180,327.86	45,081.97	225,409.84	180,327.86	-

Economic Analysis

R = Pq = 200 x 2.7 tons	Ameso 540,000	Kaboom 1,00060,000
C = mq + b = 102,000 + 141,809.53	243,809.53	694,105.08
Profit = R – C = Rq – (mq+b)	296,190.47	365,894.92

Break even Analysis

	Ameso	Kaboom
Sales	200	200
Variable cost	38	37
Contribution	162	163
Total break even = Fixed Cost / Contribution	= 241,809.5 / 162	736,105.08 / 163
	= 1,492.65kg	4,515.98kg

Opportunity Cost

Opportunity cost is the benefit that would have obtained, if the resources used for the project had been used for alternative investment available else where in the economy. The total amount of funds committed into the project by Ameso farms was N500,000. If placed with a reputable bank at 15% rate of interest compounded half yearly, using the formular: $FV = P(1+r/n)^{2n}$.

Where FV = Future value, P = Principal, r = ratae of interest and n = number of year.

The investment could have generated the sum of N77,812.50k per annum. While Kaboom farms would have generated about N102,712.50 per annum.

SUMMARY AND CONCLUSION

The size of farm was hypothesized to play an important role in farm success because it reflects availability of capital, access to credit and managerial ability. The sampled farms were small. Also, experience was thought to be a determinant of profitability in fish culture because experience would allow the farmers to adjust to changing economic condition and adopt the most efficient culture practice. The availability of funds or credit at low rate of interest and technical knowledge and skill holds the key to successful fish culture in Nigeria.

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