

## Economics of fish production and marketing in the urban areas of Tillabery and Niamey in Niger Republic

R. Kassali, O. I. Baruwa and B. M. Mariama

Department of Agricultural Economics, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria

**Abstract:** This study analysed the economics of inland fishing, aquaculture and fish marketing in Niamey and Tillabery areas of Niger Republic. Two-stage random sampling technique was adopted to select the respondents and structured questionnaire was administered to collect the data. The analytical techniques include descriptive statistics and budgeting. The results showed that both the aquaculture and inland fish production were profitable with a rate of return of 61% and 320% respectively while two types of fish marketing channels were identified. Aquaculture was found to be more capital intensive requiring more cash investment than inland fishing. A reduction in inputs cost especially the capital input would encourage more participation in fish farming as this would relieve fish supply pressure on inland fishing. Sensitization of fish producers and institutional support would also improve fish production and therefore the marketing.

**Keywords:** fish production, fish marketing, profitability, Niger

### INTRODUCTION

Niger Republic is a continental country in West Africa which covers a land area of 1,267,000 km<sup>2</sup> (with two third of desert) and has an estimated population of 10,790,352 inhabitants (Projet NER/00/P51- RGPH, 2001). The climate is of Sahelian type characterized by two broad seasons: one dry season of about nine months (September/October to May/June) and a raining season from June to September. Important spacio-temporal variability is observed in the precipitations with increased incidence of drought and desertification.

In Niger Republic, fishing is practiced in the southern part of the country along the River Niger, the Komadougou Yobe, the Lake Chad and various Fossil Rivers (Dallols Bosso and Maouri) and streams with periodic flow (Goulbi N'kaba, Korama and Maradi). Fishery presents a lot of opportunities under good hydrology. It also improves the diet of people

and contributes to the country's food security. The importation of 1,411 tonnes in 2008 (Institut National de la Statistique, 2010) indicates a deficit in local fish supply. Three types of aquaculture have been identified in the country: the semi-intensive pond, the intensive and the extensive aquaculture. The semi-intensive system started in 1974 and was funded by CARE International and the "Fond de Contre-Partie des Pays-Bas" in the River Valley. The extensive aquaculture has been developed from 1976 in order to improve the exploitation of permanent and semi permanent pools. Project of this type has been financed all over the country by many donors like OXFAN, UNICEF, FAC/France, World Bank, B.I.D, USA, etc. and resulting in increased productivity. The Intensive aquaculture was financed by "Cooperation Française" through the Project ADAN. Though, aquaculture in Niger faces lot of hydrographic constraints and fish farming is only possible under water

pump system. Since January 2002, Niger has set out a Poverty Reduction Strategy (SRP) which serves as basis for all economic interventions including the Strategy for Rural Development (SDR) with the objective of reducing poverty from 66 % presently to 52% by 2015. The strategy will focus on: (i) Developing aquaculture among fishing communities; (ii) promoting the use of adapted technologies and (iii) ensure sustainability of fisheries livelihoods through micro-finance institutions with emphasis on gender and pro-poor actions. Before Government intervention in the fishery development, the production of fish in Niger has been on the decline and total fish catches dropped from 16,400 tonnes in 1972 to about 4,156 in 1996 and 1,469 tonnes only in 2009 (Institut National de la Statistique, 2010 citing "Direction de la Pêche et d'Aquaculture"). This decline was due to a relatively high fishing pressure and mostly the Sahelian drought (Malvestuto and Meridith, 1986). In view of the national constraints faced by fisheries communities and the policies efforts of Government to eliminate poverty, it is important to analyze the economics of fish production and marketing and the problems encountered by the industry in Niger Republic.

Number of studies reported on the economics of fish production around the world. Hishamunda *et al.* (1998) in Rwanda estimated the cost and returns of aquaculture and agricultural crops such as sweet potatoes, Irish potatoes, cassava, taro, sorghum, maize, peas, beans, soybeans, peanuts rice and cabbage. With the exception of Irish potatoes, all enterprises showed positive income above variable cost and

positive net returns to labour and management. Fish production generated the highest income and net returns if fingerlings could be sold. Islam *et al.* (2002) in a study in three selected villages of Ditpur union under Baaluka Upazila of Mymensingh district found that rice production with fish was more profitable than without fish in rice-cum-fish farming. Tokrisna *et al.* (1985) in Thailand showed that it would be profitable for fishermen with modern equipment to increase the size and engine power of their vessels, whereas those with more traditional equipment should increase their use of labour. Olomola (1991) in Nigeria found that the cost of capture fisheries were higher than those of aquaculture except for the opportunity cost of family labour. Therefore, capture fisheries were more labour intensive than aquaculture. The inputted cost of family labour in capture fisheries exceeded that of aquaculture by about 63%. The author also found that the short-term profitability of aquaculture is more promising than that of capture fisheries and that the gross revenue or value of fish output associated with aquaculture exceeded that of capture fisheries by about 35%. The findings of the study showed also that the net profit was negative in both systems, indicating that capture fisheries and aquaculture are not economically viable in the long-run as the returns being generated are not sufficient to cover the fixed cost of production. Yesuf *et al.* (2002) assessed the economics of fish farming in Ibadan Metropolis. The study revealed that most farmers with secondary education and above operate at small-scale level with an average of three (3) ponds. Fish farmers practiced poly-culture fish farming. *Clarias* spp is the most

raised fish species followed by *Heteroclaris* spp. The gross margin analysis revealed that medium scale farmers derived the highest return of N1.55 for every one naira expended. This is followed by large-scale farmers at N 1.52 for every 1 Naira compared with only N 1.34 for every 1 Naira spent by small-scale farmers. Ajao (2006), found that 80% of fish farmers in Oyo state, Nigeria, operated less than two (2) ha which could not capture economy of size. More than 90% of the respondents distributed their fish at the site while 60% had little access to extension agents. Meanwhile fish farming was found to be profitable.

From the literature review aquaculture is a profitable venture, but inland fishing profitability is still questionable. This study analyzes the inland fishing and fish farming profitability and the fish marketing system in Niger. The broad objective of this study is to assess the economics of fish production and distribution in the Urban Community of Niamey (CUN) and Tillabery. Specifically the study: identifies the socio-economic characteristics of inland fishermen and fish farmers, analyze costs and returns and inputs use intensity in fish farming and inland fish production in the area and identify fish marketing channels.

#### METHODOLOGY

The study area covered Tillabery Region and the Niamey Urban Community "CUN" both located in the southern part of Niger Republic along the River Niger. Tillabery region covers a land area of 104,739 square meters. It is limited by the departments of Ouallam to the East, Tera to the West, Kollo to the South and Republic of Mali to the North. Niamey the

capital is surrounded by Tillabery and represents the Capital of the Country. The hydrographic network of CCU is made up of seventeen (17) permanent and semi-permanent pools, and the river Niger crossing the CCU on fifteen (15) km. The CCU gathers over 160 indigenous and foreign fishermen living in six localities which are Gaweye, Saga, Kombo, Goudel, Gamkale and Kirkissoye. Fishery activities take place on the river Niger or its affluent and the pools located at Sorey and Kongou Gorou. Species in the area include *Lates*, *Synodontis clarias Labeo*, *Tilapia*, *Unlunlanus*, etc. Despite the important hydrographic potential, fish production in Niamey is very low. The protein requirement of the population of Niamey is being compensated by the production from the areas of Tillabery and the imports from neighboring countries (Mali, Burkina Faso). For several years, due to the low production of fish caused by frequent drought, some inland fishermen have switched to agricultural activities (crops and livestock production) while other still use prohibited materials (Nets) to increase their production.

Data were collected with the administration of structured questionnaire. The sources of secondary data were Direction de la peche, PNEDP, ADA, COEDE and were on past production. The respondents were selected at random for interview. Data were collected on fish farmers' socio-economic background, production inputs- output, markets prices and the fish distribution channels. Two categories of fish producers were sampled: the ponds owners and the inland fishermen. Two-Stage Random Sampling Technique was adopted to select the respondents. Four (4) villages in Tillabery area

and two (2) localities in Niamey were randomly selected in the first stage. In the second stage 30 pond owners and 40 inland fishermen were randomly selected making a total of 70 respondents for the study. The sample distribution per selected village is as follows: Kollo (12 fishermen and 4 pond owners) Boubon (18 fishermen, 20 pond owners), Kokomani (3 fishermen, 2 pond owners) and Sona (0 fishermen, 4 pond owners) in Tillabery and Gamkaleye-Golle (4 fishermen, 0 pond owners) and Gamkalle-Gaweye (3 fishermen, 0 pond owners). Information on fish marketing was also gathered from two (2) selected wholesalers and forty (40) retailers from two major fish markets Djamadjie (with 15 retailers) and “Petit Marché” (with 25 retailers) markets respectively.

The methods adopted in analyzing data include descriptive statistics (mean, percentage) and budgeting technique. Profitability was assessed as follows:

$$\text{Profit} = \text{TR} - \text{TC}$$

$$\text{TC} = \text{FC} + \text{VC}$$

$$\text{TR} = \text{Q} * \text{P}$$

$$\text{Gross Margin} = \text{TR} - \text{VC}$$

With, TC = total cost; FC = fixed cost; VC = variable cost; TR = total revenue;

Q = output; P = price.

## RESULTS AND DISCUSSION

From Table 1 both fish farmers and inland fish producers are male only (100%), meaning no female presence in fish production in the area. Fish producers were between 20-39 years of age for 40 % of fish farmers and 42.5 % of fishermen; between 40-59 for 50% and 45 % of fish farmers and fishermen respectively. Fish producers are therefore of middle age in both

groups meaning age similarity. The education level was 87% and 50% for fish farmers and inland fishers respectively, but there is relatively high level of illiteracy among inland fishers with 47.5 % against 0% for fish farmers. There is also similarity in family size distribution with majority between 1 and 10 members; 73% for fish farmers and 75% for inland fishers. This would mean relative availability of family labour for fish production. Results also indicate that majority of farmers (93%) own between 1 and 9 ponds. This may mean a risk management strategy among pond owners.

Fish production shows a fixed cost of FCFA 1,952,561 for aquaculture against FCFA 34,600 only for inland fishing (Table 2 below) representing 29 and 79% of total cost for fish farming and inland fishing respectively. Variable costs were FCFA 4,631,844 for fish farming and FCFA 9,200 only for inland fishing that is 71 and 21% of the total cost of production respectively. There is therefore cost flexibility in fish farming relatively to inland fishing.

Table1: Socio-economic characteristics of fish producers

Characteristics	Fish farming		Inland fishing	
	Freq	%	Freq	%
<b>Sex</b>				
Male	30	100	40	100
Female	00	00	00	00
Total	30	100	40	100
<b>Age (years)</b>				
20-39	12	40	07	42.5
40-59	15	50	18	45.0
60-Above	03	10	05	12.5
Total	30	100	40	100
<b>Education level</b>				
None	00	00	19	47.5
Primary	26	87	20	50.0
Secondary	04	13	01	02.5
Total	30	100	40	100
<b>Family size</b>				
01 – 10	22	73	30	75

11 – 20	05	17	08	20
21 – Above	03	10	02	05
Total	30	100	40	100
<b>Nb. of ponds</b>				
01 – 09	28	93.34	-	-
10 – 19	01	03.33	-	-
20 – above	01	03.33	-	-
Total	30	100	-	-
Total	30	100	-	-

Source: Field Survey

The total revenue was FCFA 10,772,779 per ha and FCFA 184,400 per fisherman. The gross margin was FCFA 6,140,935 and 175,200 for both fish production systems respectively. The rate of returns on investment was high in inland fishing (320%) compared to fish farming (61%), both show therefore profitability in fish production.

Table2: Costs/Returns in fish farming and inland fishing

Items	Fish farming (1 ha pond)		Inland fishing (per fisher)	
	Value (FCFA)	Percentage	Value (FCFA)	Percentage
<b>Fixed Costs</b>	<b>1,952,561</b>	<b>29</b>	<b>34,600</b>	<b>79</b>
1- Rent	1,200,000	18	-	-
2-Canoe	377,370	5.5	10,600	24
3- Little materials	375,191	5.5	24,000	54
<b>Variable costs</b>	<b>4,631,844</b>	<b>71</b>	<b>09,200</b>	<b>21</b>
1- Fingerlings	1,271,277	19	-	-
2- Feed cost	2,914,026	43.5	-	-
3- Fuel	226,541	3.5	-	-
4- Sexing	20,000	0.3	-	-
5- Feeding	300,000	4.5	-	-
6- Harvesting	10,000	0.2	09,200	-
<b>Total costs</b>	<b>6,584,405</b>	<b>100</b>	<b>43,800</b>	<b>100</b>
Total revenue	10,772,779	-	184,400	-
Gross Margin	6,140,935	-	175,200	-
<b>Profit</b>	<b>4,078,374</b>	<b>-</b>	<b>140,500</b>	<b>-</b>
<b>Rate of Return</b>	<b>-</b>	<b>61</b>	<b>-</b>	<b>320</b>

Source: Data Analysis

Table 3: Factors intensity in fish farming (CFA francs)

Items	Fish farming		Inland fishing	
	Value	Percentage	Value	Percentage
<b>Capital</b>	<b>6,364,405</b>	<b>95%</b>	<b>34,600</b>	<b>79%</b>
Rent	1,200,000	18	-	-
Canoe	37,370	5.5	10,600	24
Little materials	375,191	5.5	24,000	55
Fingerlings	1,271,277	19	-	-
Feed	2,914,026	43.5	-	-
Fuel/lubricants	226,541	3.5	-	-

From table 3 below, we found out that fish farming in the area is highly capital intensive at 95% of total cost while labor represents 5% only. The cost of feed alone represents 43.5% of the total cost while fingerlings and rent amounted respectively to 19 and 18%.

Inland fishing was also capital intensive with 79% of total cost while labour made 21% of total cost as shown in Table 3. The capital costs items in this venture comprised canoe, little fishing materials and harvesting. Both were capital intensive with fish farming involving in absolute terms more of cash and management effort.

<b>Labour</b>	<b>330,000</b>	<b>5%</b>	<b>9,200</b>	<b>21%</b>
Sexing	20,000	0.3	-	-
Feeding	300,000	4.5	-	-
Harvesting	10,000	0.2	9,200	21
<b>Total</b>	<b>6,694,405</b>	<b>100%</b>	<b>43,800</b>	<b>100%</b>

Source: Data Analysis, 2005

In view of the profitability and the relative scarcity of the local production more people could be encouraged to embrace fish farming. This would reduce pressure on inland fishing with dwindling resources.

#### Marketing of fish in the Area

The main fish markets in Niamey are Djamadjie for wholesalers and “Petit Marche” for retailers. The catches from River Niger are not enough to meet the demand of Niamey and Tillabery. To compensate for the shortage wholesalers travel within and outside the country. Therefore two types of fish marketing channels were identified: the local and the international channels. In the local fish marketing channel wholesalers buy fish from fish farmers at the farm gate. They also buy fish from inland fishermen at the unloading site alongside River Niger. Wholesalers also get fish from Abalak (Tahoua) and some smoked fish from the Lake Chad (Diffa). The totality of fish bought is disembarked at Djamadjie market where it is weighted under the control of a forestry agent before the sale to retailers. Retailers in their turn sell the product to consumers and some hotels and restaurants.

For the international channel the import wholesaler get fish from the Lake Chad (Nigerian side), Burkina Faso, Mali, and frozen fish from France. The most important fish market circuit is that of Ansongho (Mali) to Niamey. The import wholesaler travel from Niamey to Tillabery town, Ayorou, Labzengua

and Ansongho along the River Niger. Fishes are collected and conserved in containers (non-functioning deep freezers) with ice for the preservation of the fish. This channel is followed once or twice every month depending on the period: flood or low water. The import wholesalers sell the commodity to retailers after weighing it at the forestry office. These retailers in turn sell to consumers and other food outlets. The frozen fish is bought by wholesalers from France and are sold to the retailers who in turn sell it to consumers. This study revealed that retailers at Djamadjie market are exclusively male and exclusively female at Petit Marche (Table 4). This indicates a gender division of the two urban retail marketers. This division of fish retail markets could be an indication of the sensitive nature of the fish distribution system probably due to its scarcity and economic nature of the commodity in the area. Therefore, there is a need for encouraging local production to improve on the marketing system and reduce importation.

Table 4: Sex Distribution of Fish Retailers at Djamadjie and Petit Marché markets

Sex	Djamadjie		Petit Marche	
	Freq	%	Freq	%
Female	0	0	25	100
Male	15	100	0	0
Total	15	100	25	100

Source: Data collection

#### CONCLUSION AND RECOMMENDATION

Inland fishing and fish farming are profitable ventures in the Tillabery and Niamey Areas of Niger Republic. Fish production in the

area should be encouraged through a reduction in fishing input costs and an improvement in extension services to fish farmers. Ways of involving women in fish production should also be sought. These measures would increase fish supply with attendant beneficial effect on market price. Formal cooperative system of fish producers should be put in place to improve fish marketing system in the areas.

#### REFERENCES

- Ajao, A.O. (2006): Economic of Fish Farming in Oyo State, Nigeria. Ph.D. Thesis, Department of Agricultural Economics. Obafemi Awolowo University, Ile-Ife, Nigeria.
- Hishamunda, N.; Thomas, M.; Brown, D.; Engel C. and Jolly C. (1998): Small – Scale Fish Farming in Rwanda: Economic Characteristics. No 124.
- Institut National de la Statistique (2010). Annuaire Statistique. Available at <http://www.stat-niger.org/statistique/articles.php?lng=fr&pg=686>
- Islam, N. S.; Murshed, M.; Moniruzzaman, M. and Abdul B. N. (2002): *Rice-Cum Fish Farming in Selected Areas of Nymensingh District*. Online Journal of Biological Sciences 2 (10): 715 – 718.
- Malvestuto, S. and Meredith, E. (1986). Résultats de l'évaluation de la pêche du fleuve au Niger. Enquête d'évaluation des captures (EEC).
- Olomola, A. (1991): Capture Fisheries and Aquaculture in Nigeria: A comparative Economic Analysis. Issues in African Rural Social Science Series. Research Report No. 13. Winrock International Institute for Agricultural Development.
- Projet NER/00/P51- RGPH (2001): Situation Actuelle du Recensement General de la Population et de l'Habitat. Available online at: <http://niger.unfpa.org/docs/Rap%20Afri%20stat%20RGPH.pdf>
- Tokrisna, R.; Panayotou, T. and Adulavidhaya, K. (1985): Production Technology and Economic Efficiency of the Thai Coastal Fishery in: Theodore Panayotou (ed). Small-scale Fisheries in Asia: Socio-Economic Analysis and Policy. IDRC. 229e. International Development Research Center, Ottawa, Canada.
- Yesuf, S.A., Ashiru, A.N., Adewuyi S.A. (2003): *Economics of Fish Farming in Ibadan Metropolis*. Tropical Journal of Animal Science. Vol. 5. No 2. Pp. 81-88