INVESTMENT PROSPECTS IN INSHORE TRAWLING IN NIGERIA

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ABSTRACT

Commercial trawling for finfish in Nigeria's inshore water
is a recent activity. Intensive industrial trawling started
when the Federal Government distributed trawlers to viable
fishermen cooperatives during the Third National Development
Plan Period (1975-80). Hitherto, industrial fisheries
development in the country focused on the assessment of the
potential fish stock on Nigeria's continental shelf and
measures to increase artisanal production. As a result of
increasing demand for fish and shortage of foreign exchange
to import fish, measures to increase fish supply leaned
towards industrial exploitation of the fisheries potentials
of Nigeria's continental shelf. Based on this background,
this paper examines the investment prospects of trawling
for fish in inshore waters. The fisheries potentials of
the inshore zone of Nigeria are identified. Catch
efficiency and profitability of inshore trawling are
estimated. Measures that can safeguard the longterm interest
of the trawling industry are recommended.

INTRODUCTION

The active promotion of industrial fishing in Nigeria is
a recent event. The Exclusive Economic Zone (EEZ)
declaration which has been incorporated into the New
International Law of the Sea has given coastal states
extended jurisdiction over living resources within a 200-
mile zone - the EEZ. The extension of national jurisdiction
offers Nigeria increased opportunities to benefit from its
fish resources.

Traditionally, fish is one of the sources of protein in the
Nigerian diet. It was estimated that fish and shell fish
comprise 40% of the total animal protein consumed by
Nigerians. With Nigeria's population estimated to grow at
a rate of approximately 3% per annum in the eighties, the
projected demand for fish for the years 1985-2000 was
estimated at more than one million metric tonnes (Tobor,
1985). Table 1 shows projected Nigerian population, per
caput consumption of fish and fish demand for the years
1985-2000.

TABLE 1 - PROJECTED NIGERIA POPULATION, PER CAPUT CONSUMPTION
OF FISH AND FISH DEMAND, 1985 - 2000

Year	Projected human population (millions)	Projected per caput consumption (kg)	Projected fish demand (million tonnes)
1985	96.126	10.59	1.018
1986	98.596	10.85	1.070
1987	101.207	11.11	1.123
1988	103.693	11.37	1.179
1989	106.345	11.63	1.237
1990	109.067	11.89	1.297
1991	111.858	12.15	1.359
1992	114.720	12.41	1.424
1993	117.657	12.67	1.491
1994	120.669	12.93	1.560
1995	123.759	12.19	1.632
1996	126.929	13.45	1.707
1997	130.180	13.71	1.785
1998	133.516	13.97	1.865
1999	136.933	14.23	1.949
2000	140.446	14.29	2.035

Source: Projected human population adopted from mid-year
population projected 1963-2000. National population
Bureau, Demographic Division, Lagos. (After Okpanefe
M.O. 1982).
Projected Fish Demand (Tobor 1985).

Historical evidence shows that the present sources of
Nigeria's domestic fish supply only provide between 54-60
per cent of our demand. Table 2 shows recent trend in
domestic fish production as a percentage of fish demand
in Nigeria between 1980-1983.

As a result of inadequate development and utilization of
domestic fisheries potentials, Nigeria increased its fish
imports in the 1970s. Table 3 shows Nigerian fish imports
and values between 1973-1980. However, in recent times,
the dwindling foreign exchange earnings from export
products (oil, cash crops) has led to a reduction in
imports. Thus, as a means of reducing the shortfall
created by reduced subvention for fish imports, fisheries
development policies of governments are designed to
encourage private investment in the exploitation and
utilization of domestic fisheries potentials. Among the
strategies adopted by governments to induce increased
domestic fish production are; provision of technical
assistance free of charge, infrastructural development of
shore and land based fisheries facilities, low annual
vessel licence fee, and distribution of trawlers at 50 per
cent subsidy to viable fishermen cooperatives. For example
the Federal Government, through the Federal Department of
Fisheries, distributed 13-meter stern trawlers to viable
fishermen cooperatives between 1979 and 1983.

Based on a survey of the industrial trawling activities of
the beneficiaries of the trawler distribution scheme, this
paper examines the investment prospects of inshore trawling
specifically by looking at the profitability of trawling
for finfish in Nigeria's inshore zone.

INSHORE FISHERIES POTENTIALS

Nigeria is endowed with approximately 800 km coastline and
EEZ of about 256,000 km². Within the EEZ, the 50-m isobath
delimits the inshore fishing zone from the offshore.
FAO (1979) estimated the area of Nigeria's trawlable
fishing ground and the offshore fishing ground in the EEZ
at 26700 km² amd 1400 km² respectively. The width of the
trawlable zone varies with greatest area occuring around
the Niger Delta and the Cross River State.

Based on global model, Ajayi (1982) estimated annual
demersal inshore finfish potential that is harvestable by
industrial trawl fleet at between 18000-20000 metric tonnes.
The major commercial inshore finfishes are represented by
the families: Sciaenidae (West African croakers),
Cynoglossidae (Tropical sole), Polynemidae (lesser African
threadfin), Pomadysydidae (Bigeye grunt), Aniidae (Marine
catfish), and Sphyraenidae (Barracuda). Others include
Carcharhinidae (Sharks) and Carangidae (moonfish). Although
shrimps may occur in the catch in the inshore zone, its
industrial prospect requires trawling in deeper waters

TABLE   3   NIGERIAN FISH IMPORTS AND VALUES, 1973 - 1980

Year	Imported Fish (tonnes)	Value (₦)
1973	106,111	7,054,633
1974	92,042	6,693,754
1975	288,626	38,771,162
1976	274,618	76,802,789
1977	289,458	77,836,841
1978	374,835	140,634,192
1979	445,147	143,548,433
1980	444,156	265,099,906

Source: Tobor (1985).

(above 50m) during its seasons of abundance by use of
medium and large trawlers (20m LOA) with special shrimp
processing and preservation facilities to increase the
shelflife of catch.

The annual abundance and distribution of major commercial
finfishes in the inshore zone are related to the influence
of temperature, food abundance and the effect of thermocline.
Although the distribution of the finfish occurs from the
surface to about 60m depth which represents the lowest limit
of the thermocline, only the croakers (Fam: Sciaenidae) show
any satisfactory and regular cycle of seasonal distribution
(Longhurst, 1964; Bayagbona, 1963A; Tobor, 1973). Longhurst
(1964) and recent surveys show that the peak catch rate for
croakers occurs in August and September and this trend is
sustained more or less until the turn of the year when a
decline sets in until a minimum is reached at the start of
the rainy season in April and May.

The Nigerian inshore fishery is a croaker fishery. The
species of the Family Sciaenidae (Pseudotolithus elongatus,
P. typus, P. senegalensis) are dominant over all other
species in the inshore commercial catch with some less
valuable species occuring as subsidiary (Tobor, 1973; Ajayi,
1982; Akinyemi et al, 1986).

According to Nsentip (1982), the family Sciaenidae (West
African croakers) accounted for 44.88 per cent of total
marine trawl landings between 1971-1979. For the same
period, Elasmobranchs accounted for 12.88 per cent,
Bigeye 4.47 per cent, catfishes 3.92 per cent, soles 2.90
per cent, threadfins 2.37 per cent and prawns 0.84 per cent.

Bayagbona (1963), Balogun et al (1986) used the proportion
of croakers (Fam: Sciaenidae) in the commercial catch as an
index for determining the profit margin that may acrue to
the fishing industry. In industrial trawl fishery, total
catch is related to the amount of expended fishing effort,
depth and time of trawling. Revenue from fishing is
related to demand and supply. For instance, within the
Nigeria's inshore fishing zone, empirical evidence shows
that catch rate decreases as the depth of trawling
increases, with best catches occuring in shallow depths
ranging between 7 - 40 meters (Tobor, 1973, Akinyemi et al,
1986). Usually, day catch rates are higher than night
catch rates during trawling for finfishes (Akinyemi et al,
1986; Parish et al, 1964).

In Nigeria's inshore zone, catch rates range between
41.5 kg/hr and 94.0 kg/hr (Tobor, 1973; Williams, 1968). In
recent surveys, catch rate is less than 41.5 kg/hr due to
intense competition for inshore finfishes by artisanal
fishermen and industrial trawlers in the inshore zone.

Nigeria's fish market shows preference for fish over 24cm
total length (White Fish Authority, 1980). Thus, commercial
catch is classified and created according to length class

rating: 24-38cm (small), 29-35cm (medium), 36-60cm (large), above 60cm (extra large). For the commercial catch within Nigeria's inshore zone, the small length class rating (24-28 cm) is dominant over other length class ratings (Akinyemi et al, 1986).

For the purpose of conservation and avoidance of conflicts between artisanal fishermen and trawling industry, the existing fisheries regulations stipulate that trawlers (except canoes) shall not fish within the first two nautical miles of the waters of the Nigerian continental shelf. Trawlers are obliged to use 77 mm codend mesh size for fin fish fishing and 44 mm codend for shrimp fishing. The sea fisheries legislation (Sea Fishing Regulations) provides great prospects for high total catch as it places no restrictions on volume of each and time of fishing (no time limitation or closed season).

INDUSTRIAL TRAWL DEVELOPMENT

In an attempt to modernize the exploitation of domestic fisheries potentials, the Federal Government, through its agencies (Federal Department of Fisheries, State Fisheries Divisions) provided material and technical assistance to the fishery industry in the country. Over the last decade, the assistance include supply of fishing inputs at subsidized prices and development of shore facilities (berthing facilities, cold-storage and ice plant, fuel depot and net loft) at strategic locations for the take off of industrial trawling. The locations of principal shore facilities for industrial trawling in Nigeria are presented in Table 4. In addition, there are dry dock facilities in Nigeria for vessel maintenance.

Table 4   -   Locations of industrial trawling shore facilities in Nigeria

State	Location
Cross River State	Uta-Ewa
Lagos State	Yovoyan
Ogun State	Igbekki/Iwopin
Ondo State	Orioke-Iwamimo/Igbokoda
Bendel State	Warri/Ogheye
Rivers State	Elembekinkiri/Oyorokot

The availability of fishing inputs in the seventies and
the recent development of shore based facilities had
encouraged intensive fishing in Nigeria's inshore zone.
The number of vessel licences issued for inshore finfish
trawling increased from 13 in 1971 to more than 40 at the
begining of the 1980s.

From research findings, vessels that ranged between 10-20m
length-overall (LOA) have been recommended for efficient
inshore finfish trawling on Nigeria's continental shelf.
A narrow overall length range (size) of vessel is
recommended for ease of management (e.g. small crew size)
and superior manouverability in indented coastline and
shallow waters. The shallow waters represent the zones of
croakers abundance on Nigeria's continental shelf.

In the seventies, a Polish shipyard designed a 13-meter
stern trawler which the Federal Department of Fisheries
approved for inshore industrial fishing. The next section
examines the industrial performace of this trawler.

PERFORMANCE OF THE TRAWLING INDUSTRY

In a trawling industry, some factors affecting cost of
operation and ultimate profit have been identified as
vessel parameters. The size of vessel, holding capacity
and engine power have been considered the most important
vessel parameters. These three factors govern the
economic efficiency of fishing operation and the economic
returns on the invested capital. According to Engvall
(1969), the catching capacity is a function of all the
listed three parameters. The size of vessel determines
the gear, and therefore, the catch rate; the holding
capacity in combination with size, fuel capacity and length
of trips, provides an upper limit to catch quantity; the
engine horse power determines the speed and thus, steaming
time and time available for fishing.

For the Nigerian trawling industry, a 13-meter trawler
designed for inshore industrial fishing was distributed
by the Federal Department of Fisheries among viable
fishermen cooperatives in the six maritime States of
Nigeria between 1979 - 1983. The characteristics of the
vessel are as follows:

Length overall   - 13 m

Length of perpendicular   -   11.5 m

Breadth LW   -   4.4 m

Breadth on deck   -   4.6 m

Moulded depth (depth MLD):   2.2 m

Draught MLD: 1.65 m

Keel Drag: 0.6 m

Fishhold capacity: 23 m³

Fuel Tank capacity: 2.5 m³

Engine capacity: 125 H.P

Gross tonnage: 29.29

Body: Steel

In a study by Mabawonku et al (1984), the performance of this trawler was assessed by using the information gathered from its various users. Eleven users of this trawler were interviewed by questionnaires. Table 5 shows the cost incurred by operators in the six maritime States of Nigeria (i.e. cost of fishing). Among the users, the costs of maintenance of vessel/gear and staff salaries represent the major factor inputs in the total cost of operating the vessel (total cost of fishing). Staff salaries (ground staff and crew) ranged from 18 per cent to 48 per cent. Craft and gear maintenance constituted about 17 per cent of operating cost and the range is from 10 per cent to 25 per cent in some cases. Fuel consumption ranged between 2.3 per cent to as high as 25 per cent depending on frequency of fishing trips, fishing range and fishing duration (trawling duration).

The profitability of fishing is used as a measure of commercial vaibility of vessel (trawler) operation. Table 6 shows costs and returns on trawler operation in six maritime States of Nigeria. The declared total incomes less total operation costs by users ranged from a loss of about ₦13000 within an operational period of 8 months to a profit of ₦13000. Five out of the eleven users examined operated at a loss. Mabawonku et al (1984) observed that in nearly all the cases examined, operating costs were inflated while actual incomes were underdeclared or depressed.

In order to verify the actual profit accruing to users, Mabawonku et al (op. cit.) recalculated incomes based on the information that the users of the trawlers supplied in the questionnaire designed to estimate catch efficiency per fishing trip. In this case, the number of voyages, number of fishing days, number of operating months and landing figures were used. Table 7 shows recalculated income/profit (loss) based on the declared landings (catch) at an assumed market price of ₦1.50 per kg of fish (Market Survey, 1984). The recalculated incomes show that only two of the users incurred losses. For example, the reported loss of over ₦10,000 by one of the users of the trawler in Ondo State (Table 1) became a net positive profit of over ₦50,000 per annum. A net profit in inshore industrial finfish trawling activity has been confirmed in a similar survey by Balogun et al (1986).

From the survey by Mabawonku et al (op. cit.), the profit recorded by users depends on the efficiency of management and technological know-how. In addition, the number of

TABLE 5 - OPERATING COSTS OF 13-METER TRAWLER IN SIX MARITIME STATES OF NIGERIA

EXPENDITURE	OGUN STATE		LAGOS STATE						ONDO STATE			
TRAWLER NUMBER	1		2		3		4		5		6	
	N	%	N	%	N	%	N	%	N	%	N	%
Ground Crew and Staff Salary	6400.00	19.0	6240.0	6.4	15680.00	24.2	3540.00	9.9	7200.00	11.9	2400.0	4.6
Floating Crew Salary	9900.00	29.4	19500.0	19.9	5960.00	9.2	5390.00	15.1	16200.00	26.8	15180.0	29.3
Fuel Consumption	7488.00	22.2	14400.0	14.7	15552.00	24.0	5760.00	16.1	1400.00	2.3	5416.0	10.5
On-Board Feeding	3840.00	11.4	4800.0	4.9	3600.00	5.6	1920.00	5.4	4800.00	7.9	3371.0	6.5
Custom Duty	–		1500.00	1.5	–		–		–		–	
Tax	–		1500.00	1.5	–		–		–		–	
Insurance	1086.20	3.2	4000.00	4.1	2100.00	3.2	–		400.00	0.7	–	
Loan Repayment												
(i) Capital	–		10000.00	10.2	10000.00	15.5	11000.00	30.8	5640.00	9.3	10000.0	19.3
(ii) Interest Charges	–		–		–		–		–		–	
Administrative Costs	3380.00	10.0	3000.00	3.1	3600.00	5.6	353.80	1.0	–		1624.00	3.1
Maintenance of Craft/Gear	163.00	0.4	12000.00	12.2	7000.00	10.8	6897.00	19.3	24000.00	39.6	13093.00	25.3
Other Charges	–		18000.00	18.3	–		–		–		–	
Rent of Jetty	–		1200.00	1.2	1200.00	1.9	600.00	1.7	900.00	1.5	720.00	1.4
Shore Handling	1440.00	4.3	2000.00	2.0	–		300.00	0.8	–		–	
Declared Total Expenditure	33697.20	100.0	98200.00	100.0	64692.00	100.0	35760.80	100.0	60540.00	100.0	51804.0	100.0

Source: Mabawonku et. al. (1984)

TABLE 5 (CONT'D)

EXPENDITURE	ONDO STATE				(CROSS RIVER STATE)		(BENDEL STATE)		(RIVERS STATE)	
TRAWLER NUMBER	7		8		9		10		11	
	N	%	N	%	N	%	N	%	N	%
Ground Crew and Staff Salary	4200.00	7.5	1920.00	4.6	18000.00	11.0	8800.00	82.3	–	–
Floating Crew Salary	15000.00	26.7	5520.00	13.3	25000.00	15.3	15000.00	14.1	41015.00*	70.3
Fuel Consumption	14400.00	25.6	5400.00	13.0	13440.00*	8.2	320.00	3.0	5700.00*	9.8
On-board Feeding	2400.00	4.3	2400.00	5.8	3600.00*	2.2	–	–	5525.00*	9.5
Custom Duty	–	–	–	–	–	–	–	–	–	–
Tax	–	–	–	–	–	–	–	–	–	–
Insurance	1200.00	2.1	–	–	–	–	–	–	50000.00	8.6
Loan Repayment										
i) Capital	10000.00	17.8	10200.00	24.6	10000.00	6.4	–	–	–	–
ii) Interest Charges	–	–	–	–	–	–	–	–	–	–
Administrative Costs	3187.00	5.7	3142.00	7.6	84000.00*	51.5	–	–	–	–
Maintenance of Craft/Gear	4800.00	8.5	10176.00	24.5	3000.00*	1.8	–	–	–	–
Other charges	725.00	1.3	2400.00	5.8	4008(2)	2.5	–	–	200.30	0.3
Rent of Jetty	240.00	0.4	320.00	0.8	–	–	–	–	925.00	1.6
Shore Handling	–	–	–	–	1600.00	1.0	–	–	–	–
Total Expenditure	56152.00	100.0	41478.00	100.0	163140.00*	100.0	10620.00	100.0	53365.00	100.00

* Average for 4 years

(2) – Dry Docking

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TABLE 6 - COSTS AND RETURNS ON 13-METER TRAWLER IN SIX MARITIME STATES OF NIGERIA

EXPENDITURE / TRAWLER NUMBER	OGUN STATE	LAGOS STATE				ONDO STATE			CROSS RIVER STATE	BENDEL STATE	RIVERS STATE
	1	2	3	4	5	6	7	8	9	10	11
Declared Total Income(N)	20700.00	12000.00	54000.00	40952.90	57739.00	60071.00	82400.86	57798.00	80000.00	13699.50	71528.65
Declared Total Expenditure (N)	33697.20	98200.00	64692.00	35760.80	60540.00	51804.00	66152.00	41478.00	163140.00	10620.00	58365.00
Declared Total Profit (N)	(12997.20)	(86200.00)	(10692.00)	5192.00	(2801.00)	8267.00	26248.86	16320.00	(83140.00)	3079.50	13163.65

TABLE 7 - CALCULATED CATCH AND INCOME (FROM CATCH DATA DECLARED BY BENEFICIARIES)

	1	2	3	4	5	6	7	8	9	10	11
No. of Operational Months	8	3	9	6	11	11	12	8	10	3.5	9
No. of Voyages	192	6	27	24	24	44	240	200	624	N.A.	128
No. of Days fished	64	N.A.	189	120	180	222	160	N.A.	264	52	128
Total Landing (Kg.)	58880.0	14595	76500	42900.0	72000.0	N.A.	446360.0	N.A.	96000.0	N.A.	384000.0
Estimated Catch (Kg)/Fishing Day	920.0	N.A.	404.8	358.0	400.0	N.A.	2790.0	N.A.	354.0	N.A.	3000.0
Calculated Total Sales (N) (1)	88320.80	21892.5	114750.0	64350.0	108000.0	60071.0	669540.0	67798.0	144000.0	13669.50	576000.0
Profit at Declared Total Expenditure(N)	54622.80	76307.5	50058.00	28589.20	47460.00	8267.00	613388.00	16320.0	(19140.00)	3049.50	517635.00
Profit Per Month (N)	6827.9	25435.8	5562.0	4764.8	4314.5	751.5	51115.6	2040.00	(1914.00)	871.3	57515.00

1) With price of 1 kg of 'Fish' fixed at N1.50 per kg irrespective of species.
2) Compiled from 1984 catch landing data at the rate of two voyages per month.
N.A. Dat Not Available.

SOURCE: Nabamonlu et. al. (1984)

fishing trips and skill of skipper have bearing on total catch, total income and profit. In the cases where losses were-recorded, it was mainly affected by lack of adequate technical skills in the operation of the trawlers. Frequent breakdown of vessel limits the number of fishing trips and high cost of vessel maintenance eroded profit. Similarly, these problems have led to the collapse of some trawl fishing companies in the Cross River State (Essein, 1982).

INVESTMENT PROSPECTS

Based on Fisheries Statistics data (1980), Nsentip (1982) estimated total domestic trawl landings of fisheries from 1971-79 at 38562 metric tonnes. That is on the average, total annual trawl landings was 4284.7 metric tonnes (Table 8). This suggests that each year about 21.4 per cent of the estimated 18000 - 20000 annual demersal fin-fish potential was harvested during the period and more fishing licence can be issued to trawlers in order to fully exploit the potentials of demersal inshore finfishes. Table 8 shows number of licences, total annual trawl landings and average annual catch per trawler in metric tonnes (1971 - 1979).

Table 8 - Number of licence issued and annual landings of inshore trawlers, 1971 - 1979

Year	No. of licence issued to inshore finfish trawlers*	Total annual trawl landings (metric t.)**	Average annual landing per trawler (metric tonnes)
1971	13	1090	83.0
1972	26	1404	54.0
1973	27	2012	74.5
1974	33	3267	99.0
1975	33	4231	128.2
1976	30	5464	182.1
1977	43	7727	179.7
1978	38	7475	196.7
1979	44	5892	133.9
Total	287	38562	1131.9
Average/annum	32.0	4284.7	125.77

*   Nsentip (1982)

**   Fisheries Statistics of Nigeria (1980)

There is prospect for higher catch and increased profit
to the trawling industry if the trend of licences issued
in the 1970s are maintained through the 1980s.

With respect to landings from the industry, the restriction
placed on the importation of animal protein (fish and meat)
by Government and the apparent gap between domestic fish
supply and demand forecasts for the 1985-2000 indicate a
promising market for fish in the country. In addition, the
declining livestock production relative to population growth
has increased the relative substitution value and the
demand for fish.

However, the future of the industry needs protection by
government. It is recommended that government policies
should support the inshore trawling industry in the
following ways:

(i)   Assistance to entrepreneurs in the procurement
          of trawlers.

(ii)   Adequate provision of spare parts.

(iii)   Effective enforcement of mesh-size regulation
          and protection of the inshore fishing zone
          from poachers.

(iv)   Effective control of the fishing range of
          trawling industry to prevent conflicts between
          artisanal fishermen and the trawling industry.

(v)   Adequate protection of the breeding grounds
          of inshore fishes from trawling activities.

(vi)   Monitoring of total annual landings from the
          trawling industry and effective regulation of
          fishing effort (Number of licences issued) to
          prevent overfishing.

(vii)   Effective monitoring and control of the
          activities of the oil industry to minimize
          latent environmental pollution and major
          blow out.

CONCLUSION

Although Nigeria's continental shelf is not among the
major fishing areas of the world, it however has potential
demersal finfishes that can sustain a viable trawling
industry if effort in capitalization (overfishing) is
prevented from manifesting itself in the industry.

The inshore trawling industry may seem threatened by
the large artisanal fishermen population in the inshore
zone, nevertheless, the different fishing techniques and

different fishing ranges exploited by these competitors (artisanal fishermen/trawling industry) offers prospect of good catch to the trawling industry. While the artisanal fishermen use set gillnets, beach seine and longline to exploit pelagic fish communities, the trawling industry uses bottom trawlnet to exploit demersal fish communities of the inshore zone.

The problems of management and technological know-how which beseiged the industry in recent times would disappear through the experience the investors acquire from learning and the availability of trained fisheries personnel to manage the industry.

Finally, the establishment of a proper managerial set-up in a trawling industry, the availability of shore facilities and the fish potentials of the inshore zone offer prospect for a viable inshore trawling industry in Nigeria.

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