The Private Sector in Fisheries: the case of Ghana.

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AUTHORS' NOTE

The research for this report consisted of two elements: a study of existing literature and data sets on Ghana fisheries, and a field trip to investigate the fishery first hand.

The field work was divided roughly equally between key informants in the production, marketing and processing of artisanal and industrial fisheries. For individual fisherfolk, middle women and processors, a purposive sampling system was necessitated by the brevity of the period of research. Where possible, key informants were sought, such as chief fishmen, "Queen" fish mammies and heads of cooperative trading and processing bodies. The bias inherent in this approach is recognised by the authors. Other potential sources of error/bias are the lack of a seasonal perspective of the fishery, unrepresentative nature of the sample of interviews and the necessity to seek informants in accessible areas of Ghana.

A number of key informants in Government institutions and agencies as well as donor agencies and universities were also interviewed in order to gain a wider perspective on the framework within which the fisheries sector operates.

Where possible, a semi-structured interview format was used, with informants and groups of respondents encouraged to discuss the key issues broadly whilst allowing the flexibility to follow interesting insights as they appeared.

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List of abbreviations and acronyms

SSA	Sub-Sahara Africa
EEZ	Exclusive economic zone
TFCC	Tema Food Complex Corporation
SCF	State Fishery Corporation
DIC	Divestiture Implementation Committee

PRIVATE SECTOR FISH PROCESSING AND MARKETING: THE CASE OF GHANA

Catches and landings of fish in Sub-Saharan Africa in 1989 amounted to 4.01 million tonnes (FAO, 1990). Fish provides up to about 25% of the protein in the diet in some countries (Essuman, 1992). Fishing and fisheries related industries such as boat-building, net-marketing, fish processing and marketing provide employment and income for a large number of people.

This case study focuses on fish processing and marketing in Ghana. This sector is of particular interest for three reasons. First, Ghana has a very prolific fishery. Despite its small coastline (536 km) it ranks about 35th in the world's fish catches. The upwelling of cold water, rich in minerals, off the coast of Ghana provides a good source of pelagic (near surface) fish. A second feature is that Ghana has a wide range of fishing operations, with large-scale industrial and artisanal marine fisheries, and also inland fishing, mostly on Lake Kariba. Thirdly, most fish processing and marketing is done by the private sector, with minimal inputs by official organisations. Women play a major role in both processing and marketing. Women also have an important role in fishing itself, as they own many of the fishing boats, even at the industrial level. Ghana's fishing industry has considerable regional importance, as much of the fish landed in other West African countries is caught by Ghanaian fishermen. They operate for short and long periods from countries as far away as Senegal and The Gambia.

The case study has three sections. Section I examines major techno-economic characteristics of fish production, noting possible implications for entry into and forms of fish processing and marketing. Section II provides a short overview of the scope and features of fish production and markets in sub-Saharan Africa. Section III examines the

Ghana experience. It briefly discusses the historical development of the industry, summarizes current patterns of production, consumption, and marketing, and examines the background, operations, and performance of private and cooperative enterprises engaged in fish production.

I. Major Techno-economic characteristics of fish and Fish products

Fish has several basic features which greatly influence the production and marketing. One is glut catches, which characterise many marine fisheries. The other is that fish is very highly perishable. Both of these features have extensive implications for processing and marketing.

Glut catches occur in many marine fisheries[1/]. It is very unusual for catches to be evenly distributed throughout the year. Often weather conditions such as high seas or monsoons, make fishing difficult or impossible for a substantial part of the year. Often the fish can only be caught at a particular season for climatic or oceanographic reasons. This applies particularly to pelagic fish such as sardines, anchovies and mackerel. In the period July-September each year, off the coast of Ghana, there is a huge upselling of cold water rich in minerals. This leads to a sudden proliferation of plankton and of the fish which feed on it. Large quantities of fish are caught over a short period, far in excess of the current consumer demand, and putting pressure on processing and marketing facilities.

1/ Most of the world's fish production comes from marine fisheries. Even in South East Asia, a major centre for aquaculture, marine capture fishery production greatly exceeds that from aquaculture. Until recently, capture fisheries yielded about 90% world production, aquaculture only 10%. During the last two years, the percentage from aquaculture has increased to abut 15%, due mainly to a decline in marine catches as a result of over-fishing. Inland capture fisheries, from lakes, rivers and reservoirs, yield only a small proportion of world production. Attempts to develop aquaculture in Africa have seldom been successful, for reasons which have not yet been elucidated.

Common access aggravates the problems of glut catches. A characteristic feature of marine fisheries (and some inland lake fisheries) is that the resource is not owned by any individual or group of individuals. In principle the fish are available to anyone who can catch them. To some extent common access is limited by Exclusive Economic Zones where nations limit fishing by licensing. This usually does not apply to artisanal fishermen. In some cases access is limited by agreement between groups, for example where canoes fish in a coastal zone up to say 10 km out, small boats operate in the next zone, and bigger boats further off shore. However, even within these groups there will inevitably be competition between individuals. Every fisherman will want to land as much fish as possible while he can do so. It will rarely be possible for any fishermen to defer catching fish, to avoid a glut and hoping for a price rise; someone else is likely to catch those fish.

Fish is very perishable, and spoils quickly especially at the temperatures prevailing in the tropics. At ambient temperatures serious spoilage occurs within a matter of a few hours. Small fish can become seriously spoiled in 6 to 8 hours and putrid within about 12 hours. Large fish keep a little longer, but even they are of poor quality within a day. Without some form of preservation, very little time is available for the fish to be landed and marketed. Icing is a very effective means of preserving fish. If packed in ice, fish retains its natural appearance, flavour and texture, all qualities favoured by consumers. However, in many areas ice is expensive, especially in relation to lower value fish. Many artisanal fishing boats are not equipped to take ice to sea, and then the fish may undergo serious spoilage before it is landed. Generally artisanal boats without ice only operate at distances at which they can expect to land the fish in marketable condition.

Some fish can often be sold uniced at landing sites. If fish is landed near a major city it may be possible to get

some of it to the consumer before it spoils, even without ice. However, usually most of the fish has to be preserved in ice or in some other way. When fish is intended for export to developed countries it may be frozen, but only small quantities of frozen fish are sold within Third World countries. The availability of frozen storage facilities in distribution and marketing, and the cost of operating them, generally make impracticable to preserve fish by freezing for sale while still frozen. (There are exceptions, such as Ghana where much fish is frozen either for smoking later, out-of-season or for sale while thawing). The other alternative is curing, that is reducing the moisture content so that the spoilage processes in the fish are greatly reduced.

Cured fish is usually produced by sun-drying or smoking, often after preliminary treatment with salt. Salting reduces the moisture content of the fish, retarding the enzymic and microbial processes involved in spoilage. More moisture can then be removed by sun-drying or smoking. The choice of process depends mainly on the size of the fish, and whether it is oily. Small fish such as triggerfish (Balistes) can be sun-dried readily. Small oily fish such as anchovies can be sun dried directly, but usually they are salted first to remove some of the water and to reduce the rancidity of the final product. Large fish can be difficult to sun-dry, as the surface hardens as it dries and that prevents moisture from within the fish moving out and evaporating; the outside may be dry while the inside continues to spoil. An alternative then is hot-smoking, heating the fish in a kiln or oven so that it is cooked and dried at the same time. Salting before smoking can accelerate the drying process. Depending on the extent to

which it is dried, cured fish can be kept for periods of many months[1/].

Glut processing is a convenient term to describe the problem which arises as a combination of glut catches with the need to sundry or smoke most of the catch. When glut catches are landed, processors of dried fish will be very busy spreading out, turning, collecting, and packing the product. They will use every available surface which is good for drying, such as tarmac roads. Fish smokers will be limited by the capacity of their kilns, and they will have to consider the capacity needed at glut seasons, when it will not be used for most of the year.

Risks are inevitable in anything related to fisheries. First, fishermen have to find the fish. In an industrial fishery, this is less difficult, with modern technology. At the artisanal level, much depends on the acquired skills of the fishermen. The resource itself is uncertain. Pelagic fish especially are greatly affected by climatic and other changes. With a change of only a few degrees in the temperature of the water near the surface, pelagic fish may disappear, perhaps to deeper water or to a completely different area. The stock of fish is dependent on the food supply, whether plankton or smaller fish species. The stock may also be affected by human activities such as pollution, sedimentation, cutting mangrove areas which serve as breeding areas, etc. Allied to this, risk within the marketing system due to the high degree of perishability, means that fishing has often remained a marginalised activity, financed by the internal sector and under-valued by government. Fishing communities are often transient. Fishing families rarely have proven land tenure or

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1/ It is important to distinguish fish, smoked to preserve it, from products like smoked salmon. The former are processed at a high temperature, often well above 100°C; they are cooked and dried to a low moisture content. The latter are flavour-modified but still perishable, e.g. they need to be kept refrigerated.

alternative income sources. In many societies all fish related activities are considered low status.

The unpredictable supply of fish creates risk for fish processors. They have to decide when to buy, knowing that at anytime large quantities of fish may be landed, causing a sudden drop in price. Alternatively, if little fish is landed, prices may rise equally quickly. Fish processed in glut seasons may be stored and sold throughout the rest of the year. Processors and traders will have to judge the price consumers will be prepared to pay for cured fish many months ahead.

Formal information systems are very rare in fisheries. Prices and supplies can fluctuate quickly, and it is difficult to disseminate them through any of the recognised media. However, there is always a well developed informal network through which processors and traders keep in touch with market information.

Vertical coordination is usually well developed, if informal. Fishermen need to know where to land their catch, which will depend on market requirements and processing facilities in each area. Fishermen usually manage to avoid landing fish for which there is no outlet, resulting in a complete loss.

Value added products from fish are not very important in Africa. In South East Asia, for example, there is a big market for products such as fish sauces, fish soups, fish crackers, etc. In Africa the consumer requirement is for fish in its wet state or cured. Cured fish cannot properly be described as a value-added product. Its price per kg or per tonne may be higher than that of wet fish, but that overlooks the fact that 1kg of cured fish is obtained by removing water from up to 3 or 4kg of wet fish. In terms of value per unit of dry matter or food value, cured fish is a lower value product than wet fish. Almost always, consumers

want wet fish and many well pay more for it when they can get it. Fish is cured not to increase its value but so that it can be preserved during marketing and distribution.

Distribution of production costs

Initial fixed capital costs in fishing (the entry requirement) tend to be heavy, including large single payment for nets, boats and increasingly, motors. Due to the unpredictable nature of fishing income streams, repayment of loans for such investment can be problematic. Therefore, the financing of the sector, especially the artisanal fishery, is commonly characterised by informal financial arrangements between boat operators/owners and shore-based money lenders and middlemen/women who will lend where other institutions are reluctant to do so.

II. Role and Importance of Fish in Sub-Saharan Africa

Fish and meat are the two sources of animal protein, and they are nutritionally superior to vegetable proteins. The relative importance of fish and meat varies throughout SSA. Key factors are first the extent of the water resource, the length of coastline and the amount of inland water which is available; secondly, the quantity of fish available in the country's water. For example, Mali has only limited access to water, with relatively few rivers and lakes. Sudan has a long coastline, but the Red Sea has only limited potential for fisheries. Many African countries are major cattle producers and there meat is much more important in the diet than fish.

Nevertheless, fish is often important even in cattle producing countries, as it may be a much cheaper source of animal protein than meat. For example in Zambia and Zimbabwe fish production is much smaller than that of meat, but the fish which is produced sells very readily and clearly the market for it exceeds the supply. One of the

reasons is that fish, especially cured fish, is often much cheaper than meat. In many countries fish provides much of the animal protein of low income groups.

In a substantial number of SSA countries, fish is a very important food for most or all levels of society. This applies particularly to the coastal states with rich off-shore fisheries such as Cote d'Ivoire, The Gambia, Ghana and Senegal. It also applies to some inland countries such as Uganda, where fish from the Lakes provides much of the nation's protein food. Fish consumption data for selected countries are given in Table 1.

Fish catches and landings for SSA countries are shown in Table 2. There is a huge variation, from Nigeria and South Africa, with more than 0.5 million tonnes, to Lesotho, 40 tonnes. There is no clear sustained change over recent years. As noted above, catches fluctuate substantially. This is particularly true for the pelagic fish species which represent the greater part of all the principal countries' catches.

Employment in fish production is substantial, but difficult to define and measure. Some countries produce data for the number of fishermen (Table 3). In addition, many more are employed in support industries such as boat-building and net-making. Large numbers of women are engaged in fish processing and marketing. The total number of people employed as a result of fish production could be as much as ten times the number of actual fishermen.

Trade in fisheries is also difficult to specify. Some countries import and export similar quantities, but this can be high value frozen shrimp for export and low value dried fish as imports. Or the value can be similar with frozen shrimp exported and luxury products like smoked salmon imported for the major hotels. Increasingly, there are

Table 1

Fish consumption

Country	Per capita consumption kg/annum	Fresh %	Cured %
Chad	8.5	10	90
Cote d'Ivoire	17.7	35	65
The Gambia	16.4	30	70
Ghana	26.4	20	80
Mali	7.1	10	90
Senegal	20.7	70	30
The Sudan	2.0	70	30
Uganda	13.0	45	55
West Africa overall	10.0		
Central Africa overall	13.2		
East Africa overall	6.0		

(Source: Essuman 1992)

Table 2

Fish Production (000's tonnes)

Country	Year 1979	1983	1986	1989
Angola			57.4	111.1
Benin	24.0	20.5	38.7	42.2
Botswana	1.0	1.3	1.7	1.9
Burkina Faso	7.0	7.0	7.6	8.0
Burundi	11.3	12.0	11.8	11.7
Cameroon	59.0	54.3	84.0	77.6
Congo	27.6	31.9	30.1	38.3
Cote d'Ivoire	86.6	94.0	104.9	100.6
Gabon	13.6	52.6	21.0	22.9
Gambia	11.2	11.5	13.3	17.6
Ghana	226.7	243.4	319.5	361.7
Kenya	51.7	97.5	120.0	144.4
Lesotho	0.04	0.04	0.03	0.03
Liberia	13.5	15.3	16.0	17.0
Malawi	60.0	67.0	72.9	87.9
Mali	74.0	61.3	61.0	71.8
Mozambique	30.1	42.4	31.9	33.6
Namibia*	331.4	339.5	14.0	20.3
Niger	8.9	6.8	2.4	4.8
Nigeria	535.4	538.4	271.5	259.5
Rwanda	1.0	1.2	1.5	1.5
Senegal	242.5	222.6	255.6	268.8
Sierra Leone	57.6	51.1	53.3	53.0
South Africa*	654.4	601.3	819.5	878.6
Tanzania	180.3	239.3	309.9	386.9
Togo	8.1	14.6	14.8	16.5
Uganda	179.9	172.0	197.6	240.0
Zaire	115.2	102.0	156.5	166.0
Zambia	49.5	67.2	68.2	68.0
Zimbabwe	9.9	13.6	17.5	20.0

Note:

** Landings at Waln's Bay were counted as Namibia in 1979 and 1983, as South Africa in 1986 and 1989.*

Source: FAO, 1984, 1990.

Table 3
Number of fishermen (Estimated)

Country	No. of fishermen
Cote d'Ivoire	14,180
Ghana	91,400
Nigeria	164,870

(Source: Infopeche, 1990)

exports of high quality iced fish, such as the export of Nile perch to Europe from Kenya, Uganda, and Tanzania.

Most of the SSA trade is in wet or cured fish to neighbouring countries. Examples are Chad, which exports nearly all its fish to Nigeria, and Malawi, which exports dried fish to Zambia. Uganda and Tanzania export substantial quantities of cured fish to Rwanda and Burundi.

Details of imports and exports of fresh fish (iced, chilled or frozen) are given in Table 4 and cured fish (dried, salted, smoked) in Table 5.

The Case of Ghana is especially interesting. Fish provides the major source of animal protein. It is one of Africa's major fish producers. In view of its small coastline it must be the world's largest fish producer in terms of catch per unit area of its Economic Zone[1/].

Many of Ghana's fishermen operate in other parts of West Africa. Ghana has a relatively sophisticated fish processing and marketing system which operates almost entirely within the private sector, despite early

1/ Countries such as North Korea catch most of their fish in distant waters.

Table 4

Trade in fresh fish from selected countries in 1990

Country	Imports		Exports	
	Quantity Thousand tonnes	Value million US$	Quantity Thousand tonnes	Value million US$
Cameroon	60.0	40.0	0.04	0.02
Cote d'Ivoire	133.6	31.0	48.9	56.3
Ghana	31.0	30.0	12.4	19.7
Kenya	-	-	6.4	14.3
Nigeria	429.5	147.3	0.5	3.2
Senegal	34.5	36.5	92.4	171.1
Togo	-	-	21.1	10.6
Zaire	-	-	75.0	31.4

(Source: FAO, 1991)

Table 5

Trade in cured fish from selected countries 1990

Country	Imports		Exports	
	Quantity Thousand tonnes	Value million US$	Quantity Thousand tonnes	Value million US$
Cameroon	1.0	2.8	0.2	0.06
Cote d'Ivoire	0.1	0.2	1.6	0.9
Ghana	0.1	0.3	1.0	0.5
Nigeria	1.7	3.6	-	-
Senegal	0.3	1.2	1.5	2.6
Togo	2.9	1.5	-	-
Zaire	6.0	15.6	-	-

(Source: FAO, 1991)

governmental policies of promoting public sector enterprises. It was the base of one of the major donor operations to assist and improve fish processing. Consequently Ghana is a particularly suitable subject for a Case Study.

III. The Fisheries Sub-Sector in Ghana

1. Historical development

Artisanal fishing in Ghana is a traditional activity, since before recorded history. Fish preservation by sun-drying or smoking, must be nearly as old. Probably fish smoking was done in primitive kilns, mud-brick or dug-out, as still used in other parts of Africa. Sometime after international trade in oil developed, certainly before the middle of the 20th Century, it was found that 44 gallon oil drums could conveniently be used as fish smoking kilns. With both ends cut off, and holes pierced in the sides to take rods to support the fish, and set on blocks over a wood fire, an oil drum serves as an effective kiln. Despite the introduction of the Chorkor Kiln (see below) many oil drum kilns are still in use. When only small quantities of fish are available the oil drum kiln is of a suitable size[1/].

There was a period of reduced sardine catches around 1970, and this had a marked effect on the local market for fish. Until then triggerfish (*Balistes* spp.) were not generally accepted by consumers and only small quantities were sold and eaten. When the supply of sardines was greatly reduced, salted sun-dried triggerfish became acceptable. They remained a recognised item in the cured fish trade for a few years but catches have now declined to a negligible level.

The industrial fishery was greatly affected by the establishment of the Tema Food Complex around 1970. From

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1/ For a review of the early history of coastal fishing in West Africa see J P Chauveau in Haakanson *et al.* 1991, p.12.

1973 the Tema Complex started large scale fish smoking, mostly of sardines but some tuna, croakers and mackerel. A fish cannery was established; this processed canned sardine and mackerel, using fish imported from Senegal and South Africa. A fish meal plant processed some cannery waste but mainly sun-dried anchovies, purchased locally. This plant is no longer fully functional due to lack of investment.

Recent catch data for Ghana are given in Tables 7 and 8. These clearly show the fluctuation in anchovy catches, with catches varying from 15,200 tonnes in 1986 to 88,000 tonnes the following year. Cured fish production is described in Table 8 and Imports and exports of fish and fish products are given in Table 9.

Table 6

Marine fish production in Ghana, 1985-1992

Fishery	Year 1985	1986	1987	1988	1989	1990	1991
Canoes	159,230	190,200	262,380	244,560	220,880	242,020	215,850
Round sardine	54,070	45,490	45,670	75,850	n/a	n/a	n/a
Flat sardine	22,230	16,630	25,480	10,450	n/a	n/a	n/a
Anchovy	27,590	15,210	87,980	75,900	n/a	n/a	n/a
Inshore	17,980	21,890	14,930	7,410	12,660	9,250	7,360
Round sardine	9,430	5,510	1,740	70	n/a	n/a	n/a
Flat sardine	1,830	2,090	1,700	100	n/a	n/a	n/a
Industrial[1/]	21,930	22,340	20,170	16,040	23,070	26,590	27,890
Shrimps	-	-	-	-	380	730	780
Tuna	34,410	34,720	33,470	35,430	32,290	40,800	37,790
Total sea fishery	233,550	269,150	330,950	303,440	289,280	319,390	289,670

Source: Department of Fisheries, personal communications

Notes:

1/ Industrial defined in Department of Fisheries Statistics as "Distant waters"

Table 7

Inland Fish Production in Ghana

Fishery	Year 1985	1986	1987	1988	1989	1990	1991
Volta lake			45,000	46,000	46,000	46,000	45,000
Rivers, dams and ponds			10,000	11,630	11,660	12,000	12,000
Total inland fishery			55,000	57,630	57,660	58,000	57,000
Fish imports			4,670	14,120	23,450	22,700	26,580
Fish exports							
Tuna transhipment			26,290	29,570	21,540	28,250	24,940
Other fish			2,630	2,430	3,710	4,960	5,230
Shrimp			-	-	190	190	150
Total fish exports			28,920	32,000	25,440	33,400	30,320
Domestic consumption[1/]			361,700	343,190	344,950	366,690	342,930

Notes:

1/ Production plus imports minus exports.

Source: Department of Fisheries, personal communication

Table 8

Ghana - Cured Fish Production

Year	(Thousand tonnes) Dried	Smoked
1981	6.8	44.0
1982	6.3	43.2
1983	6.5	44.5
1984	6.2	48.8
1985	6.5	49.6
1986	8.3	58.1
1987	8.3	44.0
1988	8.6	46.1
1989	8.6	46.1
1990	8.7	46.4

(Source: FAO 1984, 1991)

Note:
[a] *Depending on the moisture content of the product, 1 tonne of cured fish is derived from 3 to 4 tonnes of wet fish.*

[b] *Freshwater fish only; i.e. these figures do not include marine fish which is dried.*

Table 9

Ghana - Fish imports

		1987	1988	1989	1990
Fresh, chilled, frozen	Q	21.7	33.1	30.4	31.0
	V	14.0	26.5	24.6	30.0
Dried, salted, smoked	Q	0.7	0.4	0.1	0.1
	V	1.5	1.0	0.4	0.3
<u>Fish Exports</u>					
Fresh, chilled, frozen	Q	20.7	24.9	12.7	12.4
	V	14.2	20.1	11.4	19.7
Dried, salted, smoked	Q	0.3	0.4	0.2	1.0
	V	0.1	0.2	0.2	0.5
Crustaceans, molluscs	Q	0.4	0.3	0.5	0.7
	V	0.9	0.7	1.6	2.7

Note:
<u>Fish Imports</u>
Q = thousand tonnes
V = million US$
Source: FAO, 1991.

Donor funded projects in the fisheries sector in Ghana have mostly been concerned with fisheries as such, rather than with processing and marketing. However, one donor project had a substantial impact on processing, the FAO project on an improved smoking kiln, known as the Chorkor Kiln. This is described in detail in the next Section.

2. Technology and techniques used

Industrial technology, freezing and canning, has been referred to above.

Iced fish marketing and distribution. Apart from a supply of ice itself, all that is needed is an insulated container. Insulated or refrigerated trucks may be used for distribution over longer distances. However, this form of marketing is negligible in Ghana except for the catering trade.

Cured fish in its various forms is the main fish product in Ghana. Only low-cost technology is used, or needed. Salting can conveniently be carried out in tanks built of concrete or baked brick. Sun-drying can be done on the sand or earth. To reduce contamination with dirt and animal excrement, it is better to use racks made from wire netting, reed slats, or old fishing nets supported by a wooden frame and resting on wooden poles. The fish is then raised above ground and there is more wind, and moisture can take place on both sides of the fish. Drying is often done on a tarmac road, where the hard surface serves as a barbeque.

Fish smoking requires some sort of kiln. A few very old-style pit kilns may still be in use. Until 1970, most smoking was done in old oil drums. The situation was then changed by the development by FAO of the Chorkor Kiln. This kiln is named after the village near Accra where the FAO

project was based. Chorkor village is a major fish landing and very large quantities of fish are smoked there.

As noted above, the use of an old 44 gallon oil drum had become traditional in Ghana. However, this has only limited capacity, and the fire must be allowed to die down before the fish can be moved (it is advisable to put the fish in the upper cooler part of the kiln at first, moving them to the hotter parts when they have partially dried).

The Chorkor Kiln has two main parts. First, a fire box made of mud bricks, square or rectangular in shape, and level on top. Above the fire box is a series of racks, wooden frames with wire netting stretched across. These racks rest on the fire box and on each other, so that together they form a smoke chamber. A cover, such as a sheet of corrugated iron, is put on top to retain most of the smoke within the kiln. The firebox and racks are usually about 1.5m long and 1m wide. Often two fireboxes are built next to one another.

The advantages of the Chorkor Kiln are that it has a large capacity and that the heating can easily be controlled. It is easy to move the fish from cooler to warmer areas, as the trays can be lifted off and restacked in a different order. This can be done without letting the fire die, reducing the time needed for smoking. The racks can be used to store dried fish once the fire has died.

The success of the Chorkor Kiln design is evident to any visitor to Chorkor village. The houses are hidden behind the batteries of Chorkor Kilns! The design has been adopted and adapted in many other countries. There have been problems. For example women in Chorkor talk about the high cost of building the kiln (especially buying imported wire mesh) and may have reverted to the old method).

The Chorkor Kiln has some disadvantages. It needs two people to lift the racks off the firebox, and it is worth

using only if large quantities of fish are available. In places with smaller quantities of fish, and in the slack season, oil drum kilns are still used.

The cost of building a Chorkor kiln is substantial, so an outlay of capital is involved. This has been aggravated in recent years by increases in the cost of the chicken wire used in the racks.

The construction of a Chorkor Kiln requires experienced rather than highly skilled workers. When it was introduced in Togo, the kilns were built by inexperienced people who did not realise that the racks needed to fit closely together. Any air spaces between racks let the smoke and heat escape, retarding or preventing preservation of fish in the upper racks (UNDFW, 1988).

Fuel consumption is an important factor in fish smoking and its cost greatly influences the economics of this form of preservation. In other countries such as Sierra Leone (TDRI, 1986) and Tanzania (Rogers *et al.*, 1991) the use of wood in fish smoking has accelerated deforestation, and fuel wood has to be brought long distances to the fish landing area. In Ghana there is still a sufficient supply of fuel wood and coconut shells for fish smoking. Fuel efficiency is one advantage of the Chorkor Kiln as it requires less fuel than most other kilns, for the quantity of fish smoked.

Sources of technical support and equipment are very limited. Some advice may be available from fisheries officers in the villages. Generally fish processors get advice and information through informal channels from other processors.

3. Consumption of fish

On consumption side, structural adjustment has resulted in changed income patterns and to some extent diminished purchasing power. This may have been to the benefit of

fisherfolk because there seems to be some degree of substitution between fish protein and other more expensive sources of protein such as beef of pork.

Fish products seem set to play a diminishing role in the overall diet of Ghanaians.

Table 10

Livestock and fish populations

(livestock measured on units of '000 head, fish in units of '000 tonnes wet weight)

Product	1987	1988	1989	1990	Percentage change 87/90
Cattle	1,170	1,145	1,136	1,158	-1
Sheep	1,198	2,046	2,212	2,555	113
Goats	1,901	1,991	2,363	2,834	49
Poultry	8,214	8,040	8,738	9,686	18
Pigs	399	478	559	677	70
Fish	386	361	347	377	-2

(Source: Statistical Service (1992))

Significant gains in overall production of sheep, goats and pigs contrast strongly with the relative stagnation in the fish and cattle industries.

Fish is Ghana's most important source of animal protein. Official statistics suggest consumption per capita ranges between 14kg and 21kg per annum, well above the average for West Africa. Consumption is much higher in the South of the country than in the North where poor communications make marketing fish more problematic.

Demand for fish is related to population and income. FAO (1989) estimates that price elasticity of demand for fish products lies close to -1, suggesting that income gains among individuals in the wider economy will be more likely to be spent on fish. However, the impact of structural adjustment and devaluation on costs and renewed imports of canned and frozen fish has squeezed profitability (Coulter and Johnson, 1991).

With an growing population and expanding economy the demand for can be expected to out-strip supply. This will result in increased imports, more aquaculture production and additional efforts to reduce post-harvest losses. Prices can also be expected to rise.

4. Input linkages - the macro-economic environment

The impact of structural adjustment policies on the economy is indicated by the figures in Table 11. Whilst inflation has been largely controlled, for the industrial fisheries in particular, this has resulted in supply side inflationary pressure, a credit squeeze and reduced purchasing power on the part of consumers. Devaluation of the Cedi has been the primary cause of this, though constraints on the money supply have also had their effects in terms of poor access to credit and diminished demand for fish.

Interest rates during this period have often been negative, falling behind the current rate of inflation between 1988 and 1990. However, access to the formal banking system is so limited by other barriers, credit cannot be said to be effectively rationed by the interest rate. Rates for borrowing in the informal sector are much higher than those in the formal sector.

Table 11

Inflation rate, the value of the Cedi and indicative interest rates

Year	Inflation (%)	Cedis per US$	Lending rate (%)[1/]
1980	50	1.02	-
1981	117	1.15	-
1982	22	2.75	-
1983	123	20.33	-
1984	40	35.99	-
1985	10	54.37	-
1986	25	89.21	-
1987	40	162.37	-
1988	31	202.35	23.0-30.0
1989	25	270.00	22.5-30.0
1990	37	326.33	22.5-29.5
1991	18	367.78	19.5-31.5

Source: Statistical Services (1991).

Note:
[1/] *Agriculture, Forestry and Logging*

The results for the fisheries sector of relatively high cost inflation and tumbling exchange rates have been to increase the cost of inputs and to create uncertainty in marketing system.

5. Credit

Access to and the cost of credit is a key issue in any discussion of fish production and marketing. Fish is highly seasonal, and unpredictable, with landings varying in size from day to day. Fishing using modern methods ie, motors, requires considerable working capital for fuel which must be

financed before fishing commences. Demands for fixed capital at irregular intervals are considerable. In the marketing system, selling processed fish involves bulk transactions with relatively small margins requiring a high degree of liquidity on the part of the middle-person.

Credit provision can be divided clearly between formal and informal systems. The former consists of Development banks and Cooperative Societies and usually entails the compliance with certain criteria on the part of the borrower such as provision of surety, collateral, evidence of savings and testimonials. The latter is made up of a wide range of credit arrangements between relatives, ethnic groups, buyers and sellers characterised by their lack of formal fixed terms and conditions and often repaid in kind.

The formal sector

The experience of the formal sector with providing credit to the fisheries sector over the decades since Ghana's independence has not been favourable[1/]. Recovery levels on loans to artisanal fisherfolk for canoes, nets, motors and working capital for one bank are still only running at 50% of total disbursements. For the inshore fishing sector, recovery rates are nearer zero and the banks have pulled out. This has been because fishing in this sector is no longer economically viable. Furthermore, the banks have found that recovery of existing debt is almost impossible.

To improve recovery of loans, banks in Ghana have tended to increase the stringency of requirements for loans. For example, the Agricultural Development Bank requires applicants for loans to undertake the following:

* Provide evidence of their "background" ie, be known to the bank;

1/ Neither has its experience with agriculture - see OBBEN, (1991).

* Have their existing assets valued by bank valuation officers to offset against potential default;

* Have savings deposited with the bank which are greater than the value of the loan;

* Have documentary evidence of ownership of property for collateral;

In lieu of this last requirement, the bank will, under exceptional circumstances accept a personal guarantor as surety for a loan.

Effectively, these requirements exclude the majority of artisanal and industrial fisherfolk from bank loans at discounted rates.

In the past banks have lent money to middle-women for marketing and processing purposes. Usually this involves lending money at the beginning of the herring season to be paid back over the following eight months. However, very few of these loans are still undertaken. In one case all the borrowers in this sector defaulted, it is believed because they on-lent the loan to their husbands for fishing activities instead of investing in trading. The issue of fungibility of loans has yet to be resolved.

All the Ghanaian banks have been involved in the programme of advancing loans to buy outboard motors which are also provided through the bank by donors at discounted rates. Default rates on these loans were high and collateral requirements minimal. Problems were experienced with spare parts especially when the Cedi was not freely exchangeable for other currencies. A second tranche of donor money made available in 1987/88 for engines was handled more circumspectly, however, the collapse of the trigger fish catch effectively made repayment of these loans impossible.

One new area which most banks have become involved in is the financing of construction of cold stores. These are mostly used for the storage of imported frozen herring and sardines for sale during the low season.

The informal sector

The formal financial system favours large scale business. Innovativeness, imagination, a willingness to undertake small-scale transactions and encouragement of community or grass-roots participation in savings and loans are required for development of lending to the artisanal sector.

The loaning of money (or deferment of payment of accounts) is a common part of the financial/business culture in Ghanaian fisheries. Of particular interest are the credit relationships between individual members of fishing families. Often wives of fishermen, involved in processing and marketing themselves, provide capital to cover both recurrent and fixed costs. In return, fishermen market their fish through their wives at a price below the going market rate. When fish prices fall sharply, this can occasionally result in a loss on the part of the fisherwomen causing considerable family tension.

Anecdotal evidence suggests that, with the increasing costs of both artisanal and industrial fishing, the levels of indebtedness within families and between fisherfolk and middle-women is increasing. Traditionally, there has always been a degree of debt, but of late, with the devaluation of the Cedi and reduced resource base, this system has been placed under further stress. Little is known about the impact of these changes on fishing societies and particularly on income within family groups.

There exist a number of different informal credit and savings arrangements between groups of individuals. An example is the "Susu" or revolving credit and savings union

which accepts regular savings from members who each receive a lump sum equivalent to their total expected savings over the period in turn[1/].

There exist a number of informal "fish mammies" associations which collect savings from members, provide health insurance and give loans. One such association in Kumasi (the Kumasi-Mopti Cooperative Fish Marketing Society) has nearly 2,000 members who are shareholders. Credit is provided by some societies. Others will stand as guarantors for loans from the formal sector.

6. Pricing and marketing arrangements

Prices are determined by market forces. Fish supply peaks in August/September. At this time the glut of pelagic species depressed the whole market.

Fish are sold either whole or by the piece making comparisons of unit prices and assessment of relative marketing margins difficult. Retail and wholesale price information is limited.

Some indicative prices are given in table 12.

Fish prices exhibit all the characteristics of trade uncertainty and fluctuating supply. Prices can change four fold in a day depending on the size of landings. Marketing margins appear considerable, but transaction costs and risk subsumed by marketing agents are relatively high compared with other industries. Prices reflect seasonal supply variability and physical distance from the source of supply.

1/ For a comprehensive study of informal credit systems with many references to West Africa see ADAMS and FITCHETT, (1992).

Table 12

Wholesale cured fish prices in Tema, May 1992

Product	Price per kg (Cedis)
Smoked sardinella	580
Smoked anchovy	500
Smoked skates/rays	800
Smoked Tilapia	1,050
Smoked African perch	1,200
Smoked catfish	1,200
Dried anchovy	500
Salted-dried Tilapia	800
Fermented Tilapia	650
Smoked shrimps	2,500

(Source: INFOPECHE, Abidjan, personal communication)

7. The state of the resource

There are three areas of resource constraint in the Ghanain fisheries sector, that of the fish itself, the timber required to construct the fishing boats and the biomass needed to process the fish once landed. Evidence for the pressure on existing marine fish stocks is limited, though anecdotal evidence suggests that catch per unit of fishing effort is increasing and that the use of illegal fishing methods (ie, reducing the mesh size of nets) is also increasing[1/]. Fishermen and middle women alike talk of increasing proportions of juvenile fish in the catch. In recognition of this problem, and to prevent exploitation of the resource by industrial fishermen from other countries, the Government of Ghana has placed a moratorium on the

1/ For example, many canoe operators now find it economic to use ice on board their vessels to reduce spoilage and to allow them longer over the fishing grounds. This is a sign that they are travelling further out to sea and spending longer meeting target catches.

construction of new trawlers for use in the Ghanaian exclusive economic zone (EEZ). Since the introduction of this zone, canoe, inshore and deep-sea vessels must all now compete within the same territorial waters from 15 to 50 metres depth. More information is needed on the bio-economics of marine fisheries in Ghana.

A similar situation occurs in the lake fishery, though this is protected from over-exploitation for the time being by large trees which were covered when the lake was constructed and which effectively prevent trawling. Anecdotal evidence suggests that fishing for fresh-water fish is highly profitable and that large numbers of fishermen have migrated to the lake from the coast to exploit this resource. There is no research available to support this contention.

The use of large forest trees for canoe construction is traditional in Ghana. The great expansion of the canoe fleet during the 1970's and 1980's with the development of motorized fishing, coupled with a tendency to develop larger canoes which can go further to reach more productive fishing grounds, has meant that canoe carvers now have to travel considerable distances to find suitable trees. This is reflected in the increased costs of commissioning canoes (around Cedi 2 million each)[1/].

Use of wood to smoke fish, hitherto not considered a great problem in Ghana, is potentially a severe resource constraint for the future. In areas of intensive smoking, forest wood has become scarce and must be purchased from the hinterland representing a significant recurrent cost for fish smokers who must pay at the beginning of the peak season in cash. Discussions with traders from the Volta Lake suggests that wood for smoking is becoming scarce on the lake islands where this activity is carried out and wood must now be purchased and transported from the mainland.

1/ see the innovative paper by G T Chevas in Haatansen *et al.* at pp 233-242.

Monitoring and control of open access resources such as fisheries and forest is not easily managed in the private sector. However, despite commitments by the Government of Ghana to police resource use, no action has been taken. The issue of resource management requires further attention.

8. Operational framework

Size, ownership, management and financial characteristics

At the industrial level, most firms are family owned and, when not in the family name, registered under the Sole Proprietorship laws. There are few public companies in Ghana and none in fisheries. Company Law in Ghana is based on the UK model in all cases except that unlike the UK, where at least 7 directors are required for registration of a company Ghana specifies that only one name is needed. This was done to encourage traditional, family owned and run businesses to benefit from limited liability protection.

There is a tendency for companies in Ghana to restrict financing and management of companies to within the extended family framework. Under Ghanaian law, companies registered by a restricted number of family members are termed `exempt companies'. In traditional African society, financial and cultural ties between kinship groups are in many ways indistinguishable. Liability among family members is shared and much property is considered common. Large capital assets, be they companies, land or fishing vessels etc are often felt to be owned "in trust" for family members of the next generation(s). This cultural framework of business management and ownership has implications for both the artisanal and industrial sectors.

Whilst kinship groups allow companies access to, often interest free, loans from within the family group, it can limit a company's ability or willingness to raise outside

equity to fund capital expenditure. It also means that companies with excessive liabilities and debt may by unwilling to file for bankruptcy and recommence more profitable working free from debt. The deep-sea fishing fleet in Ghana is a case in point. One company invested heavily in trawlers from Europe and then found that the economics of trawling had changed making it uneconomic to put to sea. Devaluation of the Cedi during the past decade has massively increased the Cedi cost of financing the debt of the trawlers which are now unseaworthy. The net effect is that the company is unable to raise capital from formal institutions, or to spread its equity base to finance potentially profitable new areas of business because creditors are fearful of their liability position. Owner operators are reluctant to allow business to go bankrupt and the absence of an enforceable insolvency law compounds this situation.

At the inshore and artisanal levels, discussion with development banks suggests that aspects of traditional business relationships restrict access to and use of formal credit facilities. For example, banks now request borrowers seeking loans for family concerns to provide collateral in the form of real estate. In interviews boat owners revealed that they either had no proof of ownership of their family land or were not prepared for the social stigma associated with "mortgaging" their children's birth-right.

Ethnicity, gender and migration

Migration of peoples along the African coastline over a period of many centuries has produced vast "socio-economic spaces" which were only later constrained by territorial

limits superimposed by colonial powers[1/]. Three major migratory elements are identifiable:[2/]

* migration to catch fish
* migration to process fish
* migration to market fish

There is considerable ethnic diversity among Ghanaian peoples and this is reflected in the number of groups involved in fishing activities. Among ethnic groups there seems to be considerable vertical and horizontal integration. Among the numerous examples seen are:

(a) Ga women in Winneba migrate seasonally to Elmina, a predominantly Fante area to smoke fish;

(b) Women from Volta Region smoke fish on the coast and market it in their home towns, whilst fresh water fish smoked in Volta Region is marketed in Accra and on the coast by Volta people;

(c) Families whose menfolk fish often have women who process and market fish;

(d) Women traders in Kumasi use family members resident in Tema to purchase and ship frozen fish for processing and sale.

Poor communications, undeveloped financial systems, uncertainty and insecurity means that family members are preferred over outsiders because of their obligations to the family as a whole they are considered more trust-worthy.

1/ see Jean Pierre Chauveau's paper in Haakanson et al (1991) for an attempt at periodization of the regional fishery migration.

2/ Migration is defined here as the movement of peoples to seek profit or employment outside their traditional area of abode.

Transaction costs are high at both artisanal and industrial levels. Middle women complain that huge amounts of cash are required to conduct business as a result of inflation and devaluation. This is both inconvenient and insecure. Banks have begun to issue Cedi travellers cheques, but banking hours do not generally fit well with trading activities and anyway, few small-scale fish mammies have bank accounts.

An example of traditional marketing methods is the communication of price information between family members in the fish marketing chain. To communicate price information from landings to inland marketing areas a code consisting of beans or stones tied in a piece of cloth is sent with the fish denoting the purchase price and expected sale price. Individual families have their own codes which are passed on through generations.

Intra-regional trade in fisheries products is considerable but largely unmeasured. Recent studies (INFOPECHE, 1992 and 1993) suggest a number of constraints to such trade. These include:

* high cost of inter-regional transport;

* high import duties;

* poor infrastructure ie, lack of cold-chains

* non-tariff barriers ie, complicated import-export procedures;

* devaluation of currencies; this has, to some extent worked in Ghana's favour since the Cedi has been devalued considerably against the CFA.

The Ghanaian fisheries sector has considerable regional advantages in terms of know-how and ability. Currency devaluation and reduced trade restrictions have allowed them

to exploit these advantages more fully. Further benefit would accrue from improved inter-regional communications and reduced bureacracy at borders.

9. Structure of marketing and distribution system

This study defines five distinct fish production/processing and marketing systems in Ghana. These are:

Artisanal: canoes and beach seines, often processed and marketed by immediate family members.

Inshore: larger wooden hulled vessels with inboard motors, product usually marketed by an immediate family member.

Industrial (deep sea and tuna fishery): Ocean going vessels, product usually marketed by a middle-women with strong financial ties to the boat owner.

Freshwater fishery: canoes using nets and traps on the Volta Lake system selling through family members to middle women from the same ethnic group.

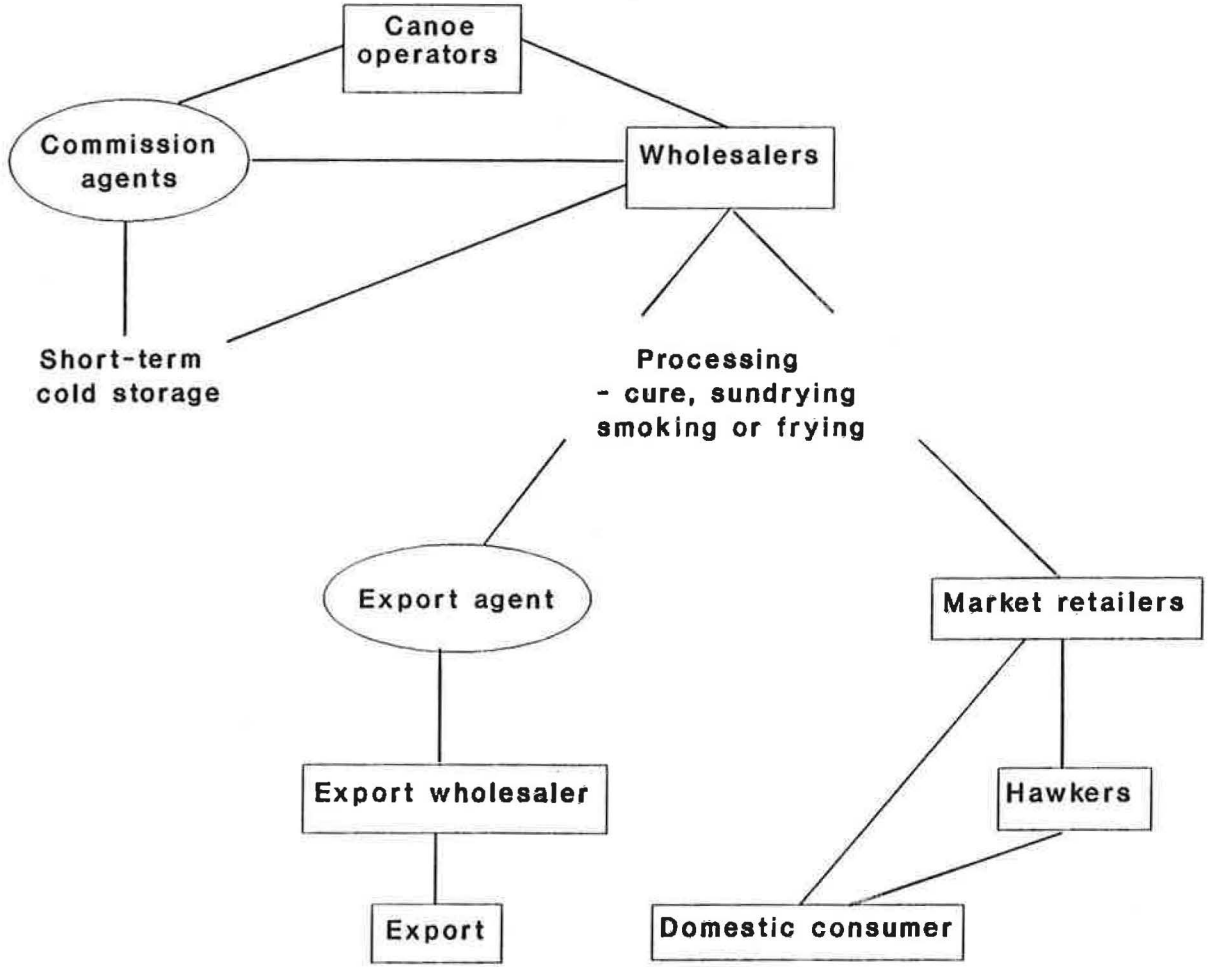
In addition, there are fisheries imports and domestic exports which link into these systems.

The main market flows are shown schematically in figures 1 - 4.

Processing and marketing is carried out by women "fish-mammies" who are often the wives of fishermen. The most comprehensive review of fish marketing in Ghana is contained in Tettey (1990). Descriptions in DANIDA (1988), FAO (1989) and UNIDO (1991) are also useful.

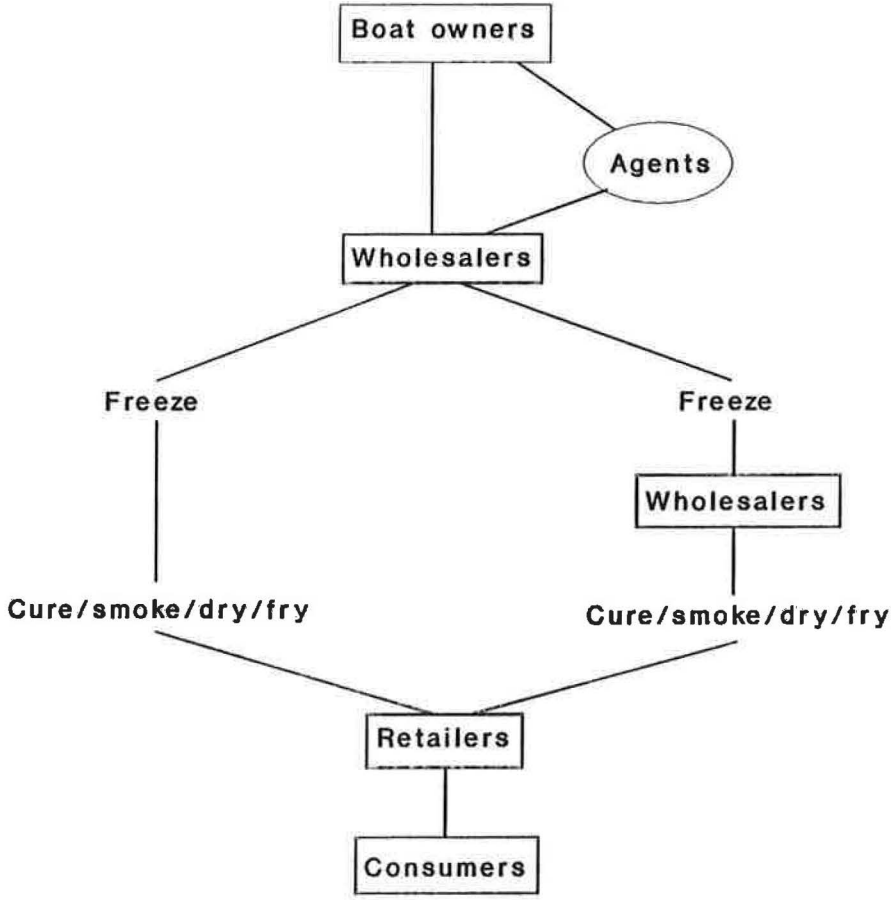
The great majority of domestically produced and imported frozen fish is processed into traditional products (as much as 80% is estimated by the Department of Fisheries).

Figure 1: Market chain for the marine artisanal fishery



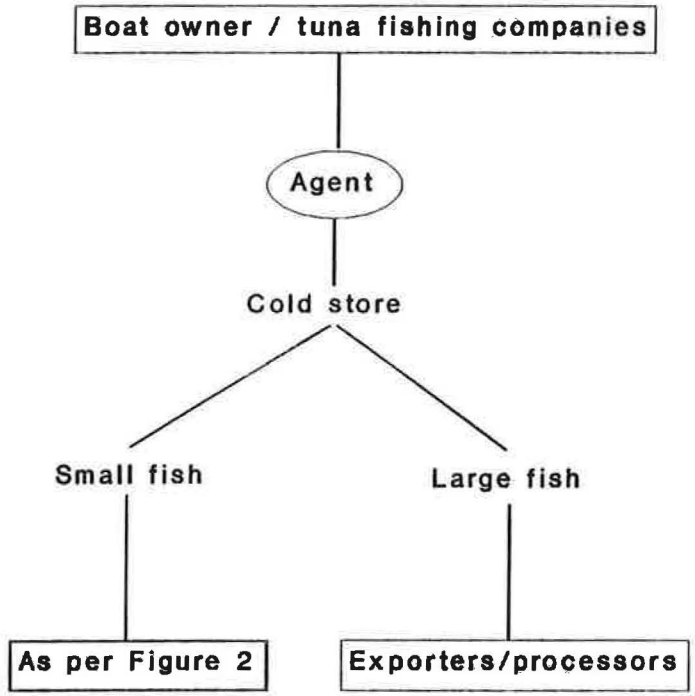
Note: a box denotes transfer of ownership
a circle denotes other physical movements not involving transfer of ownership
unboxed denotes a process or activity

Figure 2: Market chain for the marine inshore fishery



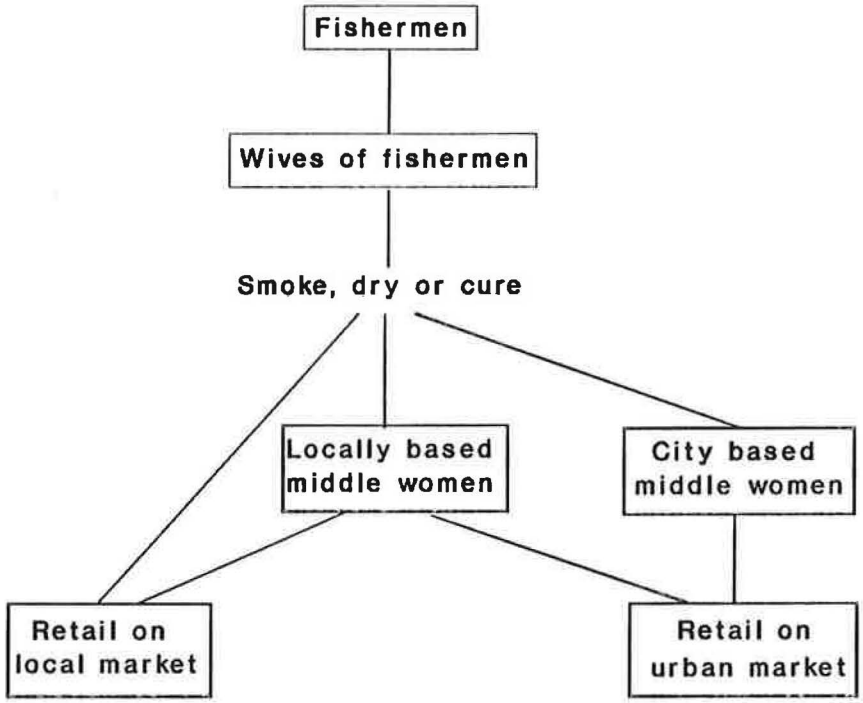
Note: a box denotes transfer of ownership
a circle denotes other physical movements not involving transfer of ownership
unboxed denotes a process or activity

Figure 3: Market chain for the tuna fishery



Note: a box denotes transfer of ownership
a circle denotes other physical movements not involving transfer of ownership
unboxed denotes a process or activity

Figure 4: Market chain for freshwater fish



Noter: a box denotes transfer of ownership
unboxed denotes a process or activity

Processing is conducted at the major landing centres like Tema, Elmina, Chorkor etc, and also in the main consumption/marketing centres inland such as Kumasi.

Smoked fish

Smoking fish is the most common method of processing fish in Ghana (KORANTENG, 1992). Two methods are practised, hot-smoking and smoke-drying. The former has a higher moisture content and therefore reduced shelf life in comparison with smoke dried fish (2-3 days). Tettey suggests that sardinella, horse mackerel, mackerel, snapper, threadfin bream, croaker, grouper, seabream, barracuda, tuna, catfish, sharks and rays are the most common fish which are hot-smoked.

Smoking is carried out by fish mammies both at the landing sites and inland. For inland smoking, frozen fish is brought from cold stores at the coastal landings and transported to the smoking area. Once smoked, fish is either sold directly to retailers or taken to occasional (ie, once weekly) markets and sold bulk to wholesalers both from Ghana and neighbouring countries. The Tuesday market in Chorker village and the Thursday market in Djemeni are good examples of wholesale markets for smoke-dried and hot-smoked fish.

Retailers of the relatively perishable hot-dried fish must re-smoke the product regularly to prevent deterioration. In Kumasi, an ancillary trade in transporting fish from the Central Market back to the smoking areas for re-smoking has developed. Quality and therefore price declines with each re-smoking.

Smoke-dried fish can last upto nine months. While mackerel and sardines are also commonly smoke-dried, anchovies and shrimp and the other main products produced using this method. Most freshwater fish is smoke-dried.

Dried fish

This occurs in two forms: sun-dried and salted dried. These processes take upto three days and involve minimal capital outlay and they are therefore commonly practised during gluts. Salt drying is a preferred method of processing Tilapia.

Fermented products

These are used mainly as flavour enhancers in the Ghanaian diet. Fermented fish is usually made with fish that has deteriorated beyond a marketable stage. It is often referred to as "stink fish" because of its strong odour.

Fried fish

Fish that is fried in vegetable oil has become a popular side dish particularly among travellers. Pelagic species are most commonly used. Frozen fish are the raw material.

Frozen fish

Curtailment of fish imports in the 1980's to conserve foreign exchange greatly reduced the year round availability of fish in Ghana. This protection of the domestic fish producing industry to some extent accounts for its resilience in the face of economic down-turn (though other factors were at play). Liberalisation measures taken in 1988 have resulted in a big increase in the quantities of frozen fish imported into Ghana (ie, from a low of 490 tonnes in 1986 to approximately 26,580 tonnes in 1991).

The widespread practice of transporting and processing frozen fish is one unusual aspect of the Ghanaian fishery. In most fisheries, consumer preference, and therefore price, follows the following order: fresh, fresh-on-ice, frozen,

processed. In Ghana, there is no consumer resistance to frozen fish. Fresh fish statistics quoted in much of the literature actually refers to recently de-frosted fish. No premium is available for fresh or iced fish with the possible exception of the catering trade which makes its own arrangement for fresh supply.

An expanding trade exists in providing re-freezing services to traders of frozen fish. At the large scale (ie, blocks of frozen fish) this costs C200 per block per day for a minimum of 5 days. At the retail level, market traders can buy space in refrigerators for keeping unsold fish overnight.

10. Marketing norms

Fresh fish at landing sites is sold to fish mammies. Where women traders own canoes or vessels, fishermen are contracted to sell to them at a pre-fixed rate set to be below the expected market rate to compensate the owner for the use of capital. Women fish traders interviewed in the inland fishery say that they effectively buy their husband's fish for a fixed price and then must attempt to sell at a price above that which includes all marketing costs.

In some instances, fishermen use agents to sell the catch to wholesalers. These agents often have a financial interest in the fishing operation having lent money to the fishermen. Agents do not hold title to the fish but take a commission on its sale. Transactions between wholesalers and retailers are often done on credit with wholesalers deferring payment until after on-sale has been achieved.

On the whole, the marketing chain is relatively short, with fish changing hands about twice before purchase by the consumer. In the case of dried fish travelling to distant rural markets, two or three wholesalers may be involved before retail.

Fish is bulked up and wholesaled in large baskets (dried/smoked) or packaged blocks (frozen). A considerable ancillary trade in supply of baskets, packaging material and packaging exists centres around major producing areas and markets. Fish landed at Tema fishing harbour is auctioned in wooden crates.

Transportation involves hiring a truck or pick-up. Groups of wholesalers often combine to rent a truck. Transport costs reflect the increasingly high cost of fuel. For example, a trader in Kumasi market pays C1,000 ($1.61) per 20kg carton of frozen fish for transport from Tema, a distance of about 110 kilometres. This represents around 12% of the purchase price of C8,500 per carton.

11. Industrial and semi-industrial fisheries in Ghana

Introduction

Much of the following is based upon a series of sector studies completed during the last five years for various international donors considering rehabilitation of the industrial sector (ie, UNIDO, 1991, World Bank, 1989, FAO, 1989, DANIDA, 1988 and CTA, 1987). In addition, in-depth interviews were conducted with key informants in public and private sector institutions in Ghana.

Medium to large scale fisheries in Ghana is a story of unabated decline since the instigation of the Recovery Programme in 1983. Details are given in Table 6 above.

To some extent this decline is disguised by the statistics, especially those for number of vessels, because they do not describe the sea-worthiness of the ships, which has declined drastically. Several of the larger companies now have fleets of trawlers which are unable to put to sea because

they need repairs or because they are the subject of legal action with regard to unpaid debt.

Characteristics of the industrial fisheries sector

For a number of reasons the industry will have problems reacting to a return of its fortunes (ie, improved catches and enhanced prices).

High levels of debt to indigenous banks and to foreign donors and investors will make getting further loans or re-capitalising the industry problematic. Boats are lying idle. Plant is out of date and needs replacing.

Overmanning is widespread, especially in the formerly state owned sector. There is a lack of bank faith in existing management capability.

High interest rates are not such a problem as access to credit itself. Industrial scale fishing can be highly profitable.

Catch variability: a poor herring/sardine catch during the 1992 season has lead many to believe that the resource is in decline. In fact this could be caused by many reasons including an El Nino effect on sea temperatures.

High input costs: The single largest element of operating costs is fuel, possibly upto 70%[1/]. Fuel costs, therefore, are the largest single determinant of profitability. Industrial fisheries have been exempted from a recent increase in taxation on fuel (60%). However, anecdotal evidence suggests that many in the semi-industrial sector are still buying fuel at sea from tenders bringing fuel from other West African sources, notably Nigeria. In July 1993

1/ This figure is disputed by a World Bank Report of 1988 as an exaggeration, putting the figure nearer 50% which is still significant, however scrutiny of one companies annual balance sheet during the field work for this report adds credence to the 70% figure.

marine diesel cost US$220/tonne in Tema harbour but was between US$185-190/tonne off-shore. Fuel purchased off-shore must be bought in US Dollars. Despite the apparent free convertibility of the Cedis, this is still considered to be a disadvantage since the banks run out of dollars.

High recurrent costs: owners have to pay port dues, even when they cannot put to sea. Many vessels are now unusuable but these fees still have to be paid.

Constraints to further development

Pressures on the resource - all fishing the same grounds - and no proper licensing results in poaching[1/]. As a reaction to this the Government of Ghana has placed strict restrictions on the operation of new boats unless they replace existing ones. With many existing boats inoperable and heavily encumbered by debt, this has effectively prevented existing companies financing the purchase of new boats.

Characteristics of the inshore fleet

These include ageing boats, a decline in fleet size, high indebtedness and lack of bargaining power. Also increased hegemony of "mammie" traders who hold debt, though this situation is confused because they are often related to boat owners and therefore they have vested interests in maintaining production. They are also often on-lending down the marketing chain to wholesalers, retailers and cold-store operators. One dramatic example of this is the State Fisheries Corporation, a parastatal, which in order to continue trading during the lengthy negotiations for its sale, has raised capital from fish mammies to pay for maintenance on its key cold store facilities.

1/ For an example of recent popular debate on this issue see "The Peoples Daily Graphic", July 6th, page 3.

Industrial scale processing and marketing

The tuna export market is dominated by one US company (Starkist) which buys the great majority of large landed tuna for re-export in frozen form. Some is converted to frozen loins. The price variation with fish size is considerable. For export, a premium is paid for large fish on a sliding scale, however, for domestic fresh consumption and smoking/curing, heavy competition for smaller fish has bid up the price (see table 13).

Table 13

Indicative landed tuna prices, July 1993

Weight (lbs)	Landed Price (US$/kg)[1/]	
	Export[1/]	Domestic
>20	600	-
7.5 - 20	600	-
4 - 7.5	600	-
3 - 4	278	-
<3	118	476

(1/ Source, Starkist International)

Other industrial scale processing included smoking at the State owned Tema Food Complex Corporation, though this is now no longer economic.

Starkist will shortly commence construction of a 100tonne per day canning plant for tuna in Tema. They have negotiated highly beneficial conditions for this plant with the Government of Ghana, including tax holidays and tariff exemption. They plan to conduct a "bonded" operation using

1/ US$ = C630, July 1993

locally landed fish, imported cans and imported soya oil. The product will be exported to the US and particularly the EC, where it will not incur import duty due to Ghana's status as a signatory of the Lôme Convention. Existing total landings will not meet this demand for some years to come. Starkist's position as a market maker will be enhanced.

Many smaller boat operators, who are heavily indebted to fish mammies, are forced to sell their whole catch through them as agents or to them as wholesalers. They in turn sell on or process the smaller fish whilst passing the large fish onto Starkist at the prevailing price.

Potential benefits of this large canning operation will be:

- employment generation, a further 370 jobs will be created, mainly for women;

- use of local utilities, ie, water and electricity;

- fish waste will be sold locally providing a valuable input of protein meal into local animal feed ingredients which have decreased in quality and increased in price in proportion to the increase in inputs costs in recent years.

Potential draw-backs include:

- Profit will be held in US$ and will be repatriated and not re-invested;

- Quality of employment low and transient ie, low skilled, low waged, on a day to day basis;

- Canning operations are easily moved, therefore capital investment may not be as long-term as it appears. Starkist has moved its operation in Ghana to

Côte d'Ivoire in the past when it has not been happy with conditions in Tema;

- Possible reduction in fish availability for domestic consumption.

12. Comparison of public and private sector enterprises

The public sector bodies still involved in fish marketing and processing are the State Fisheries Corporation (SCF) and the Tema Food Complex Corporation (TFCC). During the 1970's and 1980's these two organisations played a significant role in catching, processing and marketing fish. Centrally fixed prices for landed fish meant that, to some extent, the SCF and TFCC combined could provide a price stabilising effect, although this was never the stated goal of either organisation. In practice the organisations have been characterised by poor management, inefficiency and over-manning. In the case of the SCF, wholesalers interviewed mentioned illegal fish sales, inconvenient opening times and insufficient cooling in cold stores leading to spoilage, as examples of the poor service provided by this institution.

The TFCC consists of a single large-scale integrated food processing plant with fish canning, smoking and freezing operations sharing the site with a flour mill, an animal feed mill, an oil mill and a fish meal plant. A review of the Corporation in 1992 shows that trading losses have been incurred due to lack of raw materials, an inability to find markets for its products, lack of investment in machinery and maintenance and the high cost of inputs, such as aluminium cans, due to currency devaluation. At present the canning plant is reaching 9% capacity utilization.

TFCC feel that their status as a public corporation has a number of drawbacks including:

* They are forced to buy all inputs through a complex tendering process. In the dynamic market conditions currently extant in Ghana this often results in failure of supply;

* They are prevented from pre-financing reliable suppliers with working capital (as fish mammies do);

* Until recently, fixed capital assets were not depreciated annually in the Corporation accounts, therefore, there was no programme of replacement;

* They are unable to divest themselves of unprofitable assets while concentrating on their core business (flour milling);

* They cannot raise finance for investment in existing or new activities due to the sequestration of their debt by the Non Performing Assets Trust.

As a result of trade liberalisation, the TFCC has found it very difficult to compete with cheap imports of canned fish. This problem has been compounded by the widespread provision of canned fish as "food for work" as part of donor assisted structural adjustment amelioration programmes.

Cold storage capacity at the TFCC is surplus to needs and poorly situated for use by private fish traders. Seasonal demand for cold storage means that the cold stores may not be economically viable on their own.

The fish smoking plant has a capacity to produce 20 tonnes per day. This is far in excess of the demand likely from any individual traders. Furthermore, the high cost of firing the kilns means that they can only be used "to order".

The SCF was set up on 1961 using a Norwegian company to manage a fleet of deep sea vessels. At that time a separate company, Ghana Cold Store, bought the fish and marketed it. The price of the products was determined by the Prices and Incomes Board and was based purely on input costs in the mode of centrally planned economies. During this period prices were commonly set below operating costs.

The fishing and marketing companies merged in 1974 to form the SCF. At this time they were operating 25 large trawlers in Angolan waters. With the introduction the Exclusive Economic Zones the catch started to decline, from a peak of 33,000 tonnes per year to none now. Despite the end of fishing activities, staff were kept on. In 1986 the Corporation had 11 boats and 3,000 employees. Now it has 530 employees. In 1987 the SCF was placed on the divestiture list for disposal by the Government. It remains on that list to date. At this time outstanding debts were transferred by the Government to the Non Performing Assets Trust and responsibility for sale of the Corporations assets given to the Divestiture Implementation Committee (DIC). This effectively prevented the SCF from raising further loans from the formal sector. To continue operation the current Chairman has organised a consortium of fish mammies who provide working capital in return for free cold storage.

Capacity utilization of cold stores is high, but profitability is low due to lack of a fast freezing facility, rigid operating arrangements, poor operating standards, a heavy debt burden and aging plant. Opportunities exist for the importation of frozen fish, but lack of liquidity and an inability to borrow prevent the company benefiting from this.

Total SCF cold storage capacity is 12,000 tonnes in 40 cold stores spread around Ghana. Some, like those in Tema harbour, are potentially highly profitable. Others, many in remote inland areas, are not. About 8,000 tonnes (66%) is

operational at present. Some inland cold stores have been rehabilitated by fish mammies in return for rent free use. Lack of income from these stores is leading to problems with covering key recurrent costs such as electricity and staff salaries.

The SCF also owns a flake ice plant, recently rehabilitated with donor assistance. This lies idle because demand for ice from the inshore fishing fleet has collapsed.

Lack of a decisive divestiture strategy is a result of numerous complicated issues including resolution of staff severance arrangements, agreement over debt forgiveness and a failure of a number of potential joint venture offers from overseas. This uncertainty and delay has greatly diminished the potential of both SCF and TFCC as viable assets in the private sector. Most investors new seem to be waiting for the assets of these corporations to be liquidated by the NPAT, divided up and sold to the highest bidder. By the time this happens many of the existing assets may indeed have become liabilities.

13. Efficiency in the private sector

All fishing and marketing activities (with the exception of the meagre output of the TFCC and the SCF cold stores) are now in private hands and therefore subject to the forces of supply and demand. The changes in the cost structure of the industry discussed above have resulted in a decline in activity in the inshore and deep sea sectors. Discussions with major producers and processors reflect this trend. Tuna canning operations are currently at a stand-still. Many inshore and deep sea vessels cannot finance fishing operations at all.

Artisanal fisheries, however, appear to still be profitable, though profit margins have been squeezed and in many cases assets seem to be passing into the hands of middle women.

Recurrent expenditure, especially the cost of fuel, plays an important role in this.

Pre-mixed fuel is provided to canoe fishermen by the Government of Ghana at a subsidised rate. Effectively, this is a major subsidy to this sector at the expense of the inshore and deep sea fleets. Anecdotal evidence suggests that abuse of this system is rife and what may be happening is that the Government is unwittingly subsidising other sectors such as road transport. As observed in a World Bank report of 1989 the industrial fishing industry has sustained many of the costs of the currency movements experience without receiving the benefits because it has not been able to export effectively to recover costs. The artisanal sector is both subsidised and able to export and may also have been benefiting from an ability to raise foreign exchange for buying expensive capital items during annual migrations.

14. Impact of government

Legislation and regulation

Ghana extended jurisdiction up to 200 nautical miles through the Territorial Waters and Continental Shelf Act (amended) of 1977. The fisheries Decree of 1979 deals with controls and licences of motor fishing vessels. A minimum of 50% of the crew must be Ghanaians.

Important regulations effecting fishing are as follows:

1. licences are required to fish in Ghanaian waters;

2. tuna vessels registered in Ghana are required to land at least 10% of their catch in Ghana;

3. importation of new fishing vessels is only allowed as replacements for existing ones;

4. minimum mesh size is specified for different types of gear;

Imports of spares are not restricted however, as competition in this area is limited with only one company, Japan Motors, dominating the market.

These are other regulations effecting the production and marketing of fish are not effectively enforced because insufficient provision has been made for monitoring, surveillance and control.

The other potential major impact of Government is through on-going programmes for fisheries development. None appear to be having a significant impact on the sector though several major projects for fisheries infrastructure development are in the pipe-line.

Rehabilitation of the Ghanaian road system has had a major impact on reducing the costs associated with fish marketing and has encouraged export to neighbouring countries.

15. Employment and ancillary trades

Koranteng (1990) estimated that over 100,000 full-time fishermen are engaged in marine artisanal fisheries in Ghana with nearly 1.5 million people dependent upon them as wives, children and other relatives. In addition, he estimates that about 25,000 fishermen are engaged in the inland fishery not including dependants.

Apart from those employed in fishing directly, there are a number of ancillary and support industries:

Boat building: construction of inshore boats has almost ceased in Ghana. The one Government owned boat yard undertakes repairs only. Canoe construction remains an

important trade but is increasingly under pressure from reduced margins and increased costs (see HAAKONSEN, 1991, pp 233-243).

Boat supplies, servicing and nets: these have been effected by the down turn in the industrial fishery as a whole, though the increased average age of the fleet means more servicing is required. Engine and spares supply to the artisanal fishery is effectively a monopoly.

Processing: smoking and curing is relatively labour intensive though seasonal. Users of Chorkor kilns, for example, often employ 2 family members per kiln during peak season and may run upto 10 kilns.

Marketing: agents, wholesalers, drives, packers, retailers, hawkers, moneylenders, basket makers etc.

An example of innovativeness which has resulted from the freeing of import markets in the use of re-cycled British and German Sunday newspapers as wrapping material in the retail fish trade. This is brought into Ghana in containers and sold in bundles in markets throughout the country. Similarly, rejected carrier bags from major UK shopping chains have now found their way into Ghanaian markets and are sold by boys or given away with major purchases.

16. Conclusions

A neoclassical economic framework for the describing the economic environment in Ghanain fisheries might include: information availability, riskiness, access to property, entrepreneurial skills and the level of technology used.

Information availability is limited within the fish marketing system. Smith and Thomson (1991) argue that traders exhibit information asymmetry because of their specialised knowledge of individual market situations.

Evidence from the Ghanaian situation supports this. Lack of market knowledge, poor inter-spatial communications and the high cost of entry into the market limit competition and reduce choice.

Riskiness and uncertainty are primary characteristics of this industry and are exhibited in a number of ways. First the uncertainty of the resource suggests a need to stabilise fishing effort and conserve resource to prevent over-exploitation. Once this is done, productivity in the sector can be gradually improved to real incomes. Efforts to reduce post-harvest losses add value to fisheries products after catching would facilitate this. To do this the Government needs to be able to effectively monitor the resource base and implement restrictions on exploitation.

Property in fisheries is by nature open access. Therefore, some level of external and collective control is necessary to prevent the "tragedy of the commons".

The cost and availability of credit to finance existing and future activities reflect the riskiness of fish related activities and scale. Development of the artisanal sector in Ghana is in many ways remarkable since it has been self-financed with no dependence on the formal sector. Efforts by the Government and outside agencies to introduce outboard motors has increased productivity twelve fold over the past 10 years (Coulter and Johnson, 1991, p12). Working capital and capital accumulation for investment in new technology has been conducted within the fishing, processing and marketing systems. The majority of these key transactions are carried out by women whose role in the industry is central. Industrial fisheries, despite its problems, has, until fairly recently been able to gain access to consessionary credit through the formal banking system. This supports the theory that scale is a critical factor in gaining access to credit.

Avoidance of risk through insurance and spreading of liability among investors again shows a divergence based on scale. Although industrial fisheries have had access to the formal insurance market and limited liability company status, it has been shown that traditional value systems such as the family structure have been preferred, with dire consequences. The artisanal fish production, processing and marketing system, however, ameliorates risk by relying on traditional family structures which have proven highly resilient to wider changes in the macro-economic environment.

The primary constraints to the development of fishing technology at the artisanal level are lack of capital and the low level of education of the fishing communities.

Poor access to capital in the formal sector is a result of macro-economic policies to reduce inflation and encourage structural adjustment. However, this also results from the development of institutional and bureaucratic barriers used by the formal sector to minimise risk. A more innovative and grass roots approach to mobilising savings and providing small scale credit is needed.

Finally, the level of technology used reflects access to education, the cost of capital, and the inherent conservative nature of uncertain markets for perishable goods. The example of the limited market in Ghana for fresh fish is a good one. To exploit this potentially lucrative market will require the development of cold-chains, improved communications, more sophisticated marketing methods and a fundamental change in consumption habits. This applies to both artisanal and industrial fisheries.

Creation of an environment condusive to the development of the fisheries sector in private hands requires a strong macro-economic framework of resource control combined with an innovative, participatory development of credit

availability and encouragment of entrepreneurial skills. Fish production, marketing and processing represents a significant proportion of Ghana's economic activity and as such deserves special attention from policy makers.

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