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# Senegal's Industrial Fisheries System:

## A Systemic Development Programme

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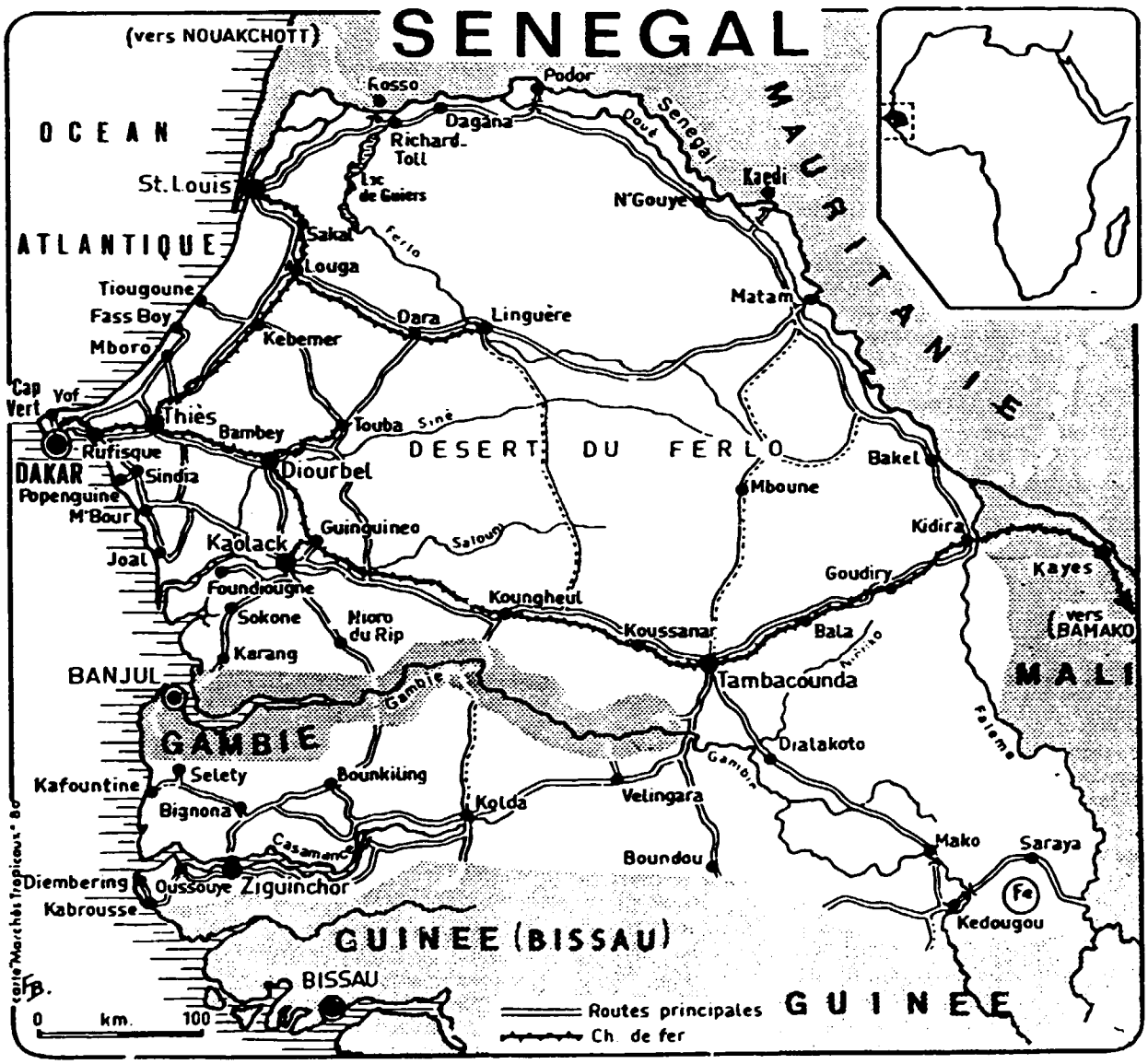
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## Preface

UNIDO has, under Project TF/RAF/87/904 Prospective Study on the Industrial Fisheries System in Senegal, undertaken a detailed analysis of the fisheries production and consumption system in Senegal in order to develop a systemic, balanced program for the advancement of national objectives through the fisheries sector. Financial and other data have been analyzed and the impact of various interventions have been simulated within the framework of UNIDO's systems model MEPS (a general method for assessing and programming integrated production/consumption systems, implemented on a micro computer). The result is an integrated set of technical assistance projects, investment activities, and policy recommendations, all of which ought to be implemented in harmony in order to reap maximum benefits from the fisheries industrial system in Senegal.

The project TF/RAF/87/904 has been financed through special funds entrusted to UNIDO by the Government of Japan. In Senegal, generous and invaluable assistance has been rendered by GAIPES (Groupment des Armateurs et Industriels de la Pêche au Sénégal) as an organization as well as by individual members and, in particular, its Permanent Secretary, Mr D. Coulibaly. Dr Ernest O. Tettey, on an inter-agency reimbursable loan for four months to UNIDO from FAO's INFOPECHE in Abidjan, Côte d'Ivoire, assisted in the primary data collection in Senegal and performed the computer analyses at UNIDO Headquarters in Vienna. The final report and development program has been compiled by the Regional and Country Studies Branch of UNIDO.

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## Explanatory Notes and Abbreviations

| | |
|---|---|
| BOAD | La Banque Ouest Africaine de Développement |
| CIF | cost, insurance and freight; imports are normally valued including such transportation charges,. i.e at CIF |
| CRODT | Centre de Recherches Océanographiques de Dakar |
| DOPM | Direction de l'Océanographie et des Pêches maritimes, Dakar |
| ECU | European Currency Unit |
| EEC | European Economic Community |
| EIU | Economist Intelligence Unit |
| EEZ | Exclusive Economic Zone; extends 200 miles from the shore line |
| FAD | Fonds Africains de Développement |
| FAO | United Nations Food and Agriculture Organization |
| FOB | free on board; exports are usually valued excluding transportation charges, i.e. at FOB |
| FCFA | the franc of the Francophone African Community; by definition equal to 50 French francs |
| GAIPES | Groupment des Armateurs et Industriels de la Pêche |
| GDP | Gross Domestic Product |
| hp | horsepower |
| HUV | High Unit Value |
| kg | kilogram |
| LDC | Least Developed Country |
| LUV | Low Unit Value |
| MVA | Manufacturing Value Added |
| IMF | International Monetary Fund |
| MEPS | Method for assessing and programming integrated production/consumption systems |
| MSY | Mean Sustainable Yield |
| Mt | Metric ton |
| sq.km | square kilometers |
| UNIDO | United Nations Industrial Development Organization |
| VA | Value Added |
| WAEC | West African Economic Community |
| $ | refers to US dollars |

## 1. The National Economy

Senegal's population is estimated at 6.9 million in 1988 and is thought to be growing at just under 3.0 per cent per annum.[1] The area of the country being 196 722 sq.km, the population density is 36 persons per sq.km. Over 80 per cent of the population lives in the coastal regions with the area around Dakar (Cap-Vert) having a density well over 1 800 persons per sq.km.

Senegal is an LDC. Its GDP in 1986 was $3 740 million (at 1986 purchaser values) yielding a GDP per capita of some $550.[2] During the period 1980,...,86, real GDP grew at an annual rate of 3.2 per cent.[2] Preliminary figures for 1986 and 1987 indicate real growth rates in excess of 4 per cent; growth of around 4 per cent seems to be assured for 1988 also. Consumer prices ("African" index) increased by only 4.6 and 4.1 per cent in 1986 and 1987, respectively. In Dakar, consumer prices actually declined all year in 1987.[3] Total external debt stood at $2 990 million in 1986.[4] The debt service ratio (total long-term debt service as percentage of exports of goods and services) was 20.2 per cent in 1986.[4]

Total exports (FOB) were $615 million in 1986.[4] Traditionally, the principal export products were phosphates and groundnuts products. Now, however, fish and fish products are by far Senegal's most important export item, accounting for more than 40 per cent of the country's total export earnings. In 1986, imports amounted to $1 031 million [4] (estimate for 1987: $1 270 million[5]), leaving a trade deficit of $406 million. Gross international reserves were only $21 million in 1986, covering 0.2 months of imports.

Despite the rather positive macroeconomic figures, Senegal's economy is experiencing great difficulties. This apparent paradox is partially explained by the unreliability of the official statistics but also by the fact that macroeconomic indicators tend to hide sectorial imbalances. Thus, the country is going through an economic restructuring (with the support of the World Bank and IMF, France, and indirectly the USA) that has been, perhaps, too successful in its aim to deflate the urban sector. During the past three years, the economic growth can almost entirely be attributed to the rural sector's recovery from drought and higher agricultural producer prices. Now there is both a political and an economic urgency to create jobs, and expand the urban economy. Both the Government and aid donors are said to realize that more account must be taken of the social (political?) aspect of structural adjustment.

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1 World Development Report 1988, the World Bank 1988 and the Economist Intelligence Unit, Country Profile, Senegal 1987-1988, p. 3.

2 World Development Report 1988, op. cit.

3 EIU Country Profile, op. cit. and EIU Senegal/the Gambia Country Report No. 2, 1988, p. 7

4 World Development Report, op. cit.

5 EIU, Country Profile, op. cit, p. 2.

On November 21, 1988, the IMF approved a $144.67 million loan to Senegal to assist with the restructuring during the next three-year period. The program aims at an annual growth rate of $4.2 per cent, a stabilization of the rate of inflation at no more than 2.4 per cent, and a progressive reduction in the external deficit through increased savings and investment, reinforcement of structural reforms, and continued cautious fiscal policies. The loan in repayable in 10 years and the rate of interest is one half of a per cent.

Public sector austerity and reduced production for domestic industry have greatly reduced the number of available jobs. Eventually perhaps 20 000 of the 70 000 civil servants may loose their jobs and there have been projections of 3 000 to 4 000 industrial jobs eliminated due to the ongoing restructuring.[6] The local paper Le Soleil reported in March 1988 a reduction of 200 in the work force of the Dakar marine ship repair yard over the previous nine months. Large as these numbers are, they are still small compared with the approximately 150 000 new entrants to the labor market each year, most of whom will be seeking urban, formal sector jobs. Thus, the Government is now giving top priority to job creation, but clearly not through expanding the public sector in any form.

Despite the favorable development in certain international prices, notably the decline in prices for oil and imported rice as well as in interest rates, several external factors are still plaguing the Senegalese economy. The terms of trade as well as the domestic value of dollar-dominated foreign aid have deteriorated as a result of the appreciation of the French (and hence the FCFA) franc against the US dollar. Prices for the country's former principal exports, phosphates and groundnuts remain weak, some having dropped by the beginning of 1988 to only one-third of their 1985 levels. Producers were further squeezed by the reduction in the Government's producer prices for groundnuts. This is a strong indication that the Government does not intend to prop up industries that face long term, structural difficulties. On the contrary, the Government seems intent on reducing significantly existing subsidies and other protectionist measures. Put differently, the Government is withdrawing from direct involvement in the productive sectors of the economy, preferring to leave it to the private sector to provide for much of the future growth. The basic assumption is that both the information and expertise to run industrial and other enterprises rests with individual businessmen and technical people rather than civil servants. Besides, the redirection of policy is necessitated by the fact that the Government has simply run out of money.

Reflecting the new direction of Government policy, four major legislative changes were implemented in 1987. The national planning mechanism was overhauled to create a three-tiered mechanism designed to afford greater flexibility in case of drastic external changes to which Senegal has been vulnerable in the past and to introduce a longer perspective (up to 15 years) into national planning.

A second measure was the cabinet approval of legislation to govern the privatization of state

6 EIU, Country Report, op. cit. p. 17

enterprises. There had been little progress on privatization because of poor book-keeping at many of the companies concerned,weak financial positions on the part of the companies to be sold, and because of difficulties on the part of potential (Senegalese) buyers to raise the required capital. The new legislation is intended to introduce a certain amount of flexibility in the financial conditions of the sell-offs while carefully maintaining the basic principles that sales be competitive, shares properly valued, and full payment be required before transfer of titles.

A third measure was the new investment code. It will largely automate the approval of new enterprises by cutting red tape and instituting a "single stop" investment agency. Foreign and domestic investors are treated equally but special advantages are offered to small- and medium-sized enterprises. Consistent with the overall restructuring philosophy, tax holidays are reduced from previously 25 years to now 12 years, phasing out over the last three years.

The fourth major reform involves some changes in the labor code. Thus, the limits on renewal of short-term employment contracts was removed; these contracts can now be renewed indefinitely. The Government employment service's monopoly on recruitment was removed, opening the way to private employment agencies. But, the crucial provision preventing companies from firing workers for economic reasons without prior Government approval, was left unchanged. Signs are, however, that it is not being implemented too enthusiastically (cf. the above mentioned losses of jobs in both the public and the private sector).

Other policy changes relevant to the present context include a lowering of the price for bottled gas (used for cooking) in order to shift the consumption of fuels away from firewood. In 1987, the cabinet approved new framework legislation covering maritime fishing. It makes essential adjustments to the previous code (of 1976) to meet changing external circumstances. Thus, the new code defines more types of fishing licenses than before, and protects more species. It also allows for quicker implementation of new regulations. Tariff barriers have been lowered from an average nominal rate of protection of approximately 50 per cent to around 40 per cent. This is intended to encourage competitiveness in the domestic industry and to make smuggling less profitable. Electricity prices for business use were cut in 1986, but business operators still complain bitterly over the high level compared with prices their international competitors are charged whence they produce (Spain, Taiwan, Thailand, etc).

The first [second] of the three year "rolling" public sector investment programs under the new planning mechanism covers the period 1987-88 [1988-89] to 1989-90 [1990-91]. It allocates 35 [33] per cent of all funds to the primary sector, mainly to agriculture and rural water resources but also 3.4 [2.5] per cent of the total to maritime fishing activities. The secondary sector which includes all processing industries, receives only 12 [14] per cent of the total investment funds. Various services (tertiary sector) is to get 30 [30] per cent of all

investments during the period. The rest goes to such public services as urban development, housing, health, education, etc.

The minimum hourly wage ("le SMIG") has been allowed to fall in real terms since the early 1980ies. It was last raised, in 1985, to FCFA 183.75/hr. The official working week is 40 hours.

## 2. Government Objectives and Policies vis-à-vis the Fisheries Industrial System

Although neither directly nor solely aimed at the fisheries industrial system, two recent changes (April 5, 1988) in the Senegalese cabinet after Mr. Diouf's investiture are worth noting. Mr. Jean Collin continues as general secretary at the Presidency but now as Minister of State, i.e. as a political rather than administrative appointee. The second significant change is the shift of Mr. Djibo Ka from Information Minister to heading the Ministry of Economic Planning and Co-operation. No doubt this amounts to a promotion. Furthermore, the move may have the effect of placing Mr. Ka in charge of both economic policy and foreign aid. Thus a man to be reckoned with in all matters concerning national economic development.

The Senegalese Government has four essential economic and social objectives:[7]

1. Stable and sustained economic growth;
2. Self-sufficiency in food;
3. Full employment; and
4. An even balance of payment.

Economic growth is seen as necessary to allow the country to solve its long-term structural imbalance. As a dynamic productive sector, the fisheries industrial system (comprising all functions from catching through marketing of sea food) is viewed as a key activity in this regard.

The current national average per capita consumption of fish is exceptionally high. However, production must increase to permit this level to be maintained in the face of demographic growth and to augment consumption in regions away from the sea.

The fisheries industrial system now employs directly as many as 100 000 persons in Senegal; indirectly perhaps 140 000.[8] Clearly then the sector is viewed as most important with respect to the full employment objective. Likewise, the sector now being Senegal's biggest foreign exchange earner is a crucial factor in the country's balance of payment. Indeed, the country is counting on the sector to boost its positive impact through both increased exports and a high value added content.

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7 Réunion sectorielle sur la pêche maritime (Dakar, 29-30 October 1986). Document final. Republique du Séngal, Ministère du développement rural, Sécretariat d'Etat aux ressources animales. Dakar, Nov. 1986, p. 2-3.

8 "Un patrimonie qu'il faut sauvegarder", interview with Mr. André Fontana, Director of CRODT, Africa International, No. 205, Mai 1988, p. 1

Subservient to the above objectives as far as the fisheries industrial system is concerned are the following operational measures:

- rational extraction of resources;
- management measures for the EEZ;
- surveillance and control of foreign fishing fleets;
- export promotion incentives;
- measures for industrial restructuring;
- privatization of state companies; and
- promotion of new products and markets.

The current medium-term adjustment plan envisages that the artisan and industrial catches will increase to 240 000 tons and 170 000 tons, respectively by 1988/89.

These policy objectives have to be pursued within the context of powerful external influences. These include increasing international competition from cost-efficient producers, European and North American market trends, world market prices (especially for tuna, shrimp and cephalopods), and quality requirements on certain markets. Especially the year 1992 with the possibility of an integrated European market with difficult entry for outsiders ("Fortress Europe") is viewed with a great deal of concern. Both Government officials and businessmen realize that the threat from changes in these external variables is severe and that the ability of Senegal's industrial systems to adjust swiftly and efficiently to such changes is weak. Indeed, the survival of many activities within the fisheries industrial system may be in question, despite favorable internal policy measures. Current thinking therefore emphasizes, on the Government side, a reduction in all forms of red tape in order to speed up necessary structural changes and, on the part of private operators, streamlining of operations in order to increase competitiveness.

Early this year, Senegal and the EEC signed a new fishing agreement, replacing the previous one of 1986. The negotiations are reported to have been exceptionally tough.[9] The agreement permits access for French, Spanish, Greek, Italian, and for the first time Danish fishing vessels but Community boats will have to land a minimum of 11 000 tons of fish in Senegalese ports. The agreement is worth ECU 24 million in Community payments for fishing rights, payable in two annual instalments, plus ECU 550 000 for marine research. Plus there will be scholarships for Senegalese students in maritime subjects.

Senegal's membership in the CFA (Francophone African Community) franc zone ensures free convertibility of its currency, the Franc CFA or FCFA. This has many advantages but it has also increased the country's difficulties to manage its own affairs in the face of external changes such as, for example, the fall of the value of the dollar in relation to the French

9 EIU Country Report No. 1, 1988, op. cit. p. 18

franc. The arrangement also rules out the possibility of using devaluation as a means to increase the competitiveness of Senegalese fishery products on international markets.

This has been become an acute problem as many of the CFA countries' African neighbors recently have had hefty devaluations of their currencies, while the FCFA remains grossly overvalued. This is clearly evidenced for example by the reversal of the smuggling traffic that used to flow from the CFA to the non-CFA countries. However, powerful political realities argue against the likelihood of a devaluation of the CFA franc. The CFA countries' urban economies are heavily dependent on imports and the governments rightfully fear massive riots if the price of (imported) food stuffs were to rise dramatically as a result of a devaluation of required proportions. Neither would France, as the "sponsor" of the CFA zone, like to see a devaluation as it could be seen as a diminishing of her stature and lead to a consequent loss of the steady support these developing countries have given France in various international fora. Moreover, in case of a devaluation, French exporters would loose profitable markets in the former colonies and French companies there with debts in French francs but earnings in CFA francs would take a severe beating.

Trade is generally subject to tariffs rather than quantitative restrictions in Senegal. Most volume restrictions were to be phased out by the beginning of 1988, leaving only a few items subject to restrictions, none of which have direct relevance for the fisheries industrial system.[10] Imports are subject to customs duty ("droit de douane") at a flat rate of 15 per cent of CIF value, fiscal entry duty ("droit fiscale d'entrée") at rates ranging between zero and 60 per cent depending on the category of goods, and value added tax ("taxe à la valeur ajoutée" or TVA) at 5, 20 or 50 per cent. Both the customs and the fiscal duties were slated to be reduced by 5 per cent, respectively, in June this year. For the fisheries industrial system, the significant categories of imported goods are equipment and raw materials, and semi-finished goods that all were (before June 1988) subject to a 10 per cent fiscal duty in addition to the flat 15 per cent customs duty.

Export subsidies were introduced experimentally in 1981 and, in view of favorable results, extended in 1983 when coverage was enlarged from only canned goods to include also fresh, frozen and processed fish. The rate of subsidy is generally 10 to 15 per cent of the FOB value and applies to exports to non-WAEC (West African Economic Community) countries (in practice this means mainly European markets). The exports of shrimp and squid enjoy an export subsidy of 15 per cent (presumably of the FOB value). It has, however, been suggested that this subsidy be lowered to 3.75 per cent. There are likely to be other subsidies as well; however, precise information is not currently available to UNIDO.

During the fiscal year 1983/84, over FCFA 2 billion were paid in subsidies to exporters of fishery products. In the first half of the following fiscal year, FCFA 2.2 billion had already been paid out. As noted above, such largesse has by now been substantially reduced under

[10] EIU Country Report No. 1, 1987, p. 36.

the economic restructuring program.

Exporters of fish products enjoy an advantage in that they can buy diesel fuel at a reduced price from the international bunker in Dakar, provided that they pay in US dollars earned through their export activities. The dollar being low, it is easy to find importers who are willing to pay in dollars so this is no problem except that the domestic value of the export earnings in dollars is also low.

There is an industrial free trade zone in Dakar that offers companies exemption from taxes and customs on their export-related activities. Nonetheless, businessmen there complain that they are still subject to a number of small taxes and duties that all add up to significant costs. For example, if something has to be taken into town for repair, it is immediately subject to import and possibly export duties, as well as delay (i.e. cost) caused by government red tape.

The overall impression of the Government's policy vis-a-vis the fisheries industrial system is that either there is no real, coherent policy or that there are so many conflicting policies touching upon the daily operations of the system that the outward impression is that of no policy at all. The rather recent study by the Boston Consulting Group on the feasibility of removing or lowering existing export subsidies goes some ways in laying bare the external environment under which the firms in the fisheries industrial system operate in Senegal. However, more of this type of analysis is needed in order to revamp the existing policy framework into a coherent and effective instrument of national economic planning.

# 3. Description of the Present System

## 3.1 Fishery Resources

The continental shelf off Senegal's coastline (550 km, some sources say 750 km) comprises a total area of 23 700 sq. km. The EEZ covers 60 900 sq. km. The maritime fisheries are divided into the regions of Côte Nord, Grand Côte, Cap Vert, Petite Côte, Sine Saloum, and Casamance. The main fresh water bodies are the Senegal River and its associated tributaries, and Lake de Guier. The Casamance region also contains important estuarine swamplands but existing road and other transportation links with the rest of the country prevents the region from realizing its full potential as a source for protein from fishery products. However, the region does contribute to subsistence level consumption but also to export of High Unit Value (HUV) products such as shrimp and frozen fish fillets.

Although the biomass is unevenly distributed over the coastal waters, it can be said that in general these waters support a high concentration of aquatic resources. This is particularly true for small pelagic species. Maximum sustainable yield from the marine resources in the EEZ has been estimated to be between 400 000 and 500 000 Mt annually. in 1986, the composition of the MSY was estimated to be

| | |
|---|---|
| High seas pelagic (tuna etc) | 30 000 Mt |
| Coastal pelagic (sardinella, tunny) | 250 000 to 300 000 Mt |
| Demersal species (all types) | 122 000 to 145 000 Mt |
| Total | 400 000 to 475 000 Mt |

With the domestic fish production (catch) averaging some 250 000 Mt annually since 1981, the rate of exploitation is barely above one half. The intensity of the harvest, however, varies a great deal by species and by type of fishery. Deep sea demersal and migratory species in total are particularly underutilized and the artisan sector shows much more vigor than the industrial fishing activity.

Within the 6 mile zone set aside exclusively for artisan fishermen, it is estimated that some 220 000 Mt of fish, mostly sardinella, could be safely harvested each year. In 1987, artisan landings reached 171 085 Mt or 78 per cent of the estimated potential. Note, however, that the larger and more powerful artisan boats can now fish beyond the 6 mile limit so that not all of this catch came from the set-aside artisan zone. Thus the artisan fishery could support still additional canoes.

The artisan shrimp fishery, practiced mainly in the Casamance region, is the most vigorous activity with a rate of exploitation reaching fully 90 per cent of the MSY. Similarly, the artisan sardinella fishery took close to three quarters of the estimated potential but cuttlefish remains underutilized by the artisan fishermen. The industrial fishing of cuttlefish, however,

grossly exceeded the MSY in 1987. On the other hand, a mere 4 per cent of the estimated industrially exploitable pelagic fish were taken and only one half of the demersal stocks were harvested by the industrial fleet.

Table 1 FISH EXPLOITATION IN THE MARINE SECTOR, 1987

| Fishery | Species | Estimated Catch Potential, Mt/yr | Total Catch, Mt | Per Cent Exploited |
|---|---|---|---|---|
| Artisan | Coastal Pelagics | 180 000 | 143 305 | 79.6 |
| | of which Sardinella | 150 000 | 110 730 | 73.8 |
| | Demersals | 40 000 | 28 500 | 71.2 |
| | of which Shrimp | 2 000 | 1 800 | 90.0 |
| | Cuttlefish | 3 500 | 1 440 | 41.1 |
| | Sub Total | 220 000 | 171 805 | 78.1 |
| Industrial | Coastal Pelagics | 130 000 | 4 808 | 3.7 |
| | of which Sardinella | 90 000 | 4 414 | 4.9 |
| | Ocean Pelagics (Tuna) | 30 000 | 30 120*) | 100.4 |
| | Demersals | 105 000 | 54 327 | 51.7 |
| | of which Shrimp | 8 000 | 6 353 | 79.4 |
| | Cuttlefish | 1 000 | 2 333 | 233.3 |
| | Sub Total | 265 000 | 89 251 | 33.7 |
| Total | | 485 000 | 261 116 | 53.8 |

*) Of the 30 120 Mt of tuna landed in 1987, it is estimated that some 20 000 Mt were caught in Senegalese waters. The remaining tonnage came mostly from Mauritania, Cape Verde, Gambia, Guinea Bissau, and Guinea.
Source: DOPM and CRODT; Provisional data; special tabulations.

With the exception of the cuttlefish fishery, there is still room for expansion in the industrial fishery sector - even for tuna production as much of the landed tuna actually was caught outside Senegalese waters. Deep sea stocks and coastal pelagic species in particular have a real exploitable potential that could contribute substantially to the country's fisheries output.

### 3.2 Extraction

Fishing is an important activity in the Senegalese economy. Gross Output from the sector as a whole[11] amounts to some FCFA 120 billion per year, or around 2 per cent of GDP[12].

[11] Whether this includes processing, distribution, and marketing or not is not clear to us.

[12] Claude Freud, SENEGAL: Post-Mission Paper, The World Bank, 1988-06-28, Mimeo, p.1

However, the Value Added portion is relatively small, on the average only 28 per cent of Gross Output. The artisan sector achieves a higher Value Added proportion, namely 60 per cent. In the industrial sector, Value Added amounts to only 3 to 7 per cent of Gross Output. However, foreign owned trawlers achieve a Value Added ratio of 25 per cent. Further distracting from the sector's contribution to the national economy is the fact that fairly large amounts of imports - in 1987 FCFA 54 million - are needed to keep the sector going.[13]

Table 2. MARINE FISH PRODUCTION, 1 000 Mt, 1980,...,87

| Fleet | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|
| Artisan | 196.8 | 147.7 | 140.3 | 143.2 | 172.1 | 173.0 | 131.4 | 171.8 |
| Semi-Industrial | .5 | .8 | .9 | .5 | 3.5 | .4 | NA | NA |
| Industrial | | | | | | | | |
| Sardinella | 15.45 | 18.4 | 22.9 | 22.2 | 8.0 | 6.0 | 3.15 | 4.81 |
| Trawl | | | | | | | | |
| Dakar Based | 36.0 | 37.45 | 46.4 | 54.0 | 50.7 | 57.0 | 62.0 | 49.4 |
| Foreign Based | 85.8 | 14.4 | 6.6 | 2.7 | 8.2 | 8.4 | 8.8 | 4.9 |
| Sub Total | 121.8 | 51.9 | 53.0 | 56.7 | 58.9 | 65.4 | 70.8 | 54.3 |
| Tuna | | | | | | | | |
| Dakar Based | 8.35 | 10.65 | 11.24 | 9.9 | 13.6 | 15.4 | 11.9 | 11.0 |
| Foreign Based | 8.6 | 11.2 | 11.1 | 18.9 | 21.1 | 19.4 | 27.5 | 19.15 |
| Sub Total | 16.9 | 21.8 | 22.35 | 28.85 | 34.7 | 34.8 | 39.4 | 31.1 |
| All | 351.5 | 240.7 | 239.4 | 251.5 | 274.2 | 279.5 | 244.8 | 261.1 |

Source: DOPM and CRODT, Dakar

Despite a relatively large number of industrial and semi-industrial fishing vessels, the traditional canoe (artisan) fishing remains the most productive - and viable - sub-sector of the Senegalese fishing industry. However, there has been a steady decline in the number of canoes operating in Senegalese waters since 1981. This has been attributed to the scarcity of wood, i.e. expense of building the traditional wooden canoe. Today, less than 6 000 canoes operate within the artisan fishery in Senegal, a decline of one third in less than a decade. Artisan landings, however, have not shown any declining trend over this period although there has been considerable fluctuations in the yearly catch. This is an indication that artisan fishermen are increasingly employing motorized canoes permitting longer fishing trips and changing their fishing method to the more profitable miniature purse seine from larger vessels thereby compensating for the decline in the total number of canoes.

The inland fisheries used to yield around 30 000 Mt per year. Due to the recent prolonged drought in the region this was reduced by 1987 to merely 13 000 Mt. Furthermore, the catch

[13] ibid. p.1; according to the Senegalese Minister for Animal Resouces, this estimate may be too low.

could go down to only 4 000 Mt by 1990 due to present dam construction on the Senegal River, unless accompanying fish farming is introduced.

The artisan fishing activity is concentrated in seven areas (see Table 3) This is the most important region in terms of both volume and value of artisan production.

Table 3. ARTISAN MARINE FISHING OPERATIONS, 1987

| Area | No. of Major Landing Beaches | No. of Fishermen | Size of Fleet | Catch Volume. Mt | Catch Value. FCFA Mill. |
|---|---|---|---|---|---|
| Dakar | 16 | 8 950 | 1 491 | 29 095 | 6 191.3 |
| Thies | 15 | 9 230 | 1 538 | 117 760 | 7 859.7 |
| St. Louis | 15 | 2 210 | 368 | 7 335 | 1017.4 |
| Ziguinchor | 72 | 11 870 | 1 979 | 7 317 | 1 907.4 |
| Fatick/Kaolack | 56 | 3 460 | 576 | 9 730 | 1 287.8 |
| Louga | 2 | 120 | 20 | 568 | 40.0 |
| All | 176 | 35 840 | 5 973 | 171 805 | 18 303.6 |

Source: DOPM, Dakar

The artisan fishing fleet consists mainly of wooden canoes of traditional design but there are also some semi-industrial boats although these have not proved themselves very popular among the Senegalese fishermen. Similarly, efforts by various donors and other external organization to introduce modern and more efficient canoe design and construction materials have not been successful in terms of acceptance by the fishermen. Motorization of the canoes, however, has progressed steadily. Two decades ago, less than one third of the canoes was outfitted with a motor. Now more than sixty per cent of the artisan canoes are motorized. The proportion would probably be even higher if the current obstacles with financing, high cost of fuel, and lack of spare parts could be removed or at least lessened. The vast majority of the fleet remains active throughout the year although some seasonal variation can be observed.[14]

Fig 1 below shows the seasonal variation in catch per season in Senegal (average catch = 100). The graph is based on reported monthly catches in 1986 by trawlers, seiners, and artisan fishermen; however, tuna boat catches are not included as the monthly data were not available at the time of the calculation of the seasonal index.

[14] CRODT, Dakar, has undertaken surveys of the number of canoes and their active status in April and September, between 1982 and 1986.

Total fishing effort as well as production have fluctuated significantly since 1980 in the industrial sector. While the industrial fleet has ranged between 230 and 280 vessels, production has varied between 130 000 and 350 000 Mt per year. The departure of 13 Polish trawlers in 1981 may have contributed to this sharp variation in production. Nonetheless, the industrial fisheries have recorded impressive gains in total production since independence. Today the total industrial catch is between 50 000 and 70 000 Mt annually. The exception to this favorable trend is the industrial sardinella fishing activity that has declined dramatically.

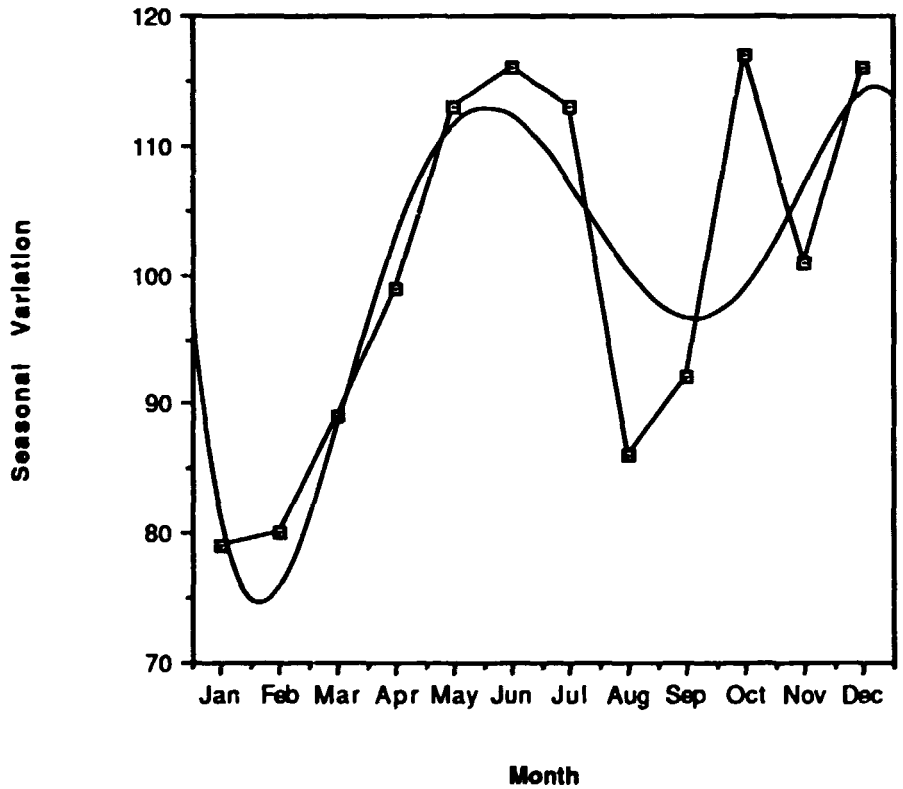


Fig. 1 Seasonal variation in catch (actual data for 1986 and polynomially smoothened curve)

A basic concern of the industrial fisheries in general is the aging fleet. It spends an increasing number of days idling in port or undergoing repairs and maintenance. Thus, the number of days actually spent fishing has diminished substantially in the past few years. With operating expenditures mounting, low labor productivity, production stagnating, and fish prices not showing much growth, the industrial fishing sector is now hard up.

From a high of 20 sardinella purse seiners in 1983, only five operated in 1987. Total catch has decreased to a tenth of what it used to be. In 1986, these vessels made on the average 136 fishing trips as opposed to 170 in 1982, lasting on the average half a day. They fished for total of 316 days at sea, catching 3 147 Mt, making the catch per effort (P.U.E.) only 10 Mt per day at sea, a very low figure indeed.

The relatively low domestic prices for fresh and frozen fish offered to the industrial fleet significantly contribute to the low profitability of the ice boats . A probable reason for this is the virtual monopsony existing in Dakar Port. Whereas before there used to be at least three or four large buyers creating some competition among them, there are now only two major ones left. The situation could be remedied easily through the introduction of an auction system open to both large and small buyers.

Table 4. COMPOSITION OF THE FISHING FLEET, 1980,...,87

| Fleet | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|---|---|
| Artisan | | | | | | | | |
| Motorized | 4616 | 4930 | 5049 | 5300 | 5286 | 5300 | 3140 | 3730 |
| Non-Motor. | 3869 | 4180 | 4052 | 3226 | 3014 | 3000 | 3040 | 2240 |
| All | 8485 | 9110 | 9101 | 8526 | 8300 | 8300 | 6180 | 5970 |
| Semi-Industrial | 14 | 14 | 24 | 19 | 24 | 19 | NA | NA |
| Industrial | | | | | | | | |
| Sardinella | 13 | 14 | 19 | 20 | 12 | 8 | 5 | 5 |
| Trawl | | | | | | | | |
| Dakar based | 125 | 130 | 145 | 145 | 135 | 158 | 153 | 150 |
| Foreign based | 67*) | 45 | 41 | 23 | 36 | 51 | 57 | 39 |
| Sub-total | 192 | 175 | 186 | 168 | 171 | 209 | 210 | 189 |
| Tuna | | | | | | | | |
| Dakar based | 30 | 330 | 29 | 28 | 25 | 24 | 24 | 22 |
| Foreign based | 45 | 37 | 43 | 37 | 38 | 39 | 31 | 26 |
| Sub-total | 75 | 67 | 72 | 65 | 63 | 63 | 55 | 48 |
| All | 280 | 256 | 277 | 253 | 246 | 280 | 270 | 242 |

*) 13 of which were Polish trawlers that left Senegalese waters in 1981.
Source: DOPM, CRODT, Dakar

Practically all sardine seining takes place around Dakar or just south of there. Two thirds of the fishing takes place in waters less than 15 meters deep, on the average within 15 miles off the coast. Water down to 100 meters are exploited only outside Dakar where also these depths are found within 15 miles of the mainland.

Fleet obsolescence, sharply increasing operating costs, and weak markets (i.e. low prices) are the main factors have made this activity financially unattractive despite the vast pelagic stocks in Senegal's waters. New business strategies, however, may render this important

fishery viable again. A new company was formed in 1988 to fish for mainly small coastal pelagics destined for the African market. In intends to initially acquire three new sardinella purse seiners. The company's strategy is based on the utilization of freezing holds that will enable the fleet to stay out to sea longer, exploiting distant but relatively richer zones such as the southern Casamance area. Moreover, the on-board freezing capability will enable the company to produce high quality fish that can be sold at a premium price. Thus, the strategy addresses two of the main present weaknesses: low productivity (short days at sea) and low prices for the product.

Sardinella accounted for 90 per cent of the 4 805 Mt of small coastal pelagics harvested by the purse seiners in 1987. Mackarel and horse mackarel are the other important small pelagic species in Senegal.

The Senegalese trawl fishery can be divided into two distinct groups: a well established in-shore fleet and a newly developing deep sea fleet. The former by far dominate the industrial fleet. The number of the Dakar based industrial vessels has ranged between 120 and 160 over the past decade.

Table 5 OPERATION OF THE DAKAR BASED TRAWLER FLEET, 1987

| Fishery | Vessel Type | Vessel Class (GRT) | Fleet Size | Catch Mt |
|---|---|---|---|---|
| Coastal | Freezer | < 51 | 1 | 146.4 |
| | | 51 - 150 | 31 | 5 554.9 |
| | | 151 - 250 | 23 | 5 609.1 |
| | | 251 - 500 | 19 | 16 533.7 |
| | | > 500 | 7 | 10 174.1 |
| | Ice | < 51 | 28 | 1 908.9 |
| | | 51 - 150 | 15 | 2 880.2 |
| | | 151 - 250 | 17 | 4 997.2 |
| Deep-sea | Freezer | 251 - 500 | 9 | 1 598.0 |
| All | | | 150 | 49 402.5 |

Source: CRODT, Dakar

In 1986, there were 144 vessels based in Dakar that practiced bottom trawling for demersal species (white shrimp, sole, red mullet, cuttlefish, sea bream, etc.). Their total catch amounted to 60 222 Mt, up 12 per cent from 1985. The increase in catch is due mainly to substantially expanded exploitation of octopus: from 450 Mt in 1985 to 7 708 Mt in 1986! The following year, however, total landings by this fleet dropped again to 49 400 Mt (see Table 5 above). Nonetheless, this fishery has grown substantially since the 1960ies. It must

also be noted that the landings in Dakar do not stem from Senegalese waters only but also from those of Mauritania, Gambia, Guinea Bissau, and Sierra Leone.[15]

To ensure its continued financial viability, this sector is not only expanding but also undergoing significant structural changes. The vessels with GRT of 50 Mt or less are gradually being replaced by larger ones. Some old ice boats are dilapidated and are becoming increasingly uneconomical as costs mount and the price for fresh fish remains very low in Dakar. The shipowners are showing a preference for freezer vessels over ice trawlers, gradually abandoning the latter type through conversion or replacement. The changing economics are reflected in the number of annual fishing trips and the number of days at sea. Those of the ice boats declined from 1985 to 1986 by 21 and 29 per cent respectively, while for the freezing vessels, the corresponding numbers were up 8 and 22 per cent, respectively. In fact, small freezer vessels manage to show a good profit now in today's markets were the old ice boats clearly are unprofitable to operate.[16] However, the resulting decline in the supply of fresh fish is causing serious problems for the local fish processing companies and a number of them have ceased operating or are doing so only with a great deal of financial difficulties.

The same nine Senegalese deep-sea trawlers that operated in 1985, continued with their deep-sea trawling for shrimp and red crab in 1986. However, the fleet made only 49 fishing tripes in 1986, 17 per cent less than the year before and the total catch was down by seven per cent to 1 821 Mt. With an average take of around 700 kg/ day at sea from the entire fleet, each boat spent on the average some 290 days of the year fishing.[17]

During 1986, 7 Italian, 13 Greek, 30 Spanish and 7 Gambian trawlers operated under license in Senegalese waters. In terms of total number and national composition, the foreign fleet remained approximately the same as in the previous year, except that in 1985 there were no Gambian vessels fishing in Senegal's waters. In 1987, the total number of foreign vessels had dropped to 39, mostly of Spanish, Greek and Italian origin. They fished primarily for high valued shrimp. Note that in 1984 there were only 21 Spanish vessels fishing under license in Senegalese waters. Since then, however, they have lost a number of licenses to fish in Mauritanian waters so they have now come further south, to Senegalese waters. There they are not at a significant disadvantage with respect to the Dakar based fleet as the latter, too, has to pay a license fee in order to be able to operate in Senegal. Although the license fee for domestic vessels is far lower than for the foreign fleet it has caused a fair amount of resentment among the local shipowners who feel that they should not have to pay any fees for fishing in their national waters. It should also be noted that license fees are not imposed solely for fiscal reasons but also to enable the Government to regulate fishing to everybody's long term benefit.

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15 Statistiques de la Pêche Maritime Sénégalaise en 1986, CRODT Dakar, 1988

16 Personal interview with Mr Jacob De Ruig, Managing Director of CAHLUCAP, 1988-11-25.

17 Statistiques ...., op. cit.

The statistics on the catch by the foreign fleet probably understate the true amounts. Nonetheless, the figures reported by the boat owners to the Department of Oceanography and Maritime Fishing (DOPM) are given in Table 6 below.

The major species caught by the trawlers are seabream, croaker, sea catfish, shrimp, grunt, threadfin, sole, cuttlefish, and mulet. These nine species accounted for more than three quarters of the fish landed by the Dakar based fleet in 1987. The deep-sea trawling evolved not long ago by Spanish operators in partnership with Senegalese. The target species include deep-water rose shrimp (parapenaeus longirostris). Hake is the species most sought after by the Spanish fleet.

Table 6 CATCHES BY FOREIGN TRAWLERS, Mt, 1984,...,1987

| Fishery | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|
| Crustaceans | 1 982 | 1 712 | 1 315 | NA |
| Cephalopods | 1 059 | 1 162 | 1 885 | NA |
| Fish | 6 728 | 5 547 | 5 555 | 4 925 |
| All | 9 469 | 8 421 | 8 755 | NA |

Source: DOPM, Dakar

Senegalese tuna vessels accounted for a mere five per cent of the tuna landings in Dakar in 1987. Together with the other Dakar based tuna fleet, they produced 10 986 Mt of tuna that year, far from enough to feed the three local canneries. Thus much of the raw tuna requirements has to be imported. This has led to recent efforts through private initiative - following the liquidation of the government sponsored SOSAP program - to build up the local tuna fleet.

Table 7. COMPOSITION AND OPERATIONS OF THE DAKAR BASED TUNA FLEET, 1987

| Vessel Type | Country of Origin | Fleet Size | Landings, Mt | | | |
|---|---|---|---|---|---|---|
| | | | Yellowfin | Skipjack | Bigeye | Total |
| Pole & Line | Senegal | 2 | 216 | 207 | 130 | 553 |
| | France | 13 | 3 540 | 2 135 | 2 353 | 8 028 |
| | Spain | 4 | 326 | 234 | 376 | 936 |
| | Sub-total | 19 | 4 082 | 2 576 | 2 859 | 9 517 |
| Seiners | Senegal | 3 | 387 | 817 | 247 | 1 451 |
| All | | 22 | 4 469 | 3 393 | 3 105 | 10 986 |

Source: CRODT, Dakar

Since 1981, the number of Senegalese tuna vessels has increased to five. But there has been no recent additions, reflecting most probably financing and other start-up difficulties.

The number of foreign based tuna vessels has fluctuated between 25 and 45 since 1980. In 1987, 26 such vessels operated in Senegal, 16 from Spain, three from Ghana, and seven collectively from France, Morocco and Côte d'Ivoire. Tuna landings have also varied a great deal over the years. In the last few years, however, they appear to have improved despite the decline in catch by the Senegalese vessels.

While the pole and line vessels have been targeting yellowfin, the seiners are catching more of skipjack. In 1987, 45 per cent of the total tuna landings of 30 120 Mt were skipjack, 41 per cent yellowfin and the rest bigeye tuna. Small tuna fish (tunny) is apparently not exploited much by the industrial fleet (773 Mt reported in 1986). However, small tuna is poorly distinguished in the log books of the industrial boats, and they probably do not report their total catch. Therefore, yearly variations in the reported landings probably do not have real significance.[18] At any rate, the industrial shipowners claim that a lack of markets is the main cause for their relatively cool interest in the small tuna fisheries. This is, however, contrasted by the owners of dried fish plants who say that they would gladly take more small tuna if they only could get it. And indeed, artisan sector has increased its catch of small tuna, in 1986 to 8 027 Mt up from 5 861 Mt in the previous year. Perhaps it is a question of price and relative production costs with the artisan fishermen being able to deliver at a price acceptable to the fish processing plants.

Old age and decay of the sardine seiners, high cost for fuel and labor, low motivation (morale) among the crews, poorly adapted management by certain ship owners, difficulties in obtaining credit and high interest and insurance rates, and weak markets for certain products are the main causes for the poor performance of the fleet based in Dakar. As both the results achieved by the artisan fishery and scientific research show, the reasons for the suboptimal performance of the industrial fleet is not the state of the fishery resources as is often alleged.[19]

The Senegalese industrial fishing fleet, especially the trawler fleet, is often bought second-hand from Europe. Already it has been technically obsolete for many years, and it is poorly maintained for lack of spare parts, cash, skilled labor, and management foresight. The fleet's modernization is widely seen as a necessary condition for the very survival of the sector. This could take place either through the purchase of newer second-hand vessels or the building or commissioning of entirely new boats. A major obstacle is financing. One company in Dakar - N. CHALUCAP S.A. - has found a solution through partners in Europe (Holland and France) who can obtain financing at significantly better terms than those available from Senegalese banks. Thus, this company took delivery of two brand new

[18] Ibid. p.34

[19] Ibid. p. 25

freezer trawlers build in the Netherlands but to Senegalese specifications. Two more such vessels are on their way. The venture is also supported by the Dutch government who is providing training for Senegalese seamen and technicians. Thus, Senegalese crews have been in Holland for 2 months of training and a Dutch expert is in Dakar for half a year to provide additional training and supervise adoption of gears to local conditions, all free of charge to CHALUCAP. The Dutch have a 10 percent stake in the company.[20]

Another possibility that has been suggested (by GAIPES, among others) is that some form of a mutual financing scheme be set up that could guarantee the loans taken by ship owners. (See also below Section 11. Financing.)

Second-hand boats are bought mainly in France, some in Spain. The reason for this are the traditional ties between France and its former colony and ease of communications (common language but also quick telecommunication links). This arrangement may be cozy but probably not the most economical one as used vessels could be obtained cheaper from for example the US or Mexico. There is, however, a relative lack of information about offerings and communication (language) capabilities.

The cost of production of one ton of sardinella is estimated at FCFA 12 000 in the artisan subsector and FCFA 54 000 for industrial vessels. This difference explains to a great deal the gradual disappearance of the industrial sardine vessels from Dakar.[21]

There are major problems for the ship owners in getting spare parts in Dakar Port: they are expensive and hard to come by. Therefore, practically every owner maintains his own shop and parts inventory, in addition to having a partner in Europe who can assist in getting a needed part to Dakar quickly - a small part can get there via air within a week, including time to clear customs etc. But, of course, this is a rather costly solution that competitors located in countries with a more developed capital goods industry do not have to face, or at least not to the extent of Senegalese operators.

### 3.3 Processing

Two thirds of the catch of the industrial fleet is sold unprocessed on the domestic market. About 15 per cent is processed before being exported. The artisan subsector supplies 15 per cent of the domestic fish for processing.

In general, the processing plants operate at lower than capacity levels; utilization levels of only 30 to 50 per cent are common. There are too many plants and too many persons employed for cost efficient processing. Industrial inputs for the artisan subsector are

20 Mr Jacob De Ruig, op. cit.

21 M. André Fontana, Director of CRODT, Dakar, in interview "UN PATRIMOINE QU'IL FAUT SAUVEGARDER" published in Africa International No 205, May 1988.

produced locally but all other inputs are imported. The degree of processing is evidently also unnecessary low: Value Added in the industrial subsector is only between three and seven per cent whereas it is as high as 60 per cent in the artisan subsector! Right now the canning of tuna depends on its protected and subsidized position on the French market for its survival.

There are 27 fish and other sea food processing plants in Dakar, three in Casamance. Five major plants account for one half of the total industrial processing. In Senegal, the activity comprises freezing, canning and reduction (of tuna and sardinella), processing into fish meal, as well as refrigeration and storage of products. In 1985, freezing and canning employed 7 500 persons. However, the number of on-shore freezing plants have declined rapidly in the last few years due to sharply increasing costs, inadequate supply of fish, and efficient competition from freezer vessels. Shipowners are now gradually replacing their older ice boats with freezer vessels that are more profitable under today's conditions. As a further consequence, the supply of fresh (iced) fish to local processing plants has also declined. In 1987, the freezing plants had a combined capacity to process 150 000 Mt of frozen fish but produced only 68 000 Mt, that is utilized only 45 per cent of the installed capacity.

Table 8 FRESH AND FROZEN TUNA PURCHASES, by cannery, Mt, 1977,...,87

| Year | SNCDS | SAPAL | SAIB | TOTAL | Per Cent Landed by Dakar-based Fleet |
|---|---|---|---|---|---|
| 1977 | 8 786 | 7 259 | 1 340 | 17 385 | 69 |
| 1978 | 9 346 | 7 776 | 1 839 | 19 384 | 78 |
| 1979 | 5 373 | 6 976 | 1 438 | 13 787 | 66 |
| 1980 | 6 063 | 9 098 | 1 763 | 16 924 | 49 |
| 1981 | 8 886 | 10 682 | 2 262 | 21 830 | 49 |
| 1982 | 9 357 | 9 639 | 3 347 | 22 343 | 50 |
| 1983 | 13 328 | 10 148 | 5 375 | 28 851 | 34 |
| 1984 | 17 826 | 11 317 | 5 545 | 34 688 | 39 |
| 1985 | 16 490 | 13 406 | 4 874 | 34 770 | 44 |
| 1986 | 17 067 | 7 123 | 5 438 | 29 628 | 39 |
| 1987 | NA | NA | NA | 30 120 | 36 |

Source: CRODT, Dakar

The three canneries are also facing problems with high operating costs and relatively low productivity that has proven difficult to improve due to socio-cultural factors. These plants have a combined capacity to produce some 35 000 Mt of canned fish each year but recently have been producing only around 20 000 Mt annually. The major problem again has been with the inadequate supply of raw fish in Dakar. The canneries are now compelled to import over half of their raw tuna requirements to keep operations going to cover at least some of their huge fixed costs. Partly because of the relatively high cost for diesel fuel in Dakar, the

tuna fleet based there plays an ever decreasing role in the supply of fresh and frozen tuna to the canneries in Dakar. High cost for fuel, however, cannot be the sole reason for this decline since the operators are known to have found ways and means to obtain fuel from international sources.

Canning operations have been centered on tuna although some significant quantities of sardinella have occasionally been canned in the past. Production of canned sardinella, however, will soon receive a tremendous boost with the completion of a sardinella line by the SNDCS company. The types of canned tuna and their proportions - averaged over the past five years - are as follows:

| | | |
|---|---|---|
| 1. | Tuna; whole, plain | 66 % |
| 2. | Tuna; whole, in oil | 22 % |
| 3. | Tuna; chunks, in oil | 8 % |
| 4. | Tuna; chunks, in tomato sauce | 4 % |

Industrial curing of fish has not caught on well with Senegalese processors. Prior to 1987, industrial curing comprised mainly dry-salting. In 1987, the three curing plants that were still in operation had a capacity to produce 2 500 Mt of dry-salted product but realized only 40 per cent of that. Now, with the installation of smoking kilns by the AFRICAMER company, industrially smoked fish products are going to feature significantly in Senegal's export trade - domestic markets are less assured because of prevailing customer preferences. However, a properly designed pricing strategy could change that.

There are two fish meal plants in Senegal. They, too, have been badly hit by supply problems as they have been depending mainly on tuna offal to feed their plants as the supply of sardinella has dwindled and the competition for the remaining supply tightened. The present capacity level is a dismal 25 per cent which will not assure profitability even with the existing export subsidy.

The artisan processing uses primitive methods and technology that has not kept up with improvements made in extraction. This affects both yield and quality and leads to high losses as well. Prices for industrially processed fish have risen relatively more than those for artisan products.

Artisan fish curing has a long tradition in Senegal. It is not only a preservation measure but also transforms the product to meet certain consumer demands with respect to texture and taste. In 1987, close to 20 000 Mt of cured products were produced by artisan fish processors, representing 60 000 Mt of fresh fish or a third of the annual artisan catch. In addition, a significant portion of the fish sold fresh or frozen may have been cured prior to final utilization by households. The leading traditional cured fish products appear in Table 9 below.

Table 9. MAJOR TRADITIONAL FISH PRODUCTS

| Product | Method of Curing | Major Species Utilized |
|---|---|---|
| Guedj | Fermented, dried | Threadfin, Seabream, Cat fish |
| Saly | Salted, dried | Threadfin, Seabream, Shark, Ray, Tilapia |
| Tambadiang | Dried | Bonga, Sardinella |
| Yoss | Dried | Juvenile fish |
| Ketiakh | Grilled, dried | Sardinella, Bonga |
| Yeet | Fermented, dried | Mollusc |
| Yokhoss | Cooked, dried | Oyster |
| Metorah | Smoked | Shark, Ray, Cat fish, Sardinella, Bonga |

Traditional fish smoking is not as widespread in Senegal as in other West African coastal countries. Senegalese processors are constrained by the scarcity of wood. Moreover, the smoked fish products are usually targeted for the export market as the local consumers prefer the fermented, dried product. Fish curing activities are concentrated to the Thies region.

Industrial services and infrastructure in Senegal are on an acceptable level. The private sector is also vigorous in its pursuit of markets and improved technology. However, it is often frustrated by the lack of or the high cost of financing as well as by relatively little information about available options. Non-convertibility of currencies in certain African countries that harbor potentially very large markets is also a cause of consternation for export oriented Senegalese fish processing enterprises.

### 3.4 Imports and Exports

Senegal is one of the world's major exporters of fish and fish products (see Fig. 2 and Table 10 below; Section 3.10 Consumption contains statistical series by product group). The sector accounts for the majority of the country's export earnings today. Over the ten year period between 1977 and 1986, nominal export earnings in dollars more than quadrupled. More recently export earnings have exceeded $250 million per year. On average, 82 per cent of all exports come from the industrial activities with the artisan fisheries providing the rest. Among others, quality concerns have hampered exports from the artisan sector. But a substantial portion of the shrimp exports originates in the artisan catch and a couple of processing plants have been established in Ziguinchor (Casamance) to procure high unit value fish from artisan fishermen and process them for export as frozen products, including cooked and packaged shrimp and fish filets. Canned tuna is the single most valuable export product accounting for between seven and twelve per cent of Senegal's total export earnings since 1980.

Table 10. TRADE IN FISH AND FISHERY PRODUCTS, ALL PRODUCTS, 1977,...,1986

| | Exports | | Imports | | Balance |
|---|---|---|---|---|---|
| Year | $ Millions | 1 000 Mt | $ Millions | 1 000 Mt | $ Millions |
| 1977 | 63.433 | 52 908 | 11.916 | 17 501 | 51.517 |
| 1978 | 75.533 | 56 487 | 15.557 | 22 891 | 59.976 |
| 1979 | 93.093 | 56 169 | 12.420 | 13 460 | 80.673 |
| 1980 | 103.712 | 71 378 | 20.575 | 16 127 | 83,137 |
| 1981 | 105.758 | 69 137 | 23.200 | 20 720 | 82.558 |
| 1982 | 148.666 | 89 001 | 13 064 | 15 036 | 135.602 |
| 1983 | 138.002 | 88 714 | 21.100 | 23 261 | 116.902 |
| 1984 | 142.059 | 93 071 | 16.468 | 21 234 | 125.591 |
| 1985 | 166.231 | 91 001 | 19.484 | 24 362 | 146.747 |
| 1986 | 259.110 | 93 224 | 20.640 | 24 637 | 238.470 |
| 1987 | | | 9 773 | 10 598 | |

Source: FAO Fisheries Yearbook 1987, except 1987 which is from Ministère de l'Economie et des Finances, Dakar

Frozen fish and crustaceans, canned tuna, cuttlefish, and recently also octopus account for most of the exports. These are mostly destined for the European markets although certain products have also found receptive markets in Japan. There are also smaller quantities of smoked and dried product as well as fish meal exported. Frozen sardinella constitutes the bulk of the export to the African countries. The products destined for the Japanese market are often transshipped in Las Palmas where Japanese traders maintain offices.

The European markets account for 37 per cent of total exports quantitywise but 70 per cent valuewise; the corresponding figures for Africa are 60 per cent and 25 per cent and for Japan 3 per cent and 5 per cent. North America remains an untapped market. Nigeria is another large potential market that is currently unexploited due to foreign exchange problems. Nonconvertibility of certain African currencies is a severe constraint for Senegalese exporters of in-shore pelagic fish, the stock of which is now underutilized.

Côte d'Ivoire, Cameroon, Congo, Gabon, Togo and Zaire have been the important markets for Senegal's frozen small pelagic fish. Prior to 1984 when Senegal could export fish products to Côte d'Ivoire virtually free of tariffs, this country was the single most important market. Since then, however, Senegal's preferential treatment has been removed and the exports have suffered a setback. Nigeria, too, used to feature prominently in Senegal's small pelagic export trade until currency convertibility problems emerged.

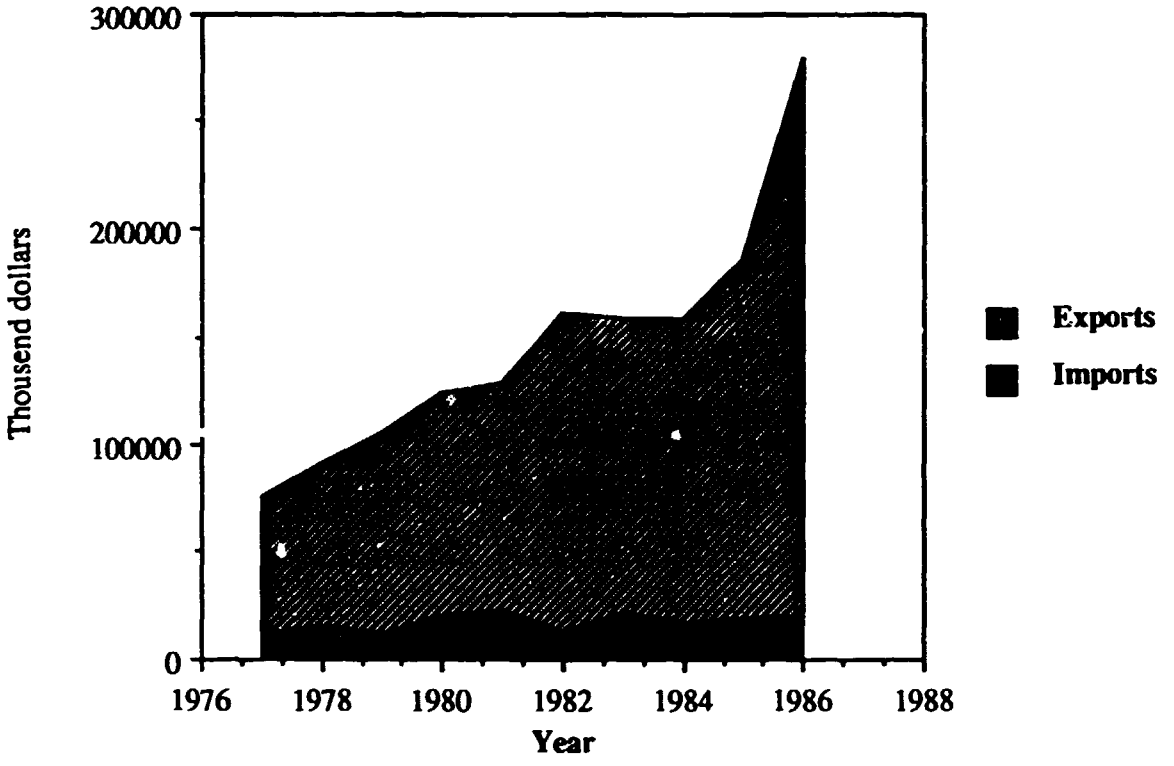


Fig. 2 Senegal's exports and imports of fishery products

Frozen shrimp and prawns account for nearly one half of the quantity of crustaceans exported. The catch is often frozen already on the boats to maintain a high quality. The main markets are France and Spain. Sole, in the form of frozen filets, is marketed mainly to France. Exports of octopus have increased dramatically over the past few years: 1 563 Mt in 1985 versus 7 607 Mt a year later, rivaling the quantity of shrimp and prawns. The exports of cuttlefish go mainly to Japan but more attention than presently must be paid to quality if the market share there is to be maintained.

Whole (chunks) natural tuna forms 60 per cent of the canned tuna export; 28 per cent is whole tuna in oil, nine per cent is in the form of mashed tuna in oil and the remaining three per cent is mashed tuna in tomato sauce.[22]

Industrially salted fish and fish meal is sold to the Spanish market whereas the canned and frozen products go primarily to France. Nearly 60 per cent of the exported weight and 25 per cent of the value from Senegal's industrial fisheries go to African markets in frozen form. The export of dried fish to African markets could be increased significantly if the current

22 "Importance du Sénégal", Marché Tropicaux, 15 juillet 1988, p. 1940

economic problem with too small lots for shipment could be overcome.

Quantitywise, total exports increased by 76 per cent from 1977 to 1986, that is much less than nominal dollar earnings. Thus, certain changes in the composition and hence, value of exports are evident. While the increase in earnings from exports of fresh, frozen or chilled fish has kept up with the general increase in all products, it is the increase in the value of the exports of frozen crustaceans (shrimp) and molluscs (cuttlefish, and octopus) that has posted the largest absolute gains: from $23.6 million (for 6 883 Mt) in 1977 to $111.0 million (for 19 529 Mt) in 1986. The increase in nominal earnings from canned tuna exports did not increase quite as much as those from all products combined although they still account for nearly one fourth of the value of all fish and fishery product exports.

Senegal's traditional heavy dependence on France as the major outlet for its products is now st rting to cause concern to the country's big exporters. Although they may not have in the past enjoyed a formal preferential or protected status, de facto these exporters have been favored on the French market for various reasons. This cozy state of affairs, it is feared in Senegal, will come to an end at the latest with the event of 1992 and the full integration of the European markets. This is probably true although EEC in Brussels assures everyone that no new trade barriers will be set up against exports from developing countries and thus that nothing should change for existing exporters to Europe. But, the mere fact that after 1992, tuna exports from Fiji to Germany for example, can easily be transported to France for sale there will mean substantially increased competition for the traditional Senegalese products. And with Senegalese production costs higher and labor productivity lower than in many other countries, notably Asian ones, the fear of lost market shares or even complete markets appear justified. Besides trying to deal with the cost and productivity issues, Senegal's exporters must now look to new marketing strategies and distribution channels (partners), new markets, and improved, differentiated products.

Senegal's imports of fish and fishery products consist almost exclusively of fresh and frozen tuna to feed the canneries. In 1987, these accounted for 92 per cent of the volume and 93 per cent of the value of all fish imports. The tuna imports mostly come from French and Spanish tuna fleets operating in the region.

Canned fish, mostly sardine is the other imported fish commodity of some importance. These originate mostly in Morocco. These imports are likely to fall off as the company SCNDS starts its new processing line for canned sardinella.

### 3.5 Marketing

The annual total production now amounts to approximately 270 000 Mt. The foreign, non-Dakar based fleet accounts for some 30 000 Mt, of which amount 20 000 Mt are landed in Dakar, the rest going directly to Europe (Spain mainly). Thus, some 260 000 Mt is landed in Senegal. 150 000 Mt are consumed locally and the rest is transformed for export, mostly to

Europe as a frozen or canned product or to African markets in smoked, dried or salted form. Approximately 93 per cent of the fish consumed locally derives from artisan fishing activities. The industrial fleet accounts for the majority of the exports; approximately ten per cent of the artisan processed product is exported to Guinea, Guinea-Bissau, Ghana, Nigeria and Gambia.

Representatives of the packing factories and small traders (fish mongers) purchase the landed fish from the fishermen. The Dakar based industrial fleet sells its catch primarily to only buyers in Dakar Port that act as price adjusters. The fish meal plant in Dakar Port obtains its raw material from the canneries operating in the Port.

Approximately ten per cent of the artisan landings are consumed locally. Some 60 per cent are sold on local markets and the rest is absorbed by traders (see Fig. 3). There are some 1200 fish mongers but only 20 per cent of them operate in a regular fashion. Cold store facilities are inadequate. Quality of the processed products as well as packaging often leaves a lot to be desired. Thus, both the quantity and quality of the distributed product is irregular and prices are unstable much depending on season, geographical region and even hours of the day.

Senegal has traditionally had strong links with the African markets. The share of total exports going to these markets, however, has been steadily declining. In 1983, the African markets accounted for 56 per cent of the total volume of Senegal's fish exports. This share declined to 48 per cent by 1985 and indications are the situation has not changed much since then. This trend is attributed to the near collapse of the Senegalese sardinella fleet as well as to deteriorating financial conditions (convertibility of currencies, export credit financing, and risk) making these markets very uncertain. The currency devaluations in certain countries outside the FCFA zone has also made exports difficult to these markets.

It should also be noted that the constantly changing trade policies in a number of fish importing countries in Africa have not been conducive to maintaining stable trade relationships. Often the governments of these countries curtail fish imports with short notice by imposing high tariffs in response to acute foreign exchange shortages. Nonetheless, Senegalese exporters should, and do, regard the African markets with interest given their vast demand potential and geographical proximity. In addition, many low unit value species that are unsuitable for European, Japanese and North American markets, make good export products for the African markets.

While Senegal's fish trade with African countries has been proportionally declining, it has been gradually increasing with Europe and Japan especially. North American markets remain largely untapped. France steadily absorbing nearly one third of Senegal's exports in volume terms - even more in value terms! - is by far the most important trade partner. Moreover, commercial links are established with only a few importers. The reasons for this has as

much to do with tradition as with the common language and ease of currency transactions. While these arrangements may prove quite appropriate for exporters who handle only small shipments, for those who deal in large consignments it could be far more profitable to throw the net a little wider, so to say.

Although canned tuna is important, the bulk of the Senegalese fish product exports to Europe is whole frozen. Moreover, where packaging for retail does take place, it has not been very attractive leading to a preference among buyers to import in bulk. This means that Senegal does not derive the maximum value added possible from its fishery resource.

The Japanese market is of growing importance, especially for Senegalese cuttlefish exports. Again,the exporters could considerably add to their revenues by selling semi-finished or finished products rather than whole frozen as is now the case. To maintain or increase their share on this sophisticated market, it is essential that the Senegalese exporters concentrate on high quality rather than price and quantity. This would translate directly into higher unit prices and profitability.

### 3.6 Distribution, Transport and Storage

Utilization of fish in the fresh form is very popular in Senegal, more so than in other West African countries. In 1987, more than one half of the artisan catch was distributed fresh via central wholesale markets with cold store and ice making facilities that have been established in major production centers such as Kayar, Joal and Rufisque. Some of the cold stores are serviced by insulated trucks. The interior markets, however, are served by ordinary trucks carrying smoked and dried products from processing centers near or at the landing sites.

Distribution problems are acute in the artisan sector. The Government has initiated a number of programs to improve the distribution but management problems have rendered these efforts fruitless. Due to high fuel costs, poor maintenance of vehicles, and bad road conditions, road transportation is expensive. Consequently, many inland areas suffer from inadequate and costly supplies and the resulting per capita consumption is low in these areas.

The bulk of fresh fish that enters the distribution network originates in the Thies region whereas Dakar is by far the largest market. The good roads between the two areas as well as their proximity to each other has facilitated this trade.

The distribution of cured fish products follows three main channels in Senegal (see Table 9 above for an explanation of the local names):

(a) "guedj", "yeet", and "ketiakh" for the urban markets;
(b) "tambadiang" for the rural markets; and
(c) "metorah" and "saly" usually for the export markets.

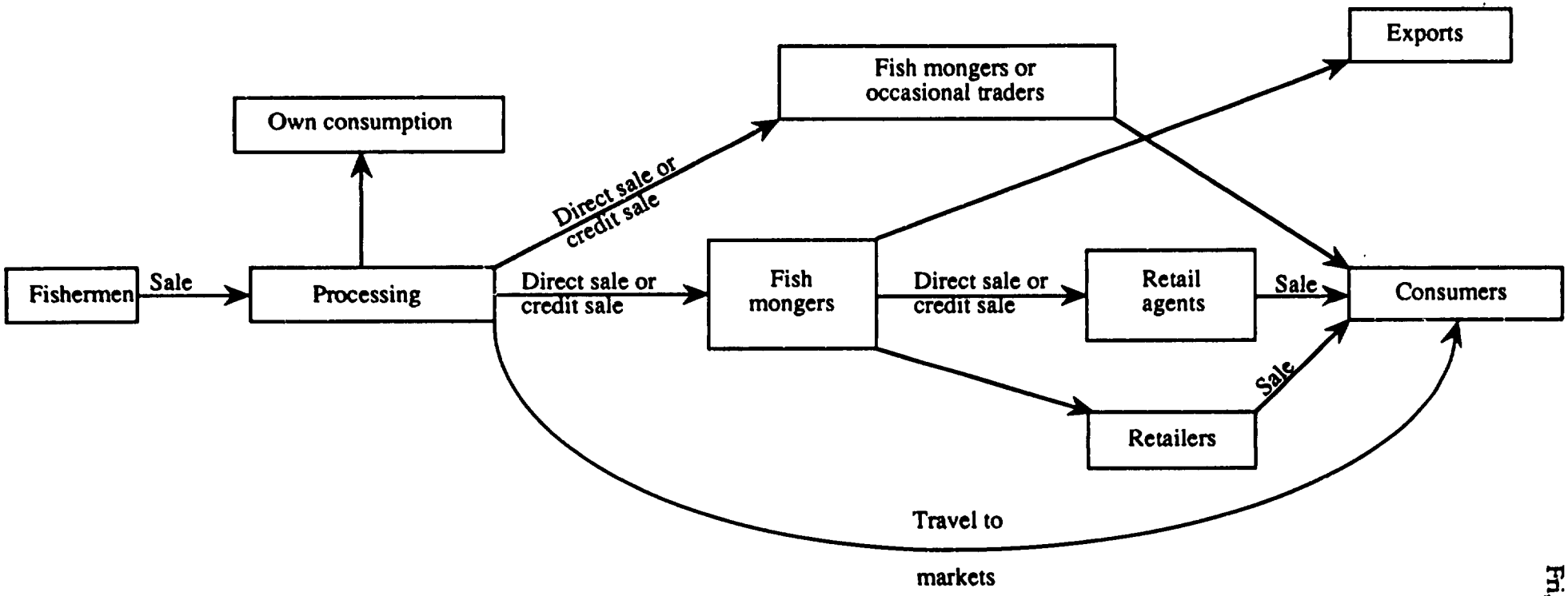


Fig. 3 Distribution network for artisan processed fish

The cured fish distribution is dominated by small, women traders who get their supplies from such major fish processing centers as Joal, Mbour, Djifere, Kayar, Rufisque, and Zuiguinchor.

Table 11. ARTISAN FISH DISTRIBUTION, Mt, 1987

| | Production Centers | | | | | |
|---|---|---|---|---|---|---|
| Destination | Dakar | St. Louis | Thies | Fatick | Kaolack | All |
| Fresh Fish: | | | | | | |
| Cap Vert | 19 585 | 2 033 | 19 663 | 1 283 | 3 | 42 567 |
| Casamance | 26 | 0 | 49 | 1 | 0 | 76 |
| Diourbel | 1 063 | 163 | 8 468 | 1 | 0 | 9 695 |
| Fleuve | 292 | 1 798 | 5 474 | 0 | 0 | 7 564 |
| Senegal Oriental | 108 | 61 | 1 286 | 4 | 0 | 1 459 |
| Sine Saloume | 880 | 123 | 13 251 | 1 667 | 756 | 16 677 |
| Thies | 977 | 117 | 15 492 | 253 | 9 | 16 848 |
| Louga | 843 | 440 | 2 087 | 0 | 0 | 3 370 |
| Exports | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 23 774 | 4 735 | 65 770 | 3 209 | 768 | 98 256 |
| Cured Fish: | | | | | | |
| Cap Vert | 1 223 | 104 | 2 785 | 125 | 5 | 4 242 |
| Casamance | 7 | 0 | 52 | 8 | 0 | 67 |
| Diourbel | 177 | 4 | 1 922 | 17 | 16 | 2 136 |
| Fleuve | 0 | 110 | 1 660 | 5 | 44 | 1 819 |
| Senegal Oriental | 5 | 1 | 1 180 | 19 | 25 | 1 230 |
| Sine Saloume | 7 | 0 | 4 784 | 293 | 38 | 5 122 |
| Thies | 182 | 10 | 1 914 | 0 | 0 | 2 106 |
| Louga | 15 | 55 | 1 354 | 0 | 0 | 1 424 |
| Exports | 42 | 246 | 1 172 | 18 | 0 | 1 478 |
| Total | 1 658 | 530 | 16 823 | 485 | 128 | 19 624 |

*) Excludes production from Ziguinchor and Louga; Source: DOPM

A cold chain has been established with the installation of seven new cold stores along the Senegalese coast and eight stores inland with the assistance of Danish and Japanese aid. Together with previously installed ice making facilities and stores, through Canadian aid, they serve as short term storage for fish prior to traditional processing. However, energy costs are very high and add to product costs. Moreover, maintenance problems and at least in some instances inappropriate location have rendered most of the facilities ineffective - some of them hardly function at all.

Other cold stores, primarily in Dakar and at Casamance, serve to hold supplies for industrial export products. Due to the high cost of power and frequent black-outs, the operating costs of these stores are also unduly high, ultimately affecting the international competitiveness of the end product.

Quality control and product standards in processing, packaging, storage, and transportation need considerable attention. Presently large volumes of fish and fish products are lost through the inadequacies in the distribution system.

Dakar has one of the best equipped ports in West Africa. There is practically every day container service to Europe, and every ten days there is a direct line to Japan. The latter one is especially important for the trade in top quality[23] cephalopods that goes to Japan - the rest goes mainly to Italy.

The handling of fish from the industrial fleet at Dakar Port is much better than in the artisan sector. Ice is manufactured by two specialized plants at the fishing harbor - one produces slab ice and the other flake ice. In addition, some of the fishing and processing companies have ice making facilities of their own. The combined ice making capacity at the Port is 300 Mt per day. AFRICAMER alone accounts for more than one half of that amount. With the ice boat fleet declining continuously, ice supply problems do not appear likely in the near future at least, provided the existing facilities are maintained in good working condition.

The Port has adequate cold storage facilities, too. The freezing plants can handle up to 150 000 Mt of fish each year; currently they are using only one half of that capacity. There is, however, a slight peaking problem. Occasionally during the tuna season, the cold store capacity is fully utilized forcing some vessels to off-load in Abidjan. It is questionable whether it would be feasible to construct additional capacity only for this peak demand.

Currently there are two major repair yards at Dakar Port - Dakar Marine and Manutention Africaine. The former can handle large vessels. In addition, most of the large fishing companies at the Port have their own limited repair shops, referring work beyond their own capabilities to the two above mentioned repair yards. These repair operations are not without their problems either. Employee motivation is low, quality of work does not measure up to the high charges, and repair work is often stretched out over a long time, representing substantial losses of earnings to the ship owners. There are also substantial problems with obtaining spare parts in the Port, and they are expensive. Thus, virtually every ship owner maintains his own stock of parts which of course gets to be more expensive than a central depot. It also helps to have a partner in Europe who can have a needed part air freighted to Dakar within a week, including clearing customs.

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23 The quality is assured by Korean and Japanese supervison right on the boats in Senegal.

### 3.7. Spoilage and Quality

The often poor conditions of the cold stores, the utilization of ordinary trucks for transportation, the partial thawing of frozen fish between landing and storage and/or during transportation, and frequent breakdowns of refrigeration equipment and trucks, power failures, etc. all contribute to spoilage and a lowering of quality. Re-freezing of once thawed product also lowers the quality a great deal although perhaps not enough to render the product unfit for local markets. Smoked products are some times re-smoked several times before final consumption in order to retard inherent deterioration due to poor quality standard in the first place.

Lack of ice or the application of too little ice as a major factor in the deterioration of the quality of fresh, chilled and frozen fish and shrimp. Improper handling also contributes to lower than necessary quality. The quality of smoked, salted, or dried product is mostly affected by poor handling, and unsanitary and inadequate packaging and storage. At times no packaging or other protection at all against insects and rodents is used.

It has been estimated that the losses between landing and consumption vary from 15 to 35 per cent for the artisan sector. Undoubtedly, the reduction in these losses through proper handling, processing, packaging, and storage offers the greatest opportunity to increase the local consumption of fish and fishery products with no increase in actual captures. However, these losses also represent a major challenge for adaptive technology in low-cost packaging of stable products acceptable to the consumer. Since small packs are best suited to the purchasing power of most families, the cost of a 4 oz. tin can per unit of protein is too high although its shelf life is indefinite. Shrink-on or plastic vacuum packaging of stable products would seem a more appropriate alternative.

### 3.8. Employment and Labor Conditions

The artisan subsector employs approximately 7 000 fishermen and some 23 000 directly in related activities. Around 10 000 people are involved in artisan processing of fish and fishery products. The industrial tuna fishing activity provides some 4 000 jobs. Industrial processing employs some 10 000 people. In total some 100 000 Senegalese find employment directly or indirectly in the sector.[24]

Wages are very high, especially in relation to labor productivity and in comparison with Senegal's international - both African and Asian - competitors.

Fishing and the related industrial activities are highly seasonal and are also characterized by a high degree of risk (what will the catch be?). Labor legislation in Senegal, however, is rigid and not in tune with this character of the sector. Thus, for example, despite the fact that non-

[24] M. André Fontana, op.cit.

permanent, day laborer have been found to have higher productivity and far less absenteeism than permanent workers within Senegal's fisheries industrial system, the vast majority of the work force in this sector are hired on permanent basis and have to be paid for 40 hours per week regardless of the actual level of activities. Recent changes in the Labor Code removing the limits on renewal of short term employment contracts - these contracts can now be renewed indefinitely - will have a positive impact in the longer run as present permanent contracts can be gradually replaced by shorter term hiring. However, short term measures are still needed.

Statutory requirements seem to favor payment by the hour rather than by piece. Competitors in other countries, however, normally pay according to a piece rate or a statutory minimum wage. Clearly, this puts the Senegalese producers at an disadvantage.

Labor Code 70.180 that regulates over-time work is unsuited for the random character of fishing operations and the perishable nature of the product. At times large amounts of catch are brought into port and needs to be landed, transported and stored relatively quickly. Indications that the present code is unsuited are the frequent occasions when it is openly circumvented or ignored and the numerous instances where it is the basis for formal disputes in the labor tribunals.

The crucial provision preventing companies from laying off workers for economic or technical reasons without prior Government approval is proving costly to Senegal's industrial operators, especially in the fisheries sector where lack of supplies or orders as well as technical break-downs would often require shot-downs for economic reasons. This provision should be repealed as soon as possible in order to protect the industry and its jobs in the long run. The present formulation serves only those now employed, and only as long as the firms manage to operate.

In Dakar Port, operators have during the past few years often been forced to use Longshoremen for landing the catches the latter have tried to maintain a certain level of employment in the face of diminished commercial operations in the Port. This is unacceptable from the point of view of both cost and conception. Longshoremen are paid by the hour, they follow certain minimum hour regulations, and demand that working teams have to be of at least a given minimum size regardless of the task at hand. Transport has to be provided after 18 hours. They cause costly damage and pilferage is rampant; repression is difficult because of constant threat of reprisal (in the form of still more damage or work slow-down). Work moral is low leading to intentional slow work and systematic stoppages to gain maximum hours out of a given task. They do not maintain hygienic conditions and are in general not accustomed to handling fish. Finally, Longshoremen's rates and other employment conditions are set beyond the control of the operators within the fisheries industrial system.

Certain attitudinal characteristics of the Senegalese work force have a detrimental affect on the

international competitiveness of the Senegalese industry. Working standing up, for example, is frowned upon and absenteeism can reach the completely unacceptable level of 35 per cent of the total work force at any given time.

### 3.9. Financing

The major credit institutions for the sector in Senegal are the local banks, Banque Nationale de Développement du Sénégal (BNDS), and Société Sénégalaise pour le Développement de l'Industrie et du Tourisme (SOFISEDIT). However, the fishing industry is considered a relatively high risk activity by these institutions and is therefore practically ignored by them: in all, industrial fishing loans amount to only FCFA 2.5 billion which is is hardly three per cent of the total lending by these institutions to the Senegalese economy.

Currently only Société Nationale de Garantie, d'Assistance et de Credit (SONAGA) grants loans to the artisan fishing sector. But, due to lack of funds, SANAGA's operations are very modest.

Owing to the lack of development type, long term credit from public or semi-public institutions, the fisheries industry has had to turn increasingly to short term commercial credits for the financing of investments in both vessels and processing units. The rate of interest on such loans are frequently in excess of 14 or 15 per cent, far more than competing enterprises in other countries face.

Indeed, the truly severe problems with financing for Senegalese entrepreneurs has been identified by both outsiders (the World Bank, for example) and insiders (GAIPES, for instance) as perhaps the greatest obstacle to the required modernization of the Senegalese fleet and processing plants. It is both the amount of available credit and the cost (rate of interest) that must be tackled if lasting solutions to the current and pending dilemmas for the industry are to be found. To some extent it is also a question of unsuitability of the available credit to the specific conditions of the fisheries industrial system. To alleviate the situation, GAIPES has suggested the formation of a Mutual Credit Union (Crédit Fonds de Garantie Professionnelle) that would guarantee the loans taken by operators.

### 3.10. Consumption

Per capita consumption of fish in Senegal; is one of the highest in Africa although it appears to have declined over recent years (see Fig 4 and Table 12 below). Consumption is now estimated to be around 23 kg per capita per year on the average in the country.

Regionwise, fish intake varies a great deal. People in the coastal areas consume large quantities of fish while those in land consume very little fish and fishery products. Thus, in the Cap Vert region, per capita consumption can be as high as 35.6 kg whereas in eastern

Senegal it reaches no more than 8.7 kg per year. This uneven distribution of consumption is a concern of the Government who would like to improve the nutritional intake of the inhabitants of inland areas.[25]

Table 12. FISH AND FISHERY PRODUCTS FOOD BALANCE, 1977,...,87

| Year | Landings Mt | Imports Mt | Exports Mt | App. Cons.[1] Mt | Popula-tion | Consumption Per Capita, Kg |
|---|---|---|---|---|---|---|
| 1977 | 216 701 | 17 501 | 52 908 | 181 294 | 5 250 700 | 34.53 |
| 1978 | 221 175 | 22 891 | 56 487 | 187 579 | 5 387 500 | 34.82 |
| 1979 | 225 185 | 13 460 | 56 169 | 182 476 | 5 524 400 | 33.03 |
| 1980 | 232 752 | 16 127 | 71 378 | 177 501 | 5 661 200 | 31.35 |
| 1981 | 225 509 | 20 720 | 69 137 | 177 092 | 5 823 800 | 30.41 |
| 1982 | 229 435 | 15 036 | 89 001 | 155 470 | 5 970 000 | 26.04 |
| 1983 | 263 150 | 23 261 | 88 714 | 197 697 | 6 310 000 | 31.33 |
| 1984 | 250 408 | 21 234 | 93 071 | 178 571 | 6 397 000 | 27.91 |
| 1985 | 255 381 | 24 362 | 91 001 | 188 742 | 6 600 000 | 28.60 |
| 1986 | 255 381 | 24 637 | 93 224 | 186 794 | 6 710 000 | 27.84 |
| 1987 | 261 116 | 24 382 | 108 949 | 176 549 | 6 964 000 | 25.35 |

[1] Apparent Consumption = Landings + Imports - Exports
Source: UNIDO Secretariat calculations.

Fresh fish is consumed mainly in the coastal and urban communities. Inland the predominant form is smoked, dried or salted. About three fourths of all the fish consumed locally gets processed this way. The production, trade and apparent consumption by different types of products appear in the tables below.

Clearly, consumption of fish and fishery products could be increased significantly in areas away from the major landing sites if more attention than hitherto were paid to spoilage, quality of transformed product, packaging, and storage. This would require no increase in actual landings. However, consumption could also be increased through greater exploitation of cuttlefish resources by artisan fishermen and coastal pelagic species - mainly sardinella - by the industrial fleet. Presently these two resources are very much underutilized.[26]

Per capita fish consumption in Senegal may have declined in response to increases in prices (See Fig. 4 below.)

25 The number of regions has recently been increased to 10, some of the names have been changed, and the regional population figures have been adjusted correspondingly. However, these changes have no substantial bearing on the analysis here.

26 Note that the cuttlefish resources in the industrial zone are now overexploited.

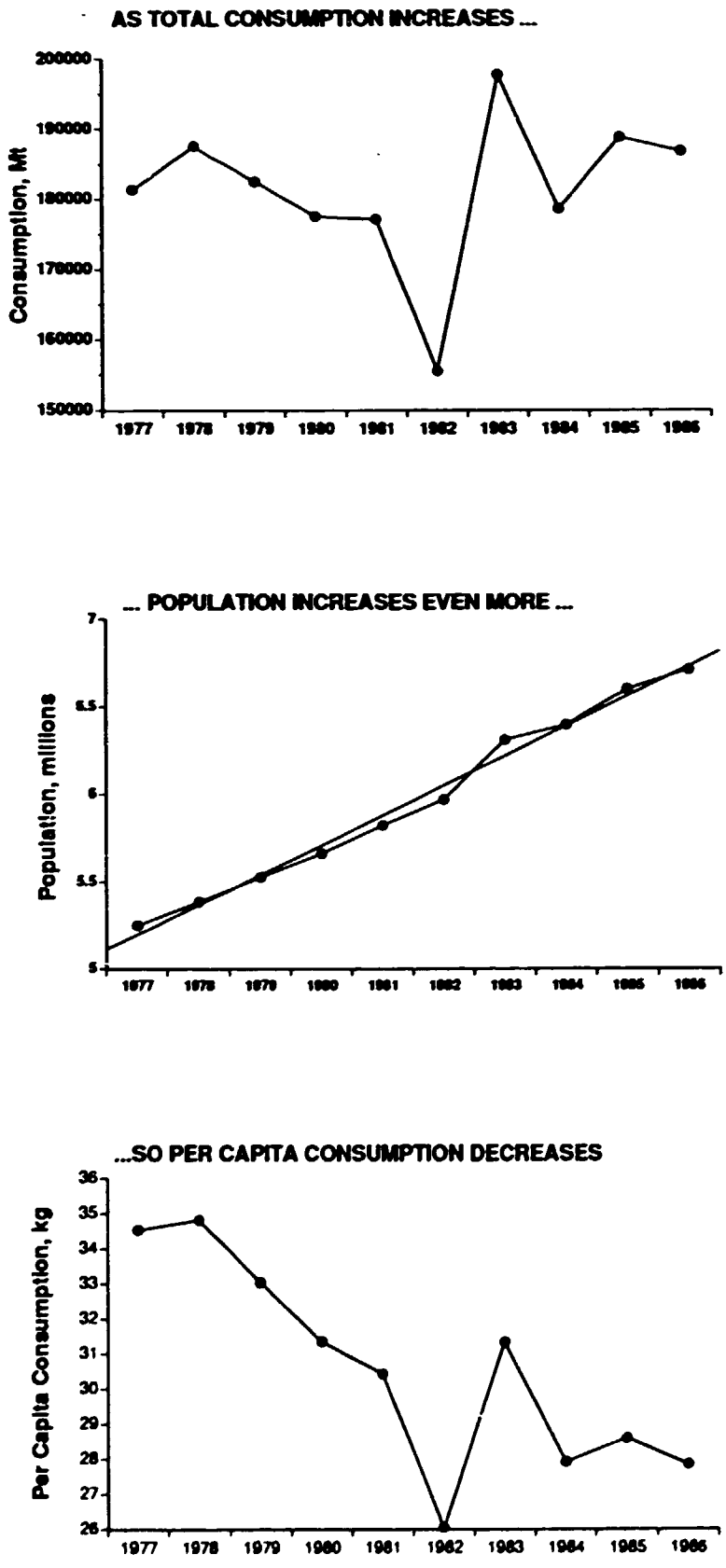


Fig. 4 Less fish to eat

Reportedly retail prices in some areas now exceed willingness to pay by the lowest income consumers. With urban unemployment looming high, the domestic market situation is not likely to improve in the short run.

Table 13. PER CAPITA CONSUMPTION OF FISH AND FISHERY PRODUCTS, By region, 1987

| Region | Population | Per Cent | Consumption Per Capita, Kg |
|---|---|---|---|
| Cap Vert | 1 547 000 | 22.2 | 35.6 |
| Casamance | 959 000 | 13.8 | 22.5 |
| Diourbel | 544 000 | 7.8 | 11.9 |
| Fleuve | 665 000 | 9.5 | 13.3 |
| Senegal Oriental | 393 000 | 5.6 | 8.7 |
| Sine Saloum | 1 376 000 | 19.8 | 21.3 |
| Thies | 931 000 | 13.4 | 25.0 |
| Louga | 549 000 | 7.9 | 19.4 |
| National | 6 964 000 | 100.0 | 22.8 |

Source: UNIDO Secretariat calculations.

Possible reasons for the relatively high domestic prices for fresh and frozen fish, especially from the industrial fleet in Dakar, include the high mark-ups charged by middlemen between the landing vessels and the final consumer: retail prices can be up to three or four times those paid in Port of Dakar. Moreover, transportation costs are very high in Senegal, and if the fish is stored in cold stores for any length of time, the high cost of electricity further adds to the final price charged the consumer.

Table 14. FISH FRESH, FROZEN OR CHILLED; Quantity and Value, 1977,...,87

| Year | Production Mt | Imports Mt | Imports $1 000 | Exports Mt | Exports $1 000 | App. Cons. Mt |
|---|---|---|---|---|---|---|
| 1977 | 34 784 | 16 037 | 8 960 | 34 783 | 20 079 | 16 038 |
| 1978 | 36 964 | 21 827 | 13 284 | 36 964 | 25 320 | 21 827 |
| 1979 | 49 718 | 13 200 | 11 979 | 36 906 | 29 625 | 26 012 |
| 1980 | 56 059 | 15 801 | 20 164 | 49 326 | 34 033 | 22 534 |
| 1981 | 60 939 | 20 523 | 22 677 | 46 017 | 37 358 | 35 445 |
| 1982 | 67 173 | 14 973 | 13 414 | 62 878 | 63 075 | 19 268 |
| 1983 | 60 416 | 23 189 | 20 921 | 60 420 | 52 339 | 23 185 |
| 1984 | 60 116 | 20 611 | 15 991 | 59 734 | 49 884 | 20 993 |
| 1985 | 53 507 | 24 155 | 19 340 | 55 774 | 57 529 | 21 888 |
| 1986 | 50 665 | 24 517 | 20 480 | 51 522 | 80 937 | 23 660 |
| 1987 | | 9 559 | 10 268 | 86 573 | | |

Source: Latest FAO Fisheries Yearbook, except 1987 which is from DOPM

Table 15. FISH DRIED, SALTED OR SMOKED; Quantity and Value, 1977,...,87

| Year | Production Mt | Imports Mt | Imports $1 000 | Exports Mt | Exports $1 000 | App. Cons. Mt |
|---|---|---|---|---|---|---|
| 1977 | 19 799 | 336 | 275 | 626 | 281 | 19 509 |
| 1978 | 19 202 | 180 | 155 | 280 | 128 | 19 102 |
| 1979 | 19 616 | 154 | 140 | 847 | 860 | 18 923 |
| 1980 | 22 765 | 275 | 223 | 3 966 | 1 356 | 19 074 |
| 1981 | 17 999 | 35 | 37 | 1 709 | 1 555 | 16 325 |
| 1982 | 15 996 | 5 | 21 | 2 345 | 1 543 | 13 656 |
| 1983 | 16 321 | 2 | 26 | 1 729 | 2 746 | 14 594 |
| 1984 | 22 978 | 334 | 158 | 2 768 | 3 358 | 20 544 |
| 1985 | 21 400 | 17 | 22 | 2 818 | 3 300 | 18 599 |
| 1986 | 16 600 | 0 | 0 | 2 497 | 5 099 | 14 103 |
| 1987 | | 5 | 14 | 3 382 | 4 804 | |

Source: Latest FAO Fisheries Yearbook, except 1987 which is from DOPM

Table 16. FISH PRODUCTS AND PREPARATIONS, (Mainly Tuna) WHETHER OR NOT IN AIRTIGHT CONTAINER; Quantity and Value, 1977,...,87

| | Production | Imports | | Exports | | App. Cons. |
|---|---|---|---|---|---|---|
| Year | Mt | Mt | $1 000 | Mt | $1 000 | Mt |
| 1977 | 11 616 | 44 | 95 | 10 616 | 18 186 | 1 044 |
| 1978 | 12 393 | 51 | 118 | 12 393 | 21 230 | 51 |
| 1979 | 12 061 | 35 | 113 | 11 695 | 29 875 | 401 |
| 1980 | 13 085 | 25 | 99 | 11 556 | 34 647 | 1 554 |
| 1981 | 15 358 | 62 | 102 | 15 176 | 39 388 | 244 |
| 1982 | 16 406 | 0 | 0 | 16 259 | 40 857 | 147 |
| 1983 | 20 187 | 0 | 0 | 20 141 | 45 231 | 46 |
| 1984 | 22 712 | 241 | 265 | 22 712 | 50 763 | 241 |
| 1985 | 20 597 | 172 | 86 | 20 597 | 45 369 | 172 |
| 1986 | 19 676 | 120 | 160 | 19 676 | 61 476 | 120 |
| 1987 | | 209 | 316 | 18 994 | 65 769 | |

Source: Latest FAO Fisheries Yearbook, except 1987 which is from DOPM

Table 17. CRUSTACEANS; Quantity and Value, 1977,...,86

| | Production | Imports | | Exports | | App. Cons. |
|---|---|---|---|---|---|---|
| Year | Mt | Mt | $1 000 | Mt | $1 000 | Mt |
| 1977 | 6 883 | 1 084 | 2 569 | 6 883 | 23 661 | 1 084 |
| 1978 | 6 850 | 833 | 1 978 | 6 850 | 27 255 | 833 |
| 1979 | 7 486 | 71 | 174 | 6 721 | 28 593 | 836 |
| 1980 | 8 497 | 26 | 77 | 6 530 | 30 510 | 1 993 |
| 1981 | 7 333 | 100 | 374 | 6 235 | 25 270 | 1 198 |
| 1982 | 7 572 | 58 | 169 | 7 519 | 39 933 | 111 |
| 1983 | 6 439 | 70 | 163 | 6 424 | 35 244 | 85 |
| 1984 | 7 897 | 48 | 54 | 7 857 | 37 545 | 88 |
| 1985 | 11 839 | 18 | 36 | 11 812 | 57 688 | 45 |
| 1986 | 19 522 | 0 | 0 | 19 529 | 111 045 | -7 |

Source: Latest FAO Fisheries Yearbook

Table 18. FISH MEAL; Quantity and Value, 1977,...,86

| | Production | Imports | | Exports | | App. Cons |
|---|---|---|---|---|---|---|
| Year | Mt | Mt | $1 000 | Mt | $1 000 | Mt |
| 1977 | 4 377 | | | 4 377 | 1 226 | 0 |
| 1978 | 5 681 | | | 5 681 | 1 600 | 0 |
| 1979 | 7 896 | | | 7 896 | 3 990 | 0 |
| 1980 | 6 646 | | | 6 646 | 3 150 | 0 |
| 1981 | 5 037 | | | 5 037 | 2 118 | 0 |
| 1982 | 2 741 | | | 2 741 | 1 258 | 0 |
| 1983 | 4 630 | | | 4 630 | 2 442 | 0 |
| 1984 | 1 031 | | | 1 031 | 509 | 0 |
| 1985 | 4 437 | | | 4 437 | 2 341 | 0 |
| 1986 | 748 | | | 748 | 552 | 0 |

Source: Latest FAO Fisheries Yearbook

### 3.11.Current or Recent Projects

Currently, Government policy objectives emphasize private enterprise in order to maximize production and earnings as well as reduce waste. Accordingly there has been progressive release of Government ownership and operation of processing and storage centers, and a general reduction in government intervention in industrial and artisan services for productive systems has taken place. For example, parastatal integrated industrial enterprises established in an effort to facilitate and modernize services catering to small scale fishing have gone out of business or their activities have been curtailed.

Various sectorial studies of the sector have addressed specific aspects of the artisan and industrial fisheries as well as particular operation interactions and constraints on fisheries, e.g. for tuna, shrimp, etc. Based on these studies, many donors have drawn up their plans for assisting the Senegalese fishing and fish processing sector. Table 19 below lists the projects currently underway. A short description of each project follows the table.

Table 19: FISHERY DEVELOPMENT PROJECTS

| Title | Million FCFA | Financed by |
|---|---|---|
| A. ARTISAN FISHERIES: | | |
| 1. CAPAS/Canoe motorization | 2 700 | Japan, Italy, Senegal |
| 2. CAPAS/Fish marketing | 1 200 | Canada |
| 3. Development of artisan fishery at Petite Côte | 3 100 | BAD, FAD, Senegal |
| 4. Development of artisan fishery at Casamance | 1 700 | CCCE, FED, Senegal |
| 5. Improvement in artisan fishing technique | 2 730 | Canada, Senegal |
| 6. Fishing center at Missirah | NA | Japan, Senegal |
| 7. Propêche | 3 800 | Canada, Senegal |
| 8. Fishermen project at Casamance | 3 600 | Italy |
| B. AQUACULTURE: | | |
| 1. Shrimp culture project at Casamance | 600 | FAC |
| C. INDUSTRIAL FISHERIES: | | |
| 1. Fishery protection and surveillance | 2 800 | Canada, Senegal |
| 2. Support to Adrien shipping | 1 000 | CCCE |
| 3. Support to Nouvelle Chalucap shipping | 2 000 | CCCE, the Netherlands |
| 4. African SeaFood project | 4 900 | Denmark , SFI, Senegal |
| 5. Pilchard project (SNCDS) | 5 000 | Italy, Senegal |
| 6. Maritime credit | 3 830 | BOAD, BIRD, BAD, KFW |
| 7. Rehabilitation and extension of cold chain | 2 150 | Italy |
| 8. GAIPES boat purchase project | 3 600 | Italy |

SOURCE: DOPM, Dakar; and Claude Freud, SENEGAL: Post-Mission Paper, The World Bank, 1988-06-28, Mimeo, pp. 10 and 11

**Project descriptions:**

A. ARTISAN FISHERIES:

1. Center for Assistance with Motorization of Canoes (CAMP)
   A credit scheme has been established allowing associated fishermen to.acquire outboard motors as well as nets and other fishing gear according to their revenues.

2. Marketing of fish
   i. fish markets operational at Kayak, Joal and Rufisque
   ii. insolated storage bin installed at Fass-Boye
   iii. provision of insulated containers to points of sale

3. Development of artisan fishery at Petite Côte
   i. setting up of building yards for canoes of improved design
   ii. establishment of artisan fishery centers
   iii. credit to artisan operators

4. Development of fisheries at Casamance
   i. training of artisan fishermen
   ii. credit to artisan operators

5. Improvement of artisan fishing techniques
   i. training of artisan fishermen
   ii. setting up of building yards for canoes of improved design
   iii. support to artisan processing
   iv. credit to artisan operators

6. Fishing center at Missirah
   i. increased net revenues to fishermen despite additional costs due to motorization
   ii revalorization of motors
   iii increased fishing effort through access to zones further away, and extension of seasons
   iv increased security on the seas

7. Propêche
   The project envisions to boost self-development efforts among small scale artisan operators by putting at their disposal the latest technical and financial means in order to improve operation conditions of their enterprises

8. Fishermen project at Casamance
   as part of the Italian country program, finance a study.

B. AQUACULTURE

1. Shrimp farm project at Casamance
   i. establish the feasibility of shrimp framing and and the possibilities to thus complement fishing operations
   ii. identify local constraints in terms of raising, supply of larvas and nutrients, and variations in predator conditions
   iii. put in place equipment to mitigate the constraints

C. INDUSTRIAL FISHERIES

1.Protection and surveillance of fisheries

Safeguard marin resources that are already threatened by over-exploitation (coastal trawling) and enforce legislation that aims at rationalize appropriations.

2. Support to the company Adrien

i. acquisition of two freezer vessels
ii. equipment for a freezing plant (SOPICA)

3. Support to the company Nouvelle Chalucap

i. acquisition of three freezer vessels
ii. acquisition of one ice vessels
iii. equipment for a freezing plant (AMERGER)

4. Project Africa Seafood

i. construction of a 50 000 ton freezing plant
ii. hiring of vessels at the Faroe Islands for supplying the factory
iii. export of frozen fish (sardinella) to African markets.

5. Project Pilchard (SNCDS)

i. construction of a cannery
ii. acquisition of four vessels

Fish production (catch) 60 000 tons for conversion into 37 000 tons of canned product and 12 000 tons to be supplied fresh to Dakar markets. Credit conditions: Italian credit to the Senegalese Government for the company SNCDS (Société Sénégalaise de conserveries) at 2.5 per cent annual interest for 16 years, assured bank guarantee after factory start-up.[27]

6. Maritime credit

Massive credit scheme especially for ship owners;

i. renewal of decayed and obsolete fleet
ii. extension ("new" resources), also for factory equipment
iii. infrastructure for the valorization of export products.

7. Rehabilitation and extension of the cold chain

as part of the Italian country program, finance a study.

8. Project to buy vessels by GAIPES

as part of the Italian country program, finance a study.

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[27] Claude Freud, op. cit., p. 10

# 4. Fisheries Development Constraints

The findings related here and in the following chapters are the results of collecting very detailed, enterprise level data and statistics, and analyzing them within the framework of UNIDO's MEPS model (see Fig 3 below).[28] The model establishes quantitative links between all the components of a production system, from domestic resources and imports through processing and distribution up to and including final consumption and exports. Quantifiable policies, government objectives, and other exogenous factors are also included in the system description. The system allows UNIDO to discover bottlenecks and other weaknesses in the entire production system. Furthermore, it allows the user to simulate the impact of various interventions in the system such as investments and exogenous policy changes in order to establish a balanced and integrated development program for the production system in question. Such a program consists of technical assistance project concepts, investment opportunities, and policy recommendations, all of which must be undertaken, and in harmony, in order to reap maximum benefits from a given resource-production-consumption situation.

The present chapter describes the various constraints discovered in the present fisheries industrial system in Senegal. The next chapter outlines alternative development strategies for overcoming the constraints and meeting government objectives. The impact on system variables is also simulated in order to derive a preferred strategy. Chapter 6 finally presents a development program derived from the constraints analysis and the preferred development strategy, taking into account already ongoing or planned projects within Senegal's fisheries system. Thus not all identified constraints are dealt with in the subsequent analysis and the development program as they are evidently being addressed by other interventions.

## 4.1 Fishing Operations

While canoe and tuna fleets are operating profitably in Senegal, sardinella and trawl fleets have been going through a difficult period. These fishing fleets produced some 261 116 Mt of fish worth FCFA 49.1 billion in 1987. The canoe fleet accounted for two thirds of the volume of catch but just a little over one third of the value. The trawlers have been generating more revenue but operating problems have rendered the activity less attractive.

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[28] MEPS stands for Method for the Evaluation of Production Systems. For a description, see See Methodology for the Assessment, Programming and Management of Production and Consumption Systems, Abridged version, Sectoral Studies Series No 27, UNIDO/IS.643, Sep 1986; and Methodology for the Assessment, Programming and Management of Production and Consumption Systems, User's Guide, Sectoral Studies Series No 33, UNIDO PPD.33, Apr 1987. The system runs on a micro computer under MS-DOS. It is general in nature and can be made available to interested users. For further information, please contact UNIDO, DPPD/Program Development Support Unit, PO Box 300, A-1400, Vienna, Austria.

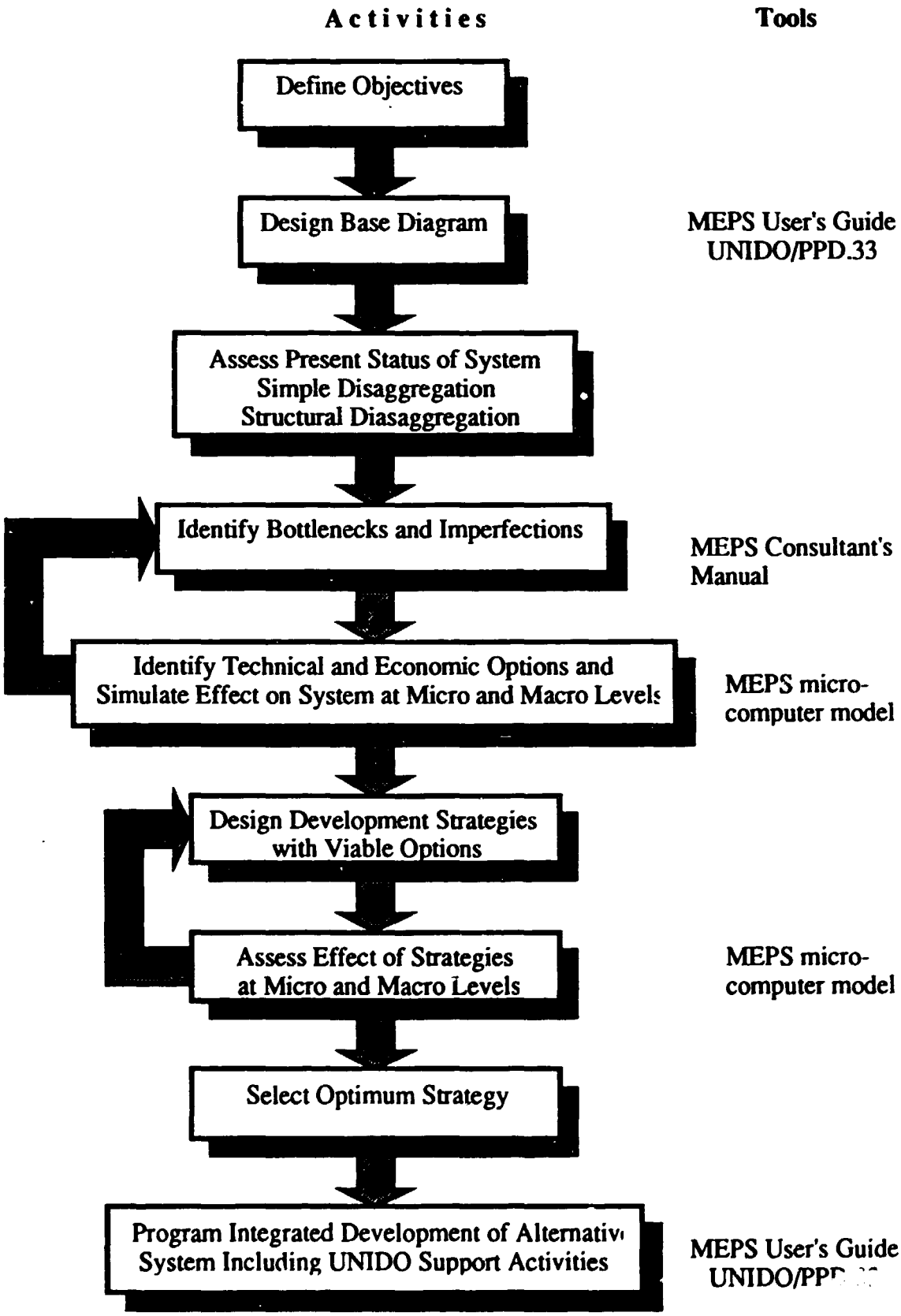


Fig. 5 The MEPS process

Table 20. SUMMARY OF FISHERY DEVELOPMENT CONSTRAINTS, OPTIONS, AND POLICY MEASURES

| Component | Constraint | Option | Policy Measure |
|---|---|---|---|
| Extraction in general | Obsolete industrial fleet | New freezer sardinella vessels | Lower interest rates |
| | | New trawlers | |
| | | Modernize tuna vessels or replace ice vessels with freezer vessels | |
| Artisan fishing | Artisan fleet too small | Treat wood against rot | |
| | | Alternative canoe construction material | |
| | Fuel, lubrication, repair, and maintenance costs high | Redesign canoes for inboard engines | Review fuel cost policy |
| Sardinella fishery | Obsolete fleet | Replace by new vessels | |
| | High costs and low prices | Quality improvement through on-board freezing | |
| | | Can surplus | |
| Trawl fishery | Obsolete fleet | Fleet Modernization | Lower interest rates |
| | High costs | Lower fuel prices | Fuel cost policy |
| | | Increase labor productivity | Training |
| | Over-fishing | Surveillance | Government project |
| Tuna Fishery | Crew skills | Upgrade skills of national crew | Review labor code |
| | Fishing treaties | Re-negotiate treaties with neighboring countries | Government project |
| | Seasonality | Adapt vessels for multi-purpose fishing during off-season | |
| | Fleet too small | New vessels under national ownership | Lower interest rates |
| Fish Processing in general | Dependent on subsidies | Restructuring | Review subsidy policy |
| | Capacity utilization low | Increase raw fish supply | Review import and subsidy policies |
| | | Regroup and merge some processing units; reduce fish meal capacity | |
| | High costs | Lower cost of energy and water | Preferential rates |

| | | | |
|---|---|---|---|
| | | Trim permanent work force in favor of seasonal labor; Modernize equipment; Pay attention to maintenance | Review labor code |
| Freezing | LUV fish | Adapt fishing techniques to target mostly HUV species | |
| | Low Value Added | Increase level of processing; Improve quality and packaging; Add high Value Added products; Diversify operations | |
| Curing | Small scale | Integrate with freezing operation | |
| | Exports low | Increase volume and diversify to European and Asian markets | |
| Canning | Dependent on imported inputs and subsidies | Vertical integration between canneries and domestic ancillary industries | |
| | | Increase competitiveness | Remove subsidies |
| Fish Meal | Inadequate supply of tuna offal | Consolidate existing two units into one | |
| | High costs | Modernize equipment | |
| Distribution | Spoilage | Improve maintenance of cold stores and ice making facilities. Improve curing and packaging | |
| | High costs | Lower transportation costs | Review fuel policy |
| | Poor distribution | Improve access roads to inland markets | |
| African Market | Unstable | Enter into long term agreements with adequate guarantees | New Government policy |
| European Market | Low Value Added | Increase level of processing; Improve quality and packaging; Add high Value Added products; Diversify operations | |
| | Limited markets | Diversify to non-traditional markets and marketing channels | |
| Japanese Market | Low Value Added | Increase level of processing; Emphasize quality over price; Establish industry managed quality control scheme | |
| American Market | Virtually untapped | Invest in processing facilities for large | |

| | | | |
|---|---|---|---|
| | | quantities of specialized high VA products<br>Emphasize quality, quantity, reliable delivery, convenient packaging; Establish industry managed quality control scheme | |
| Port | Slow, expensive repair of vessels | Improve skills, employee motivation<br>Reduce Government red tape | Review relevant regulations |
| Ancillary industries | Weak | Reduce amount of imported inputs that make end products expensive | |
| | Inferior quality | Improve skills, employee motivation | |
| Fiscal Policy | High taxes and fiscal charges | Remove immediately taxes on off-loading of items intended for export;<br>Overhaul entire fiscal structure<br>Introduce modern investment tax credit scheme | Shift taxation towards consumption<br>Regard fisheries as industrial, not commercial activity |
| Credit | Expensive | Introduce long term, development bank credit<br>Establish industry managed mutual credit and insurance scheme | Shift Government attention from artisan to fisheries industrial system |

Source: UNIDO Secretariat

## General Constraints

Obsolete Fleet

Senegal's fishing industry is characterized by an aging fleet which needs to be gradually replaced or modernized if the sector is to remain the backbone of the economy. Studies carried out by the DOPM in 1983 indicated that the average age of sardinella vessels was 27 years, trawlers 20 years and tuna fleet 31 years. Little has changed since then. Now the country's industrial fleets are increasingly spending more days in port undergoing repairs and fewer days at sea fishing. An analysis of this constraint demonstrates that if an existing old 24-meter ice sardinella vessel is replaced by a new one with similar tonnage, revenue could double while repair and maintenance costs could drastically be reduced.

Difficult access to credit and the accompanying high interest charges have been the major obstacles to fleet modernization. This has resulted is an inefficient fishing operation marked by mounting operating expenditures and dwindling revenue. Thus, not even a new purse seiner may show a profit because of the high interest charges, currently fixed at a rate of 15 per cent by most commercial banks in Senegal. But, if interest charges are reduced to 13.5

per cent or less, a MEPS simulation shows that new sardinella vessels should operate profitably.

Table 21. FISHING OPERATIONS, by fleet, Mt and FCFA Million, 1987

| Type of Fleet | Volume of Fish Production | Value of Fish Production | Value Added | Profit |
|---|---|---|---|---|
| Canoe | 171 805 | 18 219 | 11 433 | 7 067 |
| Sardine. Purse Seiners | 4 805 | 251 | 53 | -17 |
| Ice Trawlers | 9 786 | 3 141 | 1 398 | -308 |
| Freezer Trawlers | 44 541 | 18 128 | 8 368 | 3 127 |
| Ice Tuna Vessels | 8 500 | 2 550 | 1 407 | 93 |
| Freezer Tuna Vessels | 21 620 | 6 810 | 3 678 | 833 |
| Total | 261 057 | 49 099 | 26 337 | 11 411 |

Source: UNIDO Secretariat calculations

For the trawl fleet, if an existing old vessel is replaced by a new one with identical specifications, the analysis indicates that the increase in revenue and decline in repair and maintenance costs could be enough to assure profitability despite the 15 per cent interest rate. Tuna vessels are currently operating at a profit but the profitability could be substantially increased if the fleet is modernized.

On-board Preservation

The five sardinella purse-seiners that operated in 1987 were ice vessels. They usually spent between 8 to 15 hours fishing just in the vicinity of Dakar. Freezer sardinella vessels, however, could explore distant areas where some high concentrations of small pelagic stocks exist. Not only would the volume of fish production increase but also the better quality frozen products would command higher prices than the fresh fish.

Prices for fresh sardinella have remained low in the past few years and due to high perishability, producers are often unable to negotiate better prices.. As the supply of fresh fish continue to decline, several companies have found it prudent not to operate partially filled cold stores leaving the fish freezing activity into the hands of 2 or 3 companies.

For two identical vessels, one employing ice and the other freezing to preserve the catch, the analysis shows that the revenue generated by the freezer vessel would far exceed that

obtained by the ice vessel while total costs show only a slight difference. The greater profitability of freezer vessels can be attributed mostly to the higher prices for frozen fish. It should, however, be noted that the benefits from modernizing the fleets could be far greater than opting for freezing facilities.

Interest Charges

Interest payments have been accounting for a substantial share of the costs of operating a vessel in Senegal's industrial fisheries sector. They represented 19 per cent of the total costs incurred from operating a 24-meter sardinella vessel in 1987. For a new 24-meter sardinella purse seiner, interest charges could reach a third of the total costs at the current 15 per cent rate charged by local commercial banks.

The viability of the industry is now to a great deal dependent on easing some of the financial burdens of shipowners. Otherwise fleet modernization will be a long way off and producers will be operating far below their maximum potential. Cash flow problems also aggravate their financial situation to the detriment of the entire fishing industry.

### 4.1.1 Artisan Fishery

Besides the above general constraints, there are specific problems unique to each fishery. Artisan fishermen, however, have fared better than those fishing for small coastal pelagics or trawl fish in the industrial sector.

Given an average catch per trip of 2.5 Mt and 250 trips per year, the analysis shows that an artisan fisherman who operates an 18-meter canoe with a 40 hp motor generates FCFA 21.87 million in revenue. Expenditure on fuel, lubrication and crew share or salaries accounts for most of the costs. The corresponding annual profit is FCFA 8.4 million. Nonetheless, the artisan marine fishery could be much more viable if certain problems were addressed.

### Specific Constraints

Size of Canoe Fleet

To sustain or improve the performance of the artisan marine sector, the fleet should be expanded. However, a dramatic decline in the canoe fleet has been observed since 1982 (see Table 4 above). This has been attributed to scarcity of wood that is reflected in the price of canoes. The situation could partly be remedied by treating wood to prolong the useful life of wooden canoes. Also the possibilities of using other materials for the construction of boats should be examined. For example, although a little bit expensive, fiberglass vessels are more durable than wooden ones. See Project 1 in Section 6 Design of A Support Program.

Outboard Motors

Although the cost of fuel and lubrication is the major concern for artisan fishermen, there are also complaints about frequent breakdowns of outboard motors and problems with repairs and maintenance. CAMP, a project set up to promote the motorization of canoes, has gone a long way in providing answers. Thus, centers have been established in major production areas to supply spare parts for outboard motors and provide necessary technical assistance. But the long term effectiveness of the CAMP motorization campaign is not clear, and there is still more to be done. For example, canoes ought to be a redesigned and fitted with inboard engines for better adaptation.

Table 22. COSTS AND EARNINGS FOR AN 18-M WOODEN CANOE, 1987

| | |
|---|---|
| Canoe Characteristics: | |
| Length (M) | 18 |
| GRT (MT) | 20 |
| Horsepower (hp) | 40 |
| Crew Size | 20 |
| New Canoe Cost (FCFA 1 000) | 5 800 |
| - Canoe | 1 200 |
| - Outboard Motor (40 hp) | 600 |
| - Net (Seine tournantes) | 4 000 |
| Number of trips per year | 250 |
| Average catch per trip (MT) | 2.5 |
| Annual production per canoe (MT) | 625 |
| Revenue (FCFA 1 000) | 21 875 |
| Cost of inputs (FCFA 1 000) | 9 714 |
| Fuel and Lubrication | 7 054 |
| Food | 1 500 |
| Repairs and Maintenance | 1 160 |
| Value Added (FCFA 1 000) | 12 161 |
| Other Costs (FCFA 1 000) | 3 744 |
| Salaries | 2 800 |
| Interest | 653 |
| Depreciation | 291 |
| Profit (FCFA 1 000) | 8 418 |

Source: UNIDO Secretariat

Fuel Costs

While the industrial fleets are buying diesel fuel at international prices usually set at FCFA 63 per liter, artisan fishermen have to pay for diesel FCFA 170 per liter or more. As fuel and lubrication costs account for more than half the total costs incurred by operating a canoe (in 1987), fuel prices have a major impact on both the competitiveness and the profitability of artisan fishing operations. At the moment, however, artisan operations are clearly much more profitable than industrial fishing. Thus, the net effect of lowering fuel prices for artisan fishermen would probably be a continuing driving out of marginal industrial operators in shallow waters rather than an increase in overall fish supply.

### 4.1.2 Sardinella Fishery

Weak sardinella prices, escalating repair and maintenance costs as well as high interest charges are the major reasons for the losses recorded by sardinella vessel operators. In 1987, repair and maintenance costs together with interest charges accounted for more than a third of total expenditures incurred in the operation of a 30 year old, 24-meter purse seiner.

Of particular concern are the low revenues caused, on one hand, by the generally weak sardinella prices, on the other, by the diminished level of effort. In 1987, the catch was less than half of what could be considered normal. On the average, the sardinella purse seiners made only 115 trips per vessel, probably because of a combination of low rentability and repair and maintenance problems with the old vessels. A new vessel on the other hand could make about 250 trips a year and land some 2 100 Mt of fish. Considering the enormous stocks of small pelagic resources in Senegal's waters, there appears to be ample scope for a program to revitalize this fishery and make it profitable. This option is further explored in Chapter 5.

### Specific Constraint

Weak Sardinella Prices

Problems in the fishing industry have been more acute for the sardinella fishery than elsewhere. This is reflected in the steady decline of the sardinella fleet since 1983. While sardinella prices have hardly shown any overall growth over the last decade, they have been very sensitive to seasonal changes in supply and demand. During peak time, prices are depressed to the extent that producers barely break even.

The major problem appears to be overlapping sardinella seasons in the West African countries that constitute Senegal's traditional markets (Côte d'Ivoire is the leading market for Senegal's frozen small pelagic exports). This prevents Senegalese producers from disposing of their excess catch in an efficient and timely manner as demand for imports stays low with

prices remaining unattractive.

Holding the surplus catch in cold stores turns out to be uneconomical. A plausible alternative is to can the surplus catch in the peak season. Indeed, this option is now being tested by one of the tuna canneries that has established a sardinella line, with assistance from the Italian government. Thus, this option will not be considered further for inclusion in the alternative development strategies.

Table 23. COSTS AND EARNINGS FOR A 24-M SARDINELLA VESSEL, by vessel age, 1987

| Vessel Characteristics | OLD | NEW |
|---|---|---|
| Length (M) | 24 | 24 |
| GRT (MT) | 35 | 35 |
| Horsepower (hp) | 420 | 420 |
| Crew Size | 14 | 14 |
| Replacement Value of Vessel (FCFA 1 000) | 128 000 | 320 000 |
| Number of trips per year | 115 | 250 |
| Average catch per trip (MT) | 8.4 | 8.4 |
| Annual production per vessel (MT) | 966 | 2 100 |
| Revenue (FCFA 1 000) | 50 425 | 109 620 |
| Cost of Inputs (FCFA 1 000) | 39 647 | 55 514 |
| Fuel and Lubrication | 6 375 | 13 860 |
| Ice | 5 690 | 12 370 |
| Supplies | 2 500 | 5 000 |
| Unloading Charges | 821 | 1 785 |
| Repair and Maintenance | 12 960 | 9 599 |
| Insurance | 8 000 | 9 600 |
| License | 500 | 500 |
| Administrative Charges | 2 500 | 2 500 |
| Port Taxes | 300 | 300 |
| Value Added (FCFA 1 000) | 10 779 | 54 106 |
| Other Costs (FCFA 1 000) | 35 727 | 57 158 |
| Salaries | 13 158 | 13 158 |
| Interest | 14 569 | 36 000 |
| Depreciation | 8 000 | 8 000 |
| Profit (FCFA 1 000) | -24 948 | -3 052 |

Source: UNIDO Secretariat

### 4.1.3 Trawl Fishery

Without doubt, trawling is the most valuable fishery in Senegal but it is still being exploited in a grossly inefficient manner. The problems encountered here are similar to those in the sardinella fishery. The aged trawlers that operated in 1987 made fewer trips than usual, and harvested much less fish than a new trawler with identical specifications would have been capable of.

The MEPS analysis shows that fleet modernization could turn Senegal's trawl industry into a profitable one even at the 15 per cent rate of interest charged by most local commercial banks. In 1987, a loss of FCFA 7.9 million in operating an old ice trawler could have turned into a profit of FCFA 11.0 million if it were replaced by a new one! Indeed, this opportunity has not gone unnoticed by investors and operators, and freezer trawlers have gradually replaced many of the old ice vessels. However, there is scope for further movement in this direction so this option will be tested through the alternative development strategies.

#### Specific Constraint

Cost of fuel

It is estimated that in a developed country, the running costs of a small (9 to 24 meter) trawler was around $200 000 a year in 1984 and that it could catch, say, 600 tons of cod or 1 500 tons of sardines.[29] Table 24 shows that a Senegalese operator does not come even close to such operational efficiency. It also shows the high proportion of total costs going to fuel: 45 per cent for an old freezer trawler, nearly 60 per cent for a new one. World-wide, fuel accounts for between 30 to 50 per cent of total operating costs of a deep-sea trawler.[30] Besides having an obvious impact on the international competitiveness of Senegalese operators, a high price for fuel also favors fishing in smaller vessels nearer to the coast in order to bring down total fuel cost. Thus industrial vessels will encroach on artisan fishing grounds, and will contribute to over-fishing of in-shore species. But, as stocks disappear, the fleets again have to venture further out causing disproportionate increases in fuel costs as distances and time spent at sea increase.

Over-fishing

The operations of foreign flag trawlers, in particular the heavy exploitation of cuttlefish, must be monitored and controlled in order to curtail current over-fishing in Senegal's EEZ. There are indications that certain shrimp species are also being heavily exploited. This constraint will be closely observed in the derivation of the preferred development strategy.

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29 "World fishing flounders," The Economist June 23, 1984, p. 72

30 ibid. p. 72

Table 24. COSTS AND EARNINGS FOR A 28-M TRAWLER, by vessel age and type, 1987

| | ICE-TRAWLER | | FREEZER-TRAWLER | |
|---|---|---|---|---|
| Vessel Characteristics | OLD | NEW | OLD | NEW |
| Length (M) | 28 | 28 | 28 | 28 |
| GRT (MT) | 165 | 165 | 165 | 165 |
| Horsepower (hp) | 400 | 400 | 400 | 400 |
| Crew Size | 18 | 18 | 18 | 18 |
| Vessel Replacement Value (FCFA 1 000) | 140 000 | 350 000 | 144 000 | 360 000 |
| Average number of trips | 16 | 26 | 9 | 15 |
| Average catch per trip (Mt) | 18 | 18 | 28 | 28 |
| Annual production (Mt) | 288 | 468 | 252 | 420 |
| Revenue (FCFA 1 000) | 92 448 | 150 228 | 102 564 | 170 940 |
| Cost of Inputs (FCFA 1 000) | 51 564 | 65 311 | 55 620 | 71 820 |
| Fuel and Lubrication | 16 632 | 27 027 | 24 948 | 41 580 |
| Ice | 5 275 | 8 571 | 0 | 0 |
| Supplies | 2 500 | 5 000 | 2 500 | 5 000 |
| Unloading Charges | 288 | 468 | 252 | 420 |
| Repairs & Maintenance | 14 000 | 10 500 | 14 400 | 10 800 |
| Insurance | 8 750 | 9 625 | 9 000 | 9 900 |
| Administrative Charges | 2 500 | 2 500 | 2 500 | 2 500 |
| License | 1 320 | 1 320 | 1 320 | 1 320 |
| Port Taxes | 300 | 300 | 300 | 300 |
| Value Added (FCFA 1 000) | 40 884 | 84 917 | 46 944 | 99 120 |
| Other Costs (FCFA 1 000) | 48 806 | 73 878 | 50 094 | 75 750 |
| Salaries | 24 306 | 25 753 | 24 894 | 26 250 |
| Interest | 15 750 | 39 375 | 16 200 | 40 500 |
| Depreciation | 8 750 | 8 750 | 9 000 | 9 000 |
| Profit (FCFA 1 000) | -7 922 | -11 039 | -3 150 | 23 370 |

Source: UNIDO Secretariat

### 4.1.4 Tuna Fishery

Tuna vessel operators are doing better than the others in the industrial sector although a striking amount of money is being spent on fishing crews. In fact, wages account for a greater share of total expenditure in tuna fishery than in sardinella purse seining or trawling.

Tuna vessels on the average generated substantial revenues in 1987. Based on the average fleet performance of 16 trips catching 30 Mt of tuna per trip, a typical 26-meter pole and line ice vessel realized FCFA 144 million. Of these, FCFA 12.5 million were declared profits.

Table 25. COSTS AND EARNINGS FOR A 26 M POLE & LINE TUNA VESSEL, by vessel age and type, 1987

| | ICE-VESSEL | | FREEZER-VESSEL | |
|---|---|---|---|---|
| Vessel Characteristics | OLD | NEW | OLD | NEW |
| Length (M) | 26 | 26 | 26 | 26 |
| GRT (MT) | 140 | 140 | 140 | 140 |
| Horsepower (hp) | 400 | 400 | 400 | 400 |
| Crew Size | 16 | 16 | 16 | 16 |
| Vessel Replacement Value (FCFA 1 000) | 168 000 | 420 000 | 180 000 | 450 000 |
| Average number of trips | 16 | 21 | 11 | 14 |
| Average catch per trip (Mt) | 30 | 30 | 46 | 46 |
| Annual production (Mt) | 480 | 630 | 506 | 644 |
| Revenue (FCFA 1 000) | 144 000 | 189 000 | 159 390 | 202 860 |
| Cost of Inputs (FCFA 1 000) | 72 472 | 77 870 | 73 312 | 77 158 |
| Fuel and Lubrication | 16 632 | 21 830 | 23 377 | 29 753 |
| Ice | 7 920 | 10 395 | 0 | 0 |
| Supplies | 5 000 | 5 500 | 5 000 | 5 500 |
| Unloading Charges | 1 200 | 1 575 | 1 265 | 1 610 |
| Repairs & Maintenance | 16 800 | 12 600 | 18 000 | 13 500 |
| Insurance | 10 500 | 11 550 | 11 250 | 12 375 |
| Administrative Charges | 2 500 | 2 500 | 2 500 | 2 500 |
| License | 11 620 | 11 620 | 11 620 | 11 620 |
| Port Taxes | 300 | 300 | 300 | 300 |
| Value Added (FCFA 1 000) | 71 528 | 111 130 | 86 078 | 125 702 |
| Other Costs (FCFA 1 000) | 58 988 | 87 923 | 62 724 | 93 683 |
| Salaries | 29 588 | 30 173 | 31 224 | 31 808 |
| Interest | 18 900 | 47 250 | 20 250 | 50 625 |
| Depreciation | 10 500 | 10 500 | 11 250 | 11 250 |
| Profit (FCFA 1 000) | 12 540 | 23 207 | 23 354 | 32 019 |

Source: UNIDO Secretariat

## Specific Constraints

### Skilled Crew

Tuna fishing demands advanced techniques and therefore calls for a highly skilled crew. Availability of crew of such calibre in Senegal is often lacking. Therefore shipowners

usually depend on foreign expertise that is quite expensive. This has caused a major drain on the financial resources of most tuna vessel owners. In 1987, crew wages alone accounted for nearly 20 per cent

Tuna Fishing Treaties

Tuna fishing agreements with neighboring countries should be reviewed to ensure conformity. Today, Senegalese tuna boats operating in Mauritania are charged a license fee of US $ 250 per GRT while Mauritanian vessels pay only FCFA 25000 or US $ 80 per GRT in Senegal. Due to the highly migratory characteristics of the tuna resource, the Senegalese tuna fleet cannot escape this fee as it must also fish in the waters of neighboring countries. Thus, license fees now account for a substantial share of all operating costs. It would seem both necessary and possible for the Government to negotiate more favorable and equitable terms for the Senegalese operators in order to ensure long term profitability and indeed competitiveness of the Senegalese industry vis-a-vis the fleet of other nations.

Multi-Purpose Fishing Gear

Tuna fishing is a highly seasonal activity usually covering 7 months. Re-fitting tuna vessels to fish for other species during the off-season could substantially add to the profitability of this operation. Due to the high interest charges on new vessels, it may even be that adapting a tuna vessel for multi-purpose fishing could be relatively more beneficial than modernizing. This possibility would need further, detailed study.

Size of Tuna Fleet

The French bait boats are gradually leaving without being replaced. In 1980 there were 29 of them but only 13 operated in 1987. Moreover, efforts to build up a local tuna fleet have not materialized and the number of Senegalese tuna vessels have remained unchanged at five since 1983. These vessels provided only 5 per cent of the raw tuna requirements of the local canneries in 1987.

## 4.2 Fish Processing

The fish processing activities have emerged as the leading foreign exchange earners for the country. Among these, freezing and canning are by far the most important. Virtually all the frozen and cured fish products are exported. Occasionally, some small quantities of canned fish products are utilized for domestic consumption; otherwise, the canned fish products also go to the export market. About a third of the fish meal is said to be utilized locally although the official statistics show that the whole production is exported (see Table 18 above).

Despite the important role fish processing plays in the economy, it faces an array of

problems. It has to depend on Government subsidies to generate profit or keep afloat. The sector received an export subsidy of FCFA 4.48 billion or about 10 per cent of its export earnings in 1987. Senegal's fish processing sector plainly has to be restructured to become self-sufficient.

## General Constraints

### Raw Fish

All the four industrial fish processing activities in the country, namely, freezing, curing, canning and the production of fish meal are facing problems with inadequate raw fish supply. Capacity utilization has been very low, ranging from 25 per cent for the fish meal industries to 57 per cent for the canneries. It has had disastrous consequences for the freezing companies many of which have ceased operating. Even with the export subsidy, the profitability of the fish meal plants cannot be assured if they continue to produce at a dismal 25 per cent of capacity.

Table 26. FISH PROCESSING ACTIVITIES, Mt and FCFA Million, 1987

| Processing Activity | Volume of Production | Value of Production | Export Earnings | Value Added | Profit |
|---|---|---|---|---|---|
| Freezing | 68 000 | 25 840 | 25 840 | 4 960 | 957 |
| Curing | 1 000 | 608 | 608 | 153 | 80 |
| Canning | 20 000 | 18 075 | 18 075 | 2 146 | 1 690 |
| Reduction | 2 500 | 375 | 250 | 186 | 13 |
| Total | 91 500 | 44 898 | 44 773 | 7 445 | 2 740 |

Source: UNIDO Secretariat

The fish processing industry could become very viable and depend less on Government subsidies if capacity utilization improves. To achieve this, the supply of raw fish has to improve. To raise the capacity utilization of the processing plants to 80 per cent, the following raw fish requirements have to be satisfied:

The fish meal industry depends more on tuna offal than sardinella to feed their plants. Thus, even with the tuna canneries operating at 80 per cent capacity, the offal generated would only be adequate to enable the fish meal plants to operate at 35% of their capacity, given the present tuna offal to sardinella ratio of 3:1. The fish meal producers would thus have to increase their dependence on sardinella to beef up their production . This is not only

expensive but could also deprive consumers some of their demands. The two present fish meal plants could fare better if they were incorporated into one entity and/or vertically integrated into the existing tuna canning operations.

| | Needs for current capacity utilization rate (Mt) | Needs for 80 % capacity utilization rate (Mt) |
|---|---|---|
| freezing (fresh fish) | 68 000 | 120 000 |
| curing (fresh fish) | 2 500 | 5 000 |
| canning (fresh/frozen tuna) | 30 000 | 42 000 |
| fish meal (tuna offal) | 7 500 | 24 000 |
| (sardinella) | 2 500 | 8 000 |

Overcapitalization

Overcapitalization is not only a problem in the fish meal sector but also extends to the canning and freezing plants. The production capacities of these plants far exceed the amount of raw fish producers can now supply. A revitalized fishing fleet could partly provide an answer in increasing the availability of raw material. However, regrouping or merging some of the fish processing units could provide a financially attractive alternative, at least until the raw fish supply could be augmented. Importing more raw fish would also provide an alternative although this would have to be balanced against the resulting increased export earnings in order to determine the economic feasibility of such a move.

Cost of Energy

For Senegal's fish processing industry to remain competitive, it is essential to establish a preferential industrial rate for energy utilization. Energy costs are far lower in Thailand or even closer, in Ghana enabling them to produce canned fish at a much cheaper cost than Senegal. Operations using ice are also adversely affected by the current high charges for power in Senegal.

Labor

Labor legislation in Senegal is rigid and not favorable to the fish processing industries where labor requirements are highly seasonal. Of the 6 800 people employed by the fish processing plants in 1987, more than two thirds were permanent staff despite the seasonal character of the operations. To significantly minimize expenditure in this industry, the permanent work force will have to be trimmed down in favor of seasonal labor. Labor productivity is also low, far lower than in competing countries. Socioeconomic and attitudinal factors are at play here and it will take far more skilled management practices than present ones as well as new incentive structures to bring about changes necessary for the long term viability of fish

processing (and indeed other types of ) industries in Senegal.

Obsolete Equipment

Most of the equipment utilized in the fish processing sector is obsolete and technically outdated. This has had adverse effects : energy consumption, repair and maintenance costs are excessive, labor costs continue to mount as the level of automation remains low.

### 4.2.1 Freezing

Only a few companies are actually involved in freezing despite the large number of registered firms. A typical plant that handled 2000 Mt of frozen fish products in 1987 generated FCFA 760 million in revenue. However. total costs incurred far exceeded earnings and the opera-

Table 27. COSTS AND EARNINGS FOR A FREEZING PLANT, 1987

| | |
|---|---|
| Plant Characteristics | |
| Investment (FCFA million) | 250 |
| Production Capacity (Mt/yr) | 4 500 |
| Annual Production (Mt) | 2 000 |
| Product Weight Equivalent | 100% of Fresh Wt |
| Product | Frozen Fish |
| Revenue (FCFA 1 000) | 760 000 |
| Cost of Inputs (FCFA 1 000) | 614 117 |
| Raw Fish | 480 000 |
| Electricity | 56 303 |
| Water | 9 389 |
| Packaging | 41 675 |
| Repairs & Maintenance | 10 000 |
| Insurance | 6 250 |
| Administrative Charges | 10 500 |
| Value Added | 145 883 |
| Other Costs | 196 685 |
| Salaries | 151 535 |
| Taxes | 7 600 |
| Interest | 25 050 |
| Depreciation | 12 500 |
| Net Returns | -50 802 |
| Export Subsidy | 76 000 |
| Profit | 25 199 |

Source: UNIDO Secretariat

tors nad to rely on Government subsidies to make gains. The expenditure on labor has been unusually high compared to competitors in other countries.

### Specific Constraints

Fish of Low Commercial Value

The production of high value species such as shrimp and sole has not increased lately. In fact, it has stagnated or in some cases even declined in favor of commercially less valuable fish. It is estimated that nearly 80 per cent of the trawl catch is made up of low unit value (LUV) fish. In so far as this has to do with presently employed fishing techniques, these should be adapted to target mostly high unit value (HUV) fish.

Inadequate Preparation of Finished Products

Senegalese processors are not extracting the maximum Value Added from their fish products. The European consumer demands greater preparation and better packaging than currently being offered by Senegalese fish exporters. This lost Value Added now goes to packers in the importing countries. Products like smoked fish fillets in vacuum packs, frozen fish fingers and the like that could be processed in Senegal and supplied directly to supermarket chains would without doubt generate substantial Value Added for the country. Thus, to augment the value of fish exports, it is imperative that Senegalese processors diversify their operations and sell more of their products in adequately prepared forms, emphasizing quality and packaging rather than price.

### 4.2.2 Industrial Curing

Prior to 1987, all industrial curing in Senegal was focused on dry-salting. The product was usually destined to Spanish and African markets. Industrial smoking activities are now about to commence with the installation of smoking kilns in the facilities of one of the major freezing companies.

It was discovered that an industrial fish curing operation, processing only 2 500 Mt of fish annually is not an economically viable activity if the plant is established as a separate entity. Only if such an industrial curing activity were integrated into an existing freezing plant could it be operated profitably at such a small scale. In fact, the calculations show that it could generate profits even without the present export subsidy, assuming that almost all the fixed costs and a number of the variable costs, except the major items such as raw fish and salaries, are absorbed by the freezing operation.

Table 28. COSTS AND EARNINGS FOR AN INDUSTRIAL FISH CURING PLANT, 1987

| Plant Characteristics | As Individual Plant | As Integrated into Freezing Plant |
|---|---|---|
| Investment (FCFA million) | 150 | 1 |
| Production Capacity (Mt/yr) | 1 250 | 1 250 |
| Annual Production (Mt) | 500 | 500 |
| Product Weight Equivalent. (% of Fresh Weight.) | 50 % | 50 % |
| Product | Dried-Salted | Dried-Salted |
| Revenue (FCFA 1 000) | 304 000 | 304 000 |
| Cost of Inputs (FCFA 1 000) | 251 187 | 227 361 |
| Raw Fish | 198 000 | 198 000 |
| Salt | 3 750 | 3 750 |
| Electricity | 14 076 | - |
| Water | 4 695 | 4 695 |
| Packaging | 10 416 | 10 416 |
| Repairs & Maintenance | 6 000 | - |
| Insurance | 3 750 | - |
| Administrative Charges | 10 500 | 10 500 |
| Value Added (FCFA 1 000) | 52 813 | 76 639 |
| Other Costs (FCFA 1 000) | 89 380 | 66 880 |
| Salaries | 63 840 | 63 840 |
| Taxes | 3 040 | 3 040 |
| Interest | 15 000 | - |
| Depreciation | 7 500 | - |
| Net Returns (FCFA 1 000) | -36 567 | 9 749 |
| Export Subsidy (FCFA 1 000) | 30 400 | 30 400 |
| Profit (FCFA 1 000) | -6 167 | 40 149 |

Source: UNIDO Secretariat

**Specific Constraint**

Markets

Except for the Spanish market, Senegal has not been able to successfully penetrate the European or even the Asian market where cured fish products are reportedly highly prized. Instead, Senegal's industrially produced dry-salted fish has been mostly sold in the African market where prices have been less attractive. On the other hand, the low production volume does not allow for any aggressive export strategy so the production has to expand if there is to be an active participation in the European and Asian markets.

### 4.2.3 Canning

The tuna canneries generated over FCFA 18 billion in foreign exchange in 1987 underlying the importance of this sector in the economy. Moreover, at least in nominal dollars the terms of trade appear to have improved for the Senegalese exporters (see Fig. 6 below). Despite the heavy dependence on imported inputs the Government is still keen on subsidizing this industry to keep it operational. However, for the long run, it is important to make the industry competitive and decrease its dependence on imported inputs as well as Government subvention. This is truly a daunting task given that the Senegalese canneries are now operating at 50 percent higher cost than their competitors from Thailand and the event of 1992 may well remove their favored position on French markets.

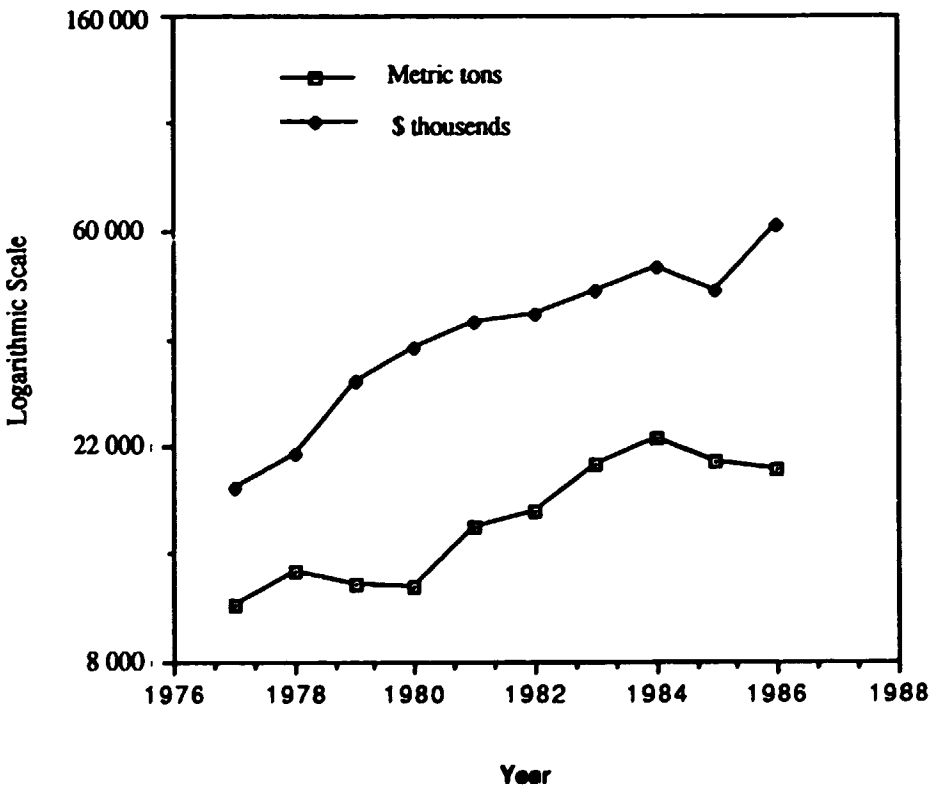


Fig. 6 Exports of canned products; value vs. volume over time

Table 29. COSTS AND EARNINGS FOR A TUNA CANNERY, 1987

| | | |
|---|---|---|
| Plant Characteristics: | | |
| Investment (FCFA million) | 780 | |
| Production Capacity (Mt/yr) | 12 000 | |
| Annual Production (mt) | 7 995 | |
| Product Weight Equivalent. (% of Fresh Weight.) | 67 % | |
| Product | Canned Tuna | |
| Revenue (FCFA 1 000) | 7 225 481 | |
| Cost of Inputs (FCFA 1 000) | 6 367 908 | *(3 264 359) |
| Raw Tuna | 4 437 225 | (2 998 125) |
| Can | 789 906 | (86 346) |
| Label | 29 981 | (9 594) |
| Oil | 503 685 | (167 895) |
| Tomato | 19 668 | (2 399) |
| Carton | 59 963 | |
| Salt | 1 200 | |
| Water | 20 435 | |
| Electricity | 25 849 | |
| Fuel and Lubrication | 43 496 | |
| Repair & Maintenance | 117 000 | |
| Insurance | 19 500 | |
| Administrative Charges | 300 000 | |
| Value Added (FCFA 1 000) | 875 573 | |
| Other Costs (FCFA 1 000) | 901 804 | |
| Salaries | 712 549 | |
| Taxes | 72 255 | |
| Interest | 78 000 | |
| Depreciation | 39 000 | |
| Net Returns (FCFA 1 000) | -44 228 | |
| Export Subsidy (FCFA 1 000) | 719 550 | |
| Profit (FCFA 1 000) | 675 322 | |

Source: UNIDO Secretariat

*Figures in parentheses indicate value of imported inputs

## Specific Constraint

### Imported Inputs

In 1987, more than two thirds of the raw tuna requirements were met through imports. On the whole, the canneries obtained more than half of their raw materials including cans, labels,

oil, tomato and cartons through imports. There are local companies which manufacture cans, oil and packaging materials but they, too, have to import most of their raw material requirements and also do not enjoy economie. of scale due to their limited production making their products expensive.

Not surprising the canneries have been looking for relatively cheaper and better quality imported inputs. However, more vertical integration between the processing and ancillary industries might prove to their mutual benefit.

### 4.2.4 Production of Fish Meal

Faced with a very limited supply of tuna offal, fish meal producers now have to compete for sardinella meant for human consumption. They are, however, finding the prices high for their operation. Thus in 1987, capacity utilization rate was only 25 per cent, the lowest in Senegal. If capacity utilization does not improve, these plants will soon produce at a loss even with the export subsidy.

All the problems enumerated above for the other parts of the processing industry apply here as well, and even much more pronounced. The plants are old and operate inefficiently - consuming more energy, frequently breaking down - and most important, have a combined capacity that could be hardly satisfied at the current fish production level.

One alternative would be to consolidate the two units into one. Also trimming the work force, saving on energy, reducing repairs and maintenance expenditure and improving the capacity utilization rate would considerably improve the financial viability of fish meal production in Senegal today.

## 4.3 Distribution and Marketing

### 4.3.1 Distribution

Fish distribution problems are acute in the artisan sector. The Government has initiated a number of programs to improve the distribution of the artisan catch but management problems have rendered these efforts fruitless. With Canadian assistance, ice making and cold storage facilities have been provided at the fresh fish markets in Rufisque, Joal and Kayar but maintenance problems have rendered them ineffective. Likewise the cold stores built in such places as Fatick, Kolda, Tambacounda, Louga, Bambey, Matam and Bakel hardly function.

Each year, substantial volumes of fish mostly from the artisan sector, are wasted through spoilage. To significantly salvage the substantial volume of fish lost annually through spoilage - a loss representing several millions of FCFA to the country- new measures have to

be effected to streamline the distribution activities.

Table 30. COSTS AND EARNINGS FOR A FISH MEAL PLANT, 1987

| | |
|---|---|
| Plant Characteristics: | |
| Investment (FCFA million) | 363 |
| Production Capacity (Mt/yr) | 3 600 |
| Annual Production (Mt) | 1 375 |
| Product Weight Equivalent. (% of Fresh Weight.) | 25 % |
| Product | Fish Meal |
| Revenue (FCFA 1 000) | 206 100 |
| Cost of Inputs (FCFA 1 000) | 103 907 |
| Tuna Offal | 30 915 |
| Sardinella | 13 740 |
| Other Ingredients | 6 000 |
| Sac | 3 435 |
| Water | 2 974 |
| Electricity | 5 288 |
| Fuel and Lubrication | 8 694 |
| Repair & Maintenance | 13 287 |
| Insurance | 9 075 |
| Administrative Charges | 10 500 |
| Value Added (FCFA 1 000) | 102 211 |
| Other Costs (FCFA 1 000) | 103 545 |
| Salaries | 47 036 |
| Taxes | 2 061 |
| Interest | 36 300 |
| Depreciation | 18 150 |
| Net Returns | -1 334 |
| Export Subsidy (FCFA 1 000) | 20 610 |
| Profit (FCFA 1 000) | 19 266 |

Source: UNIDO Secretariat

Cured fish distribution has equally become difficult partly due to the rising costs of transportation. Inland fish distribution is usually concentrated in cities and towns with good access roads. Areas with deteriorated roads usually suffer from inadequate supplies. As a consequence, a low per capita fish intake is observed in several inland towns and villages.

### 4.3.2 Marketing

The African Market

Although Senegal today has relatively strong fish trade links with its African partners, the share of the African market in the total external trade is steadily dwindling. In 1983, the African market accounted for 56 per cent of the total volume of Senegal's fish exports. This decreased to 48 per cent in 1985 and present indications are that the situation has not improved since. This is attributed largely to the near collapse of the sardinella fleet.

It should also be noted that the constantly changing trade policies in a number of fish importing countries in Africa have not been conducive to developing reliable trade relationships. Often, governments curtail fish imports as a measure to conserve foreign exchange by imposing high tariff barriers. In addition, liquidity problems have emerged lately in a number of African countries making the African market a very uncertain one.

Still, it is prudent to participate actively in this market considering the great demand potential and the proximity that allows Senegalese producers to respond to marketing opportunities swiftly and efficiently. To bring down the currently unnecessarily high transportation charges, some way has to be found to assembly larger lots for shipment.

The European Market

Senegal's fish trade with non-African countries has been gradually increasing. The trade with France has remained steady and strong absorbing nearly a third of the volume of Senegal's fish exports. In value terms, France plays an even more important role.

But, Senegalese fish exporters are not deriving the maximum benefits due to the low Value Added content of their products. The bulk of the Senegalese fish exports are whole frozen and where fish has been sold ready packed, it has been less attractive to the European consumer. To capture a greater share of this market as well as to increase the Value Added content, the products have to be processed further and presented in a more appealing form.

Another concern is a set of largely self-imposed limitations with respect to these markets. Today, Senegalese fish exporters deal with only a few importers because of traditional ties, common language, and ease in currency transaction. While such arrangement can be appropriate for small exporters; those who deal in large consignments could probably find better deals by looking at new marketing channels and altogether alternative markets.

The Japanese Market

The Japanese market has become a major outlet for Senegalese cuttlefish exports. Again,

these exporters could substantially increase their revenues if they were to process their catch into semi-finished or finished products. Now virtually all the cuttlefish are exported whole and frozen.

To maintain or improve its market share, it is essential that the Senegalese exporters emphasize quality. Japan is a major fish consuming country and a sophisticated one in its appreciating for fishery products. High quality translates into substantial price increases.

The North American Market

Senegalese fishery products hardly find their way at all to the North American markets. Current consumer trends on these markets favor lighter and healthier foods such as fish. Moreover, ready made (pre-cooked etc) meals have for a long time now found a receptive market among both individual households and institutions, offering an excellent opportunity for Senegalese producers to increase the Value Added content of their export products. Here also, as on the Japanese market, emphasis must lie on impeccable quality, large quantities, reliable deliveries, and appealing and convenient packaging. Quite possibly very attractive investment opportunities present themselves within the larger framework of such activities as they are presently fairly unexploited in Senegal.

## 4.4 Port Infrastructure

Adequate infrastructure for the handling and processing of fish is provided at the Port of Dakar. There fish is handled in a much better way than in the artisan sector. Ice is manufactured by two specialized enterprises established at the fishing harbor - one produces slab ice and the other flake ice. In addition, some individual companies also have ice making facilities to provide for their own needs. With the diminishing number of ice vessels, ice supply problems are not likely to be encountered any time soon, provided the existing facilities are well maintained.

Senegal also has adequate cold storage facilities. Only occasionally during the tuna season are the cold storage facilities fully utilized, forcing some tuna vessels to off-load in Abidjan.

Vessel repair facilities are provided at the Port although the operations are not without problems. Employee motivation is low and repair work is usually stretched over a long period of time, representing a loss to the shipowner. Besides, the quality of work usually does not measure up to the expensive charges.

Most of the large fishing companies have their own repair shops but usually refer work beyond their capabilities to the two major repair yards in the Port. One of these has facilities to handle large vessels.

## 4.5 Ancillary Industries

The weakness of the ancillary industries in Senegal have been one of the drawbacks to the full development of the fisheries sector.. A number of support services have been provided for the processing industries but hardly any for the fishing fleets. Furthermore, where they exist, they have failed to measure up to expectation.

To reduce the dependence on the importation of inputs for the canneries, plants have been established to produce cans, oil and packaging materials, among other things. Societé ELMAF-CARNAUD produces cans locally but has to import a substantial amount of its raw material making the price expensive. The canneries still import about 15 per cent of their can requirements each year.

The canneries have been receiving over two thirds of their oil supply from a local source - SONACOS - but have been importing the remaining one third. There is also one company - La ROCHETTE- that manufactures packaging materials locally. But there have been complaints about inferior products.

Locally manufactured fishing equipment, such as nets, are solely for artisan fishing. Industrial shipowners have to rely on imports to satisfy their equipment needs. Often, they do not only become expensive, but are delayed for several weeks as they have to be imported through local representatives.

## 4.6 Fisheries Legislation

### 4.6.1 Fiscal Policy

The existing tax policy has been less than favorable to the fisheries sector. When vessels unload their fresh and frozen fish for processing, they are taxed. When this processed fish are being loaded for exports markets, they are again taxed. This double taxation has raised a lot of concern among both shipowners and processors and is having a negative impact on new investment in the sector. Operators also complain about a myriad of small fiscal charges here and there that in the end add up to significant amounts that competitors in other countries do not have to put up with. Evidently the whole fiscal structure is in the need of a thorough overhaul, following a detailed, specialized study of the matter. As an interim measure, at least the off-loading activities should be excluded from tax when intended for eventual export. In general, the tendency should be towards taxing consumption rather than production to raise revenue. This would put Senegalese producers more on par with international competitors than is now the case.

### 4.6.2 Investment Tax Credit

Industrial fishing operators are obliged to make substantial investments to ensure the replacement of fishing fleets and modernization of factories. Worldwide the fisheries sector is basically export-oriented and as such often enjoy tax rebates for profit reinvested. But this is not the case in Senegal where fisheries is is regarded not as an industrial but as commercial activity.

To stimulate investment activities in this sector, it is necessary to introduce a modern investment tax credit scheme. This would facilitate efforts by shipowners and processors in expanding or modernizing their operations.

### 4.6.3 Credit

Fisheries is considered a high risk endeavor by the financial institutions in Senegal. Consequently, access to credit has become very difficult. Recognizing the need to make more credit available to the sector, the Government has put in place a number of programs for execution by both existing financial institutions and some newly created ones. Those mostly involved in fisheries include:

i. BNDS (Banque Nationale de Développement du Sénégal)
ii. SOFISEDIT (Societé Sénégalaise pour le Développement de l'Industrie et du Tourisme)
iii. CNCAS (Caisse Nationale de Crédit d'Agricole du Sénégal
iv. SONAGA (Societé Nationale de Guarantie, d'Assistance et de Crédit)
v. CEPIA (Caisse de l'Encouragement à la Pêche et à l'Industrie Animale)

The BNDS was a third co-beneficiary of a line of credit for the motorization of canoes established with the assistance of CIDA. SOFISEDIT operates an equipment loan for the artisan fish processors and distributors. In addition, this institution handles a marine credit scheme.

CNCAS was established in 1984. It is a joint venture company with the participation of two French institutions - CCCE and Credit Agricole. The foreign partners hold 20 per cent of the capital and provide direct assistance. CNCAS is responsible for providing loans to artisan fishermen and also operates a marine credit scheme. It is the third co-beneficiary of a line of credit for fishermen equipment established by the ADF under an in-shore artisan fishery development project.

SONAGA, too, operates a loan scheme for artisan fishermen. CEPIA is a special treasury account fed by contributions from the fish producers, processors and traders.

Not only have these efforts to stimulate fisheries investment by making credit readily available at reasonable terms been concentrated - for whatever reasons - in the artisan sub-sector but they have not yielded the expected results. This had led to a dependence on commercial banks for fisheries loans, especially in the industrial part of the sector. But the excessive guarantees that these institutions demand because of inadequate understanding of the sector, coupled with high financial charges, have discouraged operators in the fisheries sector from utilizing their services. The sector has thus been neglected despite its position as the leading foreign exchange earner. Clearly, it deserves a new and effective credit policy.

## 5. Development Strategies

Although the MEPS systems analysis is not a mathematical programming exercise allowing us to establish an optimum development program, its judicious use nevertheless provides a pragmatic way to arrive at a reasonable[31] program that fulfills given objectives without violating given constraints. Thus, the present analysis will proceed by imposing the Government's objective with respect to exports as foreign exchange earnings are vital for the overall economic strategy of the country. The main constraint that will be enforced is the maintaining of a sound resource balance. In choosing between alternative feasible development strategies, the impact on certain macro economic variables will be used as gages to assess the impact of alternative development strategies on these variables.

The entire analysis will be carried out in terms of 1987 actual (or estimated), non-stochastic values. Thus, "current" here refers to 1987 annual levels and the impact of the alternative strategies is measured against these levels. That is to say that the simulation of the various alternatives yields 1987 simulated values, given the modelled economic processes of 1987 and certain exogenously given target levels. The difference between 1987 actual values and 1987 simulated values then constitutes the impact in a static comparative sense. No attempt to carry out a dynamic analysis over time was made as it was assumed that such an exercise, while being both difficult and expensive, would not in the present case add significant power to discriminate between the simulated alternatives. The same assumption applies to the introduction of randomness to the data and the estimated functional relationships between variables. Undoubtedly these assumptions diminish the realism of the analyses but hopefully not the validity of the conclusions and recommendations. At any rate, present budget constraints in terms of both money and time would not allow their relaxation to any meaningful degree.

Recall that in Senegal, the Government's objectives for the fisheries sector include

i. development of a national fleet;
ii. creation of jobs;
iii. improvement in fish distribution and inland consumption; and
iv. increase the sector's positive influence on the country's trade balance.

Specifically, the 7th plan covering 1986-90 calls for an increase in fishery product exports from 100 000 Mt to 150,000 Mt, that is a 50 per cent increase. The implications of this target for the exports of various products and the fresh weight equivalents are shown in [redacted]le 31 below.

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31 "Reasonable" in the present context should be interpreted as meaning both feasible and attaining a given level of the objective (function).

All in all, 102 670 Mt of fish harvested were processed for exports in 1987. The figure 107 680 Mt in the table above results from the use of standard conversion factors between product weight and fresh weight equivalent. These same conversion factors are also used in the MEPS analyses. Moreover, it is assumed that tuna offals will continue to constitute nearly three quarters of the raw fish supply for the fish meal plants as they did in 1987 when only some 5 010 Mt of tuna offals were obtained leaving the fish meal plants to operate at very low capacity levels. The additional fresh and frozen raw fish requirements for the volume of fish product exports to expand by 50 per cent are then derived from these assumptions.

Table 31. CURRENT AND TARGET VOLUME OF FISHERY PRODUCT EXPORTS (Mt)

| | Current Level | | Target Level | |
|---|---|---|---|---|
| Product | Product Wt | Fresh Wt. Eq. | Product Wt. | Fresh Wt. Eq. |
| Fresh or Frozen | 68 000 | 68 000 | 102 000 | 102 000 |
| Cured | 1 000 | 3 000 | 1 500 | 4 500 |
| Canned | 20 000 | 30 000 | 30 000 | 45 000 |
| Fish meal | 1 670 | 6 680 | 2 505 | 10 020 |
| Total | 90 670 | 107 680 | 136 005 | 161 520 |

Source: UNIDO Secretariat

Table 32 below describes the present fisheries industrial system in terms of certain quantitative variables. Gross Output refers to market value of the production. Value added is the difference between Gross Output and the value of all inputs, plus taxes and minus subsidies. Idle capacity refers to unused installed production capacity. Employment is the total number of full time (or full time equivalent) jobs in an activity. Gross investment is the value of new capital goods required to achieve the given production goals. Net exports is the difference between export earnings and the value of necessary imported inputs. Government revenue here refers only to the net effect of a 10 per cent export subsidy minus a 1 per cent production tax amounting to, in effect, a 9 percent subsidy on the value of exports. Required financing is the amount needed to service existing and new long term debt.[32] Subsequent tables and graphs will trace the effects of the tried development strategies on these variables. Similarly, the effect on the resource balance will be estimated.

The process to derive a reasonable development strategy begins with arbitrarily choosing one possible way of fulfilling the main objective of a 50 per cent increase in exports. The strategy is then evaluated in terms of the above mentioned system variables and the effect on

[32] The interest rate on new long term debt is assumed to be 15 per cent as is usual today in Senegal, except when the effect of lowering the interest rate on profits is simulated

the resource balance. A new development strategy ... ...en designed to overcome one or more of the problems encountered with the previous alternative. The process continues until a reasonable strategy is found. In the following three such alternative strategies are presented; the results from minor trial-and-error tinkering are omitted.

Table 32 SENEGAL'S FISHERIES INDUSTRIAL SYSTEM: CURRENT ANNUAL LEVELS

| FIS Component | Gross Output | Value Added | Idle Capacity % | Employment | Gross Investment | Net Exports | Gov't Revenue | Required Financing |
|---|---|---|---|---|---|---|---|---|
| Processed: | | | | | | | | |
| Frozen | 25 840 | 4 960 | 55 | 4 200 | 0 | 25 840 | -2 326 | 1 275 |
| Canned | 18 075 | 2 146 | 43 | 2 316 | 0 | 9 834 | -1 619 | 293 |
| Reduced | 375 | 186 | 75 | 165 | 0 | 250 | -21 | 99 |
| Cured | 608 | 153 | 60 | 138 | 0 | 608 | -55 | 0 |
| Fresh: | | | | | | | | |
| Artisan fleet | 18 219 | 11 433 | 51 | 35 840 | 0 | 0 | 0 | 725 |
| Sardine fleet | 251 | 53 | 52 | 70 | 0 | 251 | 0 | 5 |
| Ice trawler fleet | 3 141 | 1 389 | 46 | 612 | 0 | 3 141 | 0 | 736 |
| Freez. trawler fl. | 18 128 | 8 268 | 46 | 2 581 | 0 | 18 128 | 0 | 4 540 |
| Freez. tuna fleet | 6 810 | 3 678 | 46 | 768 | 0 | 0 | 0 | 1 056 |
| Ice tuna fleet | 2 55 | 14 075 | 58 | 288 | 0 | 0 | 0 | 315 |
| Total | 93 997 | 33 774 | | 46 979 | 0 | 58 052 | -4 021 | 9 044 |

Note: values are in FCFA billion.
Source: UNIDO Secretariat calculations

## 5.1 Assessment of Strategies

### 5.1.1 Development Strategy I

Development Strategy I involves an across-the-board increase of 50 per cent in industrial fish production to meet the Government's objective of expanding fish exports. It is also envisaged under this strategy to increase artisan fish supply to the fish processing sector by 50 per cent.

Under Development Strategy I, tuna landings are to increase by 50 per cent translating into 4 250 Mt for the ice tuna vessels and 10 810 Mt for the freezer tuna vessels, given the present distribution between the two types of vessels. To achieve this, the tuna fishery would

require seven new, average-sized (150-250 GRT) ice vessels and 17 new average-sized freezer vessels. The artisan fleet would require twelve new canoes.[33]

Currently, in total some 30 000 Mt of tuna are landed in Senegal each year with 10 000 Mt originating from outside Senegalese waters, notably from Mauritania, Cape Verde, Gambia, Guinea Bissau and Guinea. However, even if access to these foreign waters were restricted, the country's own fishing grounds could still support an expansion of the tuna fleet.

Table 33. FISH SUPPLY TO PROCESSING PLANTS UNDER STRATEGY I

| | Supply (Mt) | | |
|---|---|---|---|
| Fishery | Current | Target | Per Cent Increase |
| INDUSTRIAL | | | |
| Tuna | | | |
| Ice Vessels | 8 500 | 12 750 | 50 |
| Freezer Vessels | 21 620 | 32 430 | 50 |
| Sub Total | 30 120 | 45 180 | 50 |
| Trawl | | | |
| Ice Trawler | 9 700 | 14 550 | 50 |
| Freezer Trawlers | 44 500 | 66 750 | 50 |
| Sub Total | 54 200 | 81 300 | 50 |
| Sardinella | 4 805 | 7 208 | 50 |
| ARTISAN | 13 545 | 20 317 | 50 |
| TOTAL | 102 670 | 154 005 | 50 |

Source: UNIDO Secretariat

The currently unused trawler capacity is large enough to accommodate the targeted increase - although it would be uneconomical to do so given their low efficiency.

The potential sardinella catch is estimated to be 130 000 Mt of which only 4 805 Mt were harvested in 1987. Thus, the industrial sardinella fishery could be an outstanding target for expansion. Indeed, this fishery could support 60 additional average-sized sardinella purse seiners each producing 2 100 Mt of small coastal pelagics annually. However, the required growth in the industrial sardinella production under Strategy I would be only 50 per cent of

33 This [12] is only the number of new canoes required to achieve the set target under the given strategy. It is, of course, marginal in comparison with the number of canoes now in use, and could be substantially larger if greater reliance were to be put on the artisan than the industrial fleet.

the current volume or 2 403 Mt which could be realized by a single new average-sized purse seiner.

The artisan sector contributes between 10 000 and 15 000 Mt of fish each year to the volume of fish processed for the export market. This includes fresh shrimp, sole and other high unit value species processed and exported as frozen fish products, and sardinella to fish meal plants for reduction.

To meet the 50 per cent expansion in volume of fish exports, the contribution from the artisan sector should reach 20 000 Mt. This would present no problem with regard to level of exploitation. However, with wood getting scarce the required expansion in canoe fleet (eleve. canoes each producing 625 Mt per year) or even maintaining the current fleet raises some concern unless other materials such as fiberglass are introduced and accepted in this fishery. In the past, attempts in this direction have been made through various technical assistance projects, but reportedly with little success. The artisan fisherman still prefers his traditional wooden canoe - albeit with a motor.

Table 34 SENEGAL'S FISHERIES INDUSTRIAL SYSTEM: ANNUAL LEVELS OF SYSTEM INDICATORS UNDER DEVELOPMENT STRATEGY I

| FIS Component | Gross Output | Value Added | Idle Capacity % | Employment | Gross Investment | Net Exports | Gov't Revenue | Required Financing |
|---|---|---|---|---|---|---|---|---|
| Processed: | | | | | | | | |
| Frozen | 38 760 | 7 725 | 32 | 6 301 | 0 | 38 760 | 3 488 | 2 125 |
| Canned | 27 113 | 3 618 | 14 | 3 474 | 0 | 14 751 | 2 429 | 488 |
| Reduced | 563 | 297 | 63 | 248 | 0 | 377 | 32 | 165 |
| Cured | 912 | 240 | 40 | 207 | 0 | 912 | 82 | 0 |
| Fresh: | | | | | | | | |
| Artisan fleet | 18 961 | 11 899 | 49 | 36 040 | 22 | 0 | 0 | 776 |
| Sardine fleet | 376 | 97 | 52 | 84 | 320 | 0 | 0 | 326 |
| Ice trawler fleet | 4 671 | 2 169 | 58 | 792 | 3 500 | 4 671 | 0 | 7 184 |
| Freez. trawler fl. | 27 167 | 13 117 | 44 | 3 535 | 21 600 | 27 167 | 0 | 26 829 |
| Freez. tuna fleet | 10 215 | 5 791 | 46 | 1 346 | 7 650 | 0 | 0 | 9 054 |
| Ice tuna fleet | 3 825 | 2 010 | 36 | 400 | 2 940 | 0 | 0 | 3 552 |
| Total | 93 997 | 33 774 | | 46 979 | 0 | 58 052 | 4 021 | 9 044 |

Note: values are in FCFA billion.
Source: UNIDO Secretariat calculations

Table 35. IMPLICATION OF STRATEGY I ON FISHERY RESOURCES

| Fishery | Potential Catch (Mt) | Current Catch (Mt) | Targeted Catch (Mt) | Per Cent Exploited |
|---|---|---|---|---|
| Industrial: | | | | |
| Tuna | 30 000 | 30 120 | 45 180 | |
| of which caught in Senegalese waters | | 20,000 | 30,000 | 100.0 |
| Demersals | 105 000 | 54 327 | 81 300 | 77.4 |
| of which Shrimp | 8 000 | 6 353 | 9 530 | 119.1 |
| Coastal Pelagics | 130 000 | 4 805 | 7 208 | 5.5 |
| of which Sardinella | 90 000 | 4 414 | 6 621 | 7.4 |
| Artisan: | 220 000 | 171 805 | 178 880 | 81.3 |

Source: UNIDO Secretariat

Tables 33 and 34 above assess the implications of Development Strategy I on certain system variables and on the resource balance. Capacity utilization remains low on the average within fishery system components even where new investment is envisioned because the current slack is uneconomic to use. In other words, there would be a mix of fully utilized new equipment and little used old capacity. On the resource side, it can be seen that while only about one half of the exploitable demersal resources are currently being harvested, the intensity of catch varies from species to species. Shrimp resources in particular are heavily exploited. Thus, the required increase in trawl catch from 54 300 Mt to 81 300 Mt under Strategy I could easily lead to shrimp resources being well over-exploited.

Thus while Development Strategy I is feasible, it is not particularly desirable. A more prudent way to achieve the goal of expanding volume of exports would be to increase the utilization of the now largely untapped small pelagic potential. This would ensure a rational utilization of resources that would enable Senegal to maximize the benefits from its fishery resources over time.

### 5.1.2 Development Strategy II

An alternative strategy to achieve the goal of increasing fish exports would be to maintain the 50 per cent growth in tuna landings as well as the 50 per cent increase in the artisan fish supply to the processing plants but the expansion in trawl catch is to be set at 25 per cent with the industrial sardinella fishery taking up the extra tonnage required.

Table 36. FISH SUPPLY TO PROCESSING PLANTS UNDER STRATEGY II

| Fishery | Supply (Mt) Current | Target | Per Cent Increase |
|---|---|---|---|
| INDUSTRIAL | | | |
| Tuna | | | |
| Ice Vessels | 8 500 | 12 750 | 50 |
| Freezer Vessels | 21 620 | 32 430 | 50 |
| Sub Total | 30 120 | 45 180 | 50 |
| Trawl | | | |
| Ice Trawler | 9 700 | 12 125 | 25 |
| Freezer Trawlers | 44 500 | 55 625 | 25 |
| Sub Total | 54 200 | 67 750 | 25 |
| Sardinella | 4 805 | 20 758 | 332 |
| ARTISAN | 13 545 | 20 317 | 50 |
| TOTAL | 102 670 | 154 005 | 50 |

Source: UNIDO Secretariat

If the current volume of trawl catch is to expand by 25 per cent, then an additional 13 550 Mt of fish would be needed - 2 425 Mt for the ice trawlers and 11 125 Mt for the freezer trawlers, given the present distribution between these two types of vessels. This calls for an addition of 5 new average-sized ice trawlers and 26 new freezer trawlers. The required increases in the tuna and artisan fleets would of course remain the same as under Development Strategy I. Average capacity utilization rates would again remain low because of the under utilization of current equipment for economic reasons.

To obtain the required 154 005 Mt of fish for the processing plants, industrial sardinella catch should increase from the current 4 805 Mt to 20 760 Mt, a growth of 332%. This would require eight new average-sized sardinella purse seiners each producing some 2 100 Mt of fish annually.

Although an economic analysis of the operation of freezer sardinella purse seiners based on 1987 data could not be undertaken since the sardinella vessels then operating were all ice purse seiners, it is believed that not only will freezer sardinella purse seiners enable the operators to explore distant and richer fishing grounds, but also the frozen fish would command higher prices. Thus, investment in freezer purse seiners should be encouraged.

Table 37 SENEGAL'S FISHERIES INDUSTRIAL SYSTEM: ANNUAL LEVELS OF SYSTEM INDICATORS UNDER DEVELOPMENT STRATEGY II

| FIS Component | Gross Output | Value Added | Idle Capacity | Employment | Gross Investment | Net Exports | Gov't Revenue | Required Financing |
|---|---|---|---|---|---|---|---|---|
| Processed: | | | % | | | | | |
| Frozen | 38 760 | 7 725 | 32 | 6 301 | 0 | 38 760 | 3 488 | 2 125 |
| Canned | 27 113 | 3 618 | 14 | 3 474 | 0 | 14 751 | 2 429 | 488 |
| Reduced | 563 | 297 | 63 | 248 | 0 | 377 | 32 | 165 |
| Cured | 912 | 240 | 40 | 207 | 0 | 912 | 82 | 0 |
| Fresh: | | | | | | | | |
| Artisan fleet | 18 961 | 11 899 | 49 | 36 040 | 22 | 0 | 0 | 776 |
| Sardine fleet | 1 068 | 337 | 49 | 230 | 2 560 | 1 068 | 0 | 2 573 |
| Ice trawler fleet | 3 892 | 1 771 | 39 | 702 | 1 750 | 3 892 | 0 | 2 762 |
| Freez. trawler fl. | 22 639 | 10 738 | 38 | 3 049 | 9 360 | 22 639 | 0 | 14 249 |
| Freez. tuna fleet | 10 215 | 5 791 | 46 | 1 346 | 7 650 | 0 | 0 | 9 054 |
| Ice tuna fleet | 3 825 | 2 010 | 36 | 400 | 2 940 | 0 | 0 | 3 552 |
| Total | 127 948 | 44 427 | | 51 997 | 24 282 | 82 399 | 6 031 | 35 744 |

Note: values are in FCFA billion.
Source: UNIDO Secretariat calculations

Table 38. IMPLICATION OF STRATEGY II ON FISHERY RESOURCES

| Fishery | Potential Catch (Mt) | Current Catch (Mt) | Targeted Catch (Mt) | Per Cent Exploited |
|---|---|---|---|---|
| Industrial: | | | | |
| Tuna | 30 000 | 30 120 | 45 180 | |
| of which caught in Senegalese waters | | 20 000 | 30 000 | 100.0 |
| Demersals | 105 000 | 54 327 | 67 750 | 64.5 |
| of which Shrimp | 8 000 | 6 353 | 7 941 | 99.3 |
| Coastal Pelagics | 130 000 | 4 805 | 20 758 | 16.0 |
| of which Sardinella | 90 000 | 4 414 | 19 068 | 21.2 |
| Artisan: | 220 000 | 171 805 | 178 880 | 81.3 |

Source: UNIDO Secretariat

As can be seen from Table 38, under Development Strategy II, problems with over-exploitation of some demersal species could be avoided. However, it should be noted that both the tuna and shrimp resources would be at the brink of being over-exploited under this arrangement. Therefore, the strategy would have to be complemented by efficient management in order to maintain resource balance in the long run. Moreover, it is apparent that the sardinella fishery has more room for expansion with only a 16 per cent rate of exploitation.

### 5.1.3 Development Strategy III

Building upon the previous two development strategies and taking into account the relative profitability of the various types of vessels, the objective of increasing the volume of exports by 50 per cent while maintaining a good resource balance calls for the following optimal expansion of the fishing fleet:

| | |
|---|---|
| tuna fishery | 7 new ice vessels; |
| | 17 new freezer vessels; |
| trawl fishery | 5 new ice vessels; |
| | 26 new freezer vessels; |
| sardinella fishery | 8 new sardinella purse seiners; |
| artisan fishery | 12 canoes. |

The utilization rate of many of the current, old vessels would remain low as they are either right-out unprofitable under current financial conditions or their profitability is low compared to new equipment. But, in addition to expanding the fishing fleet in an optimal way, Development Strategy III incorporates the Government objective of building up the national fleet as well as to create domestic jobs. Essentially, this calls for the build-up of a national tuna fleet in order to minimize the dependence on raw tuna imports.

To maximize the positive impact on Senegal's trade balance, it is essential that the new vessels are operated by Senegalese owners. Recall that today, more than one half of the local canneries' raw tuna requirements are met through imports, representing an outlay of FCFA 7.5 billion in foreign exchange in 1987. Table 39 above presents the impact on the system indicators as in the case of the other development strategies. Table 40 below focuses on the trade impact of developing a national tuna fleet.

It should be noted that the Government tried to encourage the build-up of a national tuna fleet in 1981 with the liquidation of SOSAP and the selling of its tuna vessels to local entrepreneurs. However, the plan failed to yield the desired results due to difficult access to credit, high interest charges, and lack of skilled crews. As these difficulties remain today, their resolution is a necessary condition for the successful implementation of Development Strategy III.

Table 39 SENEGAL'S FISHERIES INDUSTRIAL SYSTEM: ANNUAL LEVELS OF SYSTEM INDICATORS UNDER DEVELOPMENT STRATEGY III

| FIS Component | Gross Output | Value Added | Idle Capacity | Employment | Gross Investment | Net Exports | Gov't Revenue | Required Financing |
|---|---|---|---|---|---|---|---|---|
| Processed: | | | % | | | | | |
| Frozen | 38 760 | 7 725 | 32 | 6 301 | 0 | 38 760 | 3 488 | 2 125 |
| Canned | 27 113 | 3 618 | 14 | 3 474 | 0 | 26 001 | 2 429 | 488 |
| Reduced | 563 | 297 | 63 | 248 | 0 | 377 | 32 | 165 |
| Cured | 912 | 240 | 40 | 207 | 0 | 912 | 82 | 0 |
| Fresh: | | | | | | | | |
| Artisan fleet | 18 961 | 11 899 | 49 | 36 040 | 22 | 0 | 0 | 776 |
| Sardine fleet | 1 068 | 337 | 49 | 230 | 2 560 | 1 068 | 0 | 2 573 |
| Ice trawler fleet | 3 892 | 1 771 | 39 | 702 | 1 750 | 3 892 | 0 | 2 762 |
| Freez. trawler fl. | 22 639 | 10 738 | 38 | 3 049 | 9 360 | 22 639 | 0 | 14 249 |
| Freez. tuna fleet | 10 215 | 5 791 | 46 | 1 346 | 7 650 | 0 | 0 | 9 054 |
| Ice tuna fleet | 3 825 | 2 010 | 36 | 400 | 2 940 | 0 | 0 | 3 552 |
| Total | 127 948 | 44 877 | | 51 997 | 24 282 | 93 649 | 6 031 | 35 744 |

Note: values are in FCFA billion.
Source: UNIDO Secretariat calculations

Table 40. FISH TRADE BALANCE WITH AND WITHOUT A DEVELOPED NATIONAL TUNA FLEET, FCFA million

| | Exports | | Imports | | Net Exports | |
|---|---|---|---|---|---|---|
| Product | with | without | with | without | with | without |
| Frozen Fish | 38 760 | 25 840 | 0 | 0 | 38 760 | 25 840 |
| Cured Fish | 912 | 608 | 0 | 0 | 912 | 608 |
| Canned Fish | 27 000 | 18 000 | 999 | 8 166 | 26 001 | 9 834 |
| Fish meal | 377 | 250 | 0 | 0 | 377 | 250 |
| Total | 67 049 | 44 698 | 999 | 8 166 | 66 050 | 36 532 |

Source: UNIDO Secretariat

## 5.2 Preferred Strategy

Although there clearly are many possible strategies for achieving the Government objectives, neither time nor other resources have permitted UNIDO to test more than the above three

alternatives. Among these, Development Strategy III is clearly the preferable one as it has been developed specifically in response to one or another defect found in the previously tested strategies. This is also evident from the following table and graphs. In the sequel therefore we will refer to Development Strategy III as the preferred one.

Table 41 SENEGAL'S FISHERIES INDUSTRIAL SYSTEM: COMPARISON BETWEEN CURRENT SITUATION AND ALTERNATIVE DEVELOPMENT STRATEGIES

| Alternative | Gross Output | Value Added | Idle Capacity | Employment | Gross Investment | Net Exports | Required Financing |
|---|---|---|---|---|---|---|---|
| Present Situation | 53 997 | 33 774 | 51 | 46 979 | 0 | 58 052 | 9 044 |
| Strategy I | 132 563 | 46 964 | 36 | 52 427 | 36 032 | 86 638 | 50 499 |
| Strategy II | 127 948 | 44 427 | 42 | 51 997 | 24 282 | 82 399 | 35 744 |
| Strategy III | 127 948 | 44 877 | 42 | 51 997 | 24 282 | 93 649 | 35 744 |

Note: values are in FCFA billion, except Idle Capacity that is in per cent.
Source: UNIDO Secretariat

To recap, the preferred strategy calls for a selective expansion in the fishing fleet as well as the development of a national tuna fleet. To implement this strategy, certain policy changes to encourage national ownership and operation of an expanded tuna fleet and some FCFA 24.3 billion or US $ 75 million in new investments will be required (see Table 42 for details). This does not include capital requirements that might become necessary if processing plants are to be rehabilitated and retooled to operate more efficiently.

Table 42. REQUIRED NEW INVESTMENT IN VESSELS, FCFA million

| Type of Vessels | Required Number of Vessels | Required Investment FCFA Million |
|---|---|---|
| Ice Tuna Vessel | 7 | 2 940.0 |
| Freezer Tuna Vessel | 17 | 7 650.0 |
| Ice Trawler | 5 | 1 750.0 |
| Freezer Trawler | 26 | 9 360.0 |
| Sardinella Purse Seiner | 8 | 2 560.0 |
| Canoe | 12 | 21.6 |
| Total | | 24 281.6 |

Source: UNIDO Secretariat

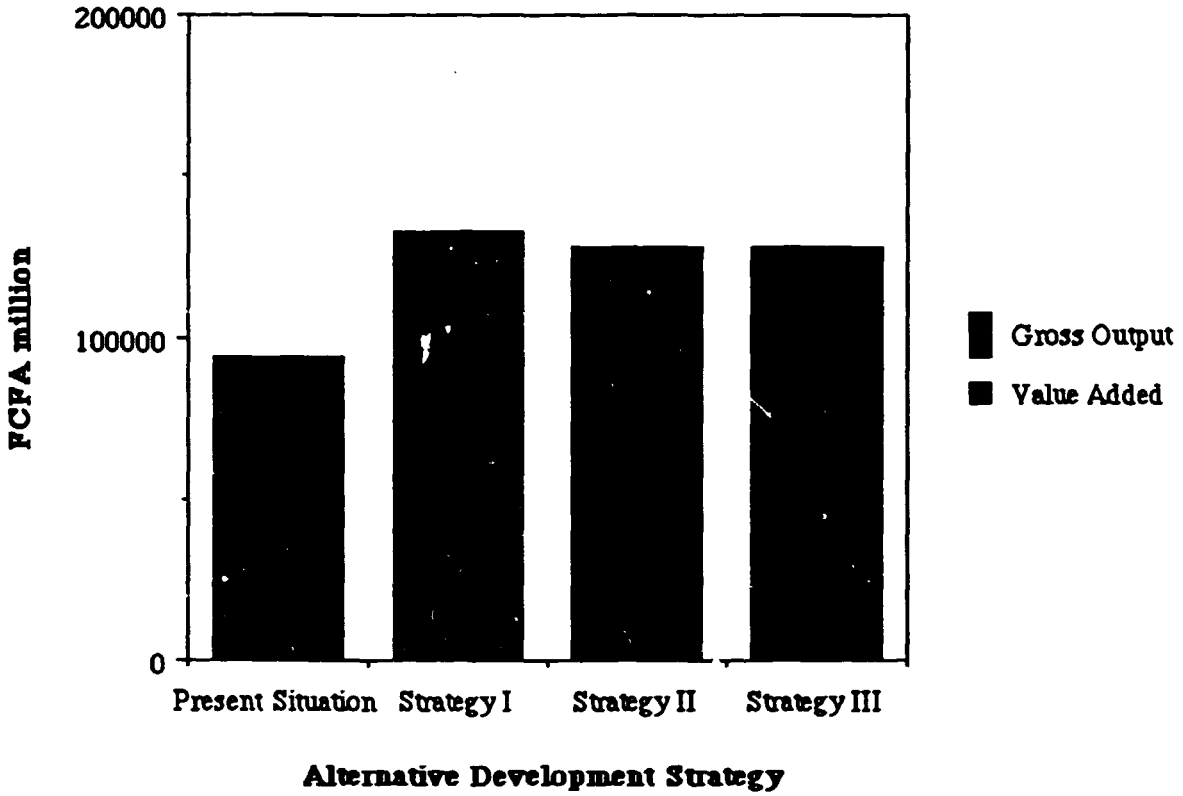


Fig. 7 Value Added in Gross Output by Alternative Development Strategy

Although Gross Output, Value Added - and employment - would increase under Development Strategy I more than under the other tested strategies (see Fig. 7), the gains per unit of investment would be significantly less (see Fig. 8 and Fig 9). And, in a country where investment capital is so scarce as in Senegal, efficiency in investment is extremely important.

Strategies II and III yield the same total Gross Output but the latter alternative is marginally better in terms of a higher Value Added accruing to Senegal (see Fig 7) because of the emphasis on a national tuna fleet.

The benefits that could accrue from restructuring the sector could be tremendous. The Preferred Strategy if successfully implemented, would substantially improve the performance of the fishing industry. For example, fish and fish products worth some FCFA 94 billion were produced in 1987 by the country's artisan fishermen and industrial fishing vessel operators. This could increase to FCFA 128 billion per annum under the new development scheme. The impact in the processing sector could be even more remarkable and the analysis shows that the target of a 50% growth in foreign exchange earnings is attainable.

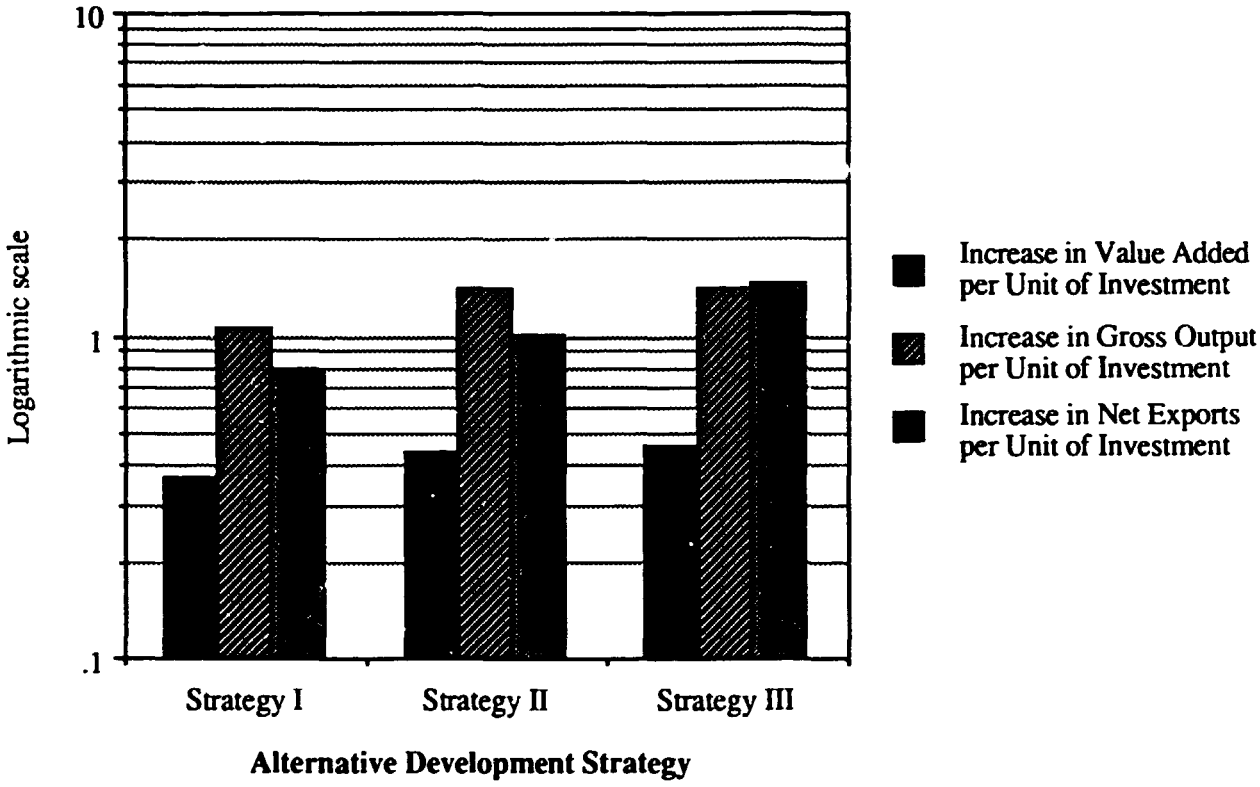


Fig. 8 Increases in Value Added, Gross Output and Net Exports per Unit of Investment

The relative efficiency of the Preferred Strategy is evident in Fig. 8 and Fig 9. The pay-off of new investment in terms of additional net exports (exports minus imports) and Value Added are particularly noteworthy.

Employment in the fisheries sector would receive a moderate boost under all tested alternative development strategies (see Table 40 above). Value Added per employee would be larger under Development Strategy I than under the other strategies (see Fig. 10). The Preferred Strategy would add a further 5 000 people to the existing labor force directly employed in the fishery sector, a growth of 11 per cent. Note that the impact on employment would be much more pronounced if the multiplier effect on such related activities as fish handling and distribution were also considered.

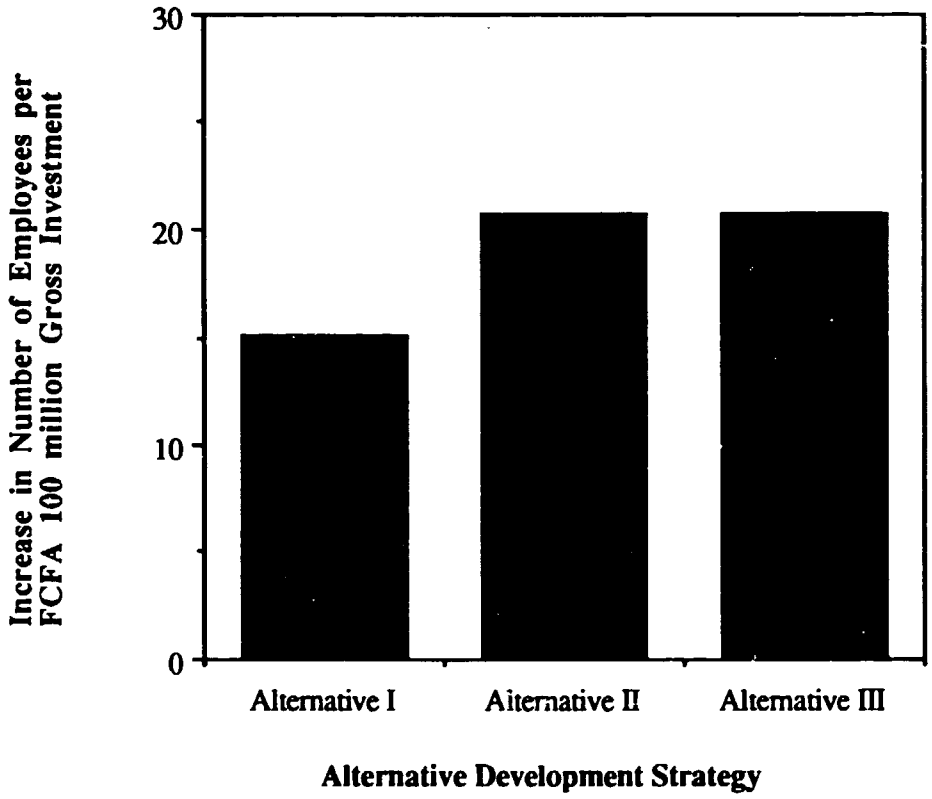


Fig. 9. Investment Generated New Employment

Substantial savings could be derived from developing a national tuna fleet and minimizing the dependence on imported raw tuna. In 1987, the three canneries together exported some FCFA 18 billion worth of canned fish but had to spend FCFA 8.2 billion on imported inputs leaving a balance of FCFA 9.8 billion in net export earnings. If the country itself were to provide its own raw tuna requirements, there would be a tremendous improvement in foreign exchange earnings. If the volume of exports is expanded by 50 per cent, the three canneries could generate some FCFA 27 billion. Of this, costs of imported inputs such as cans, oil, packaging materials and tomato would represent less than FCFA 1 billion. The Preferred Strategy is again the most efficient in terms of generated net exports per unit of new investment.

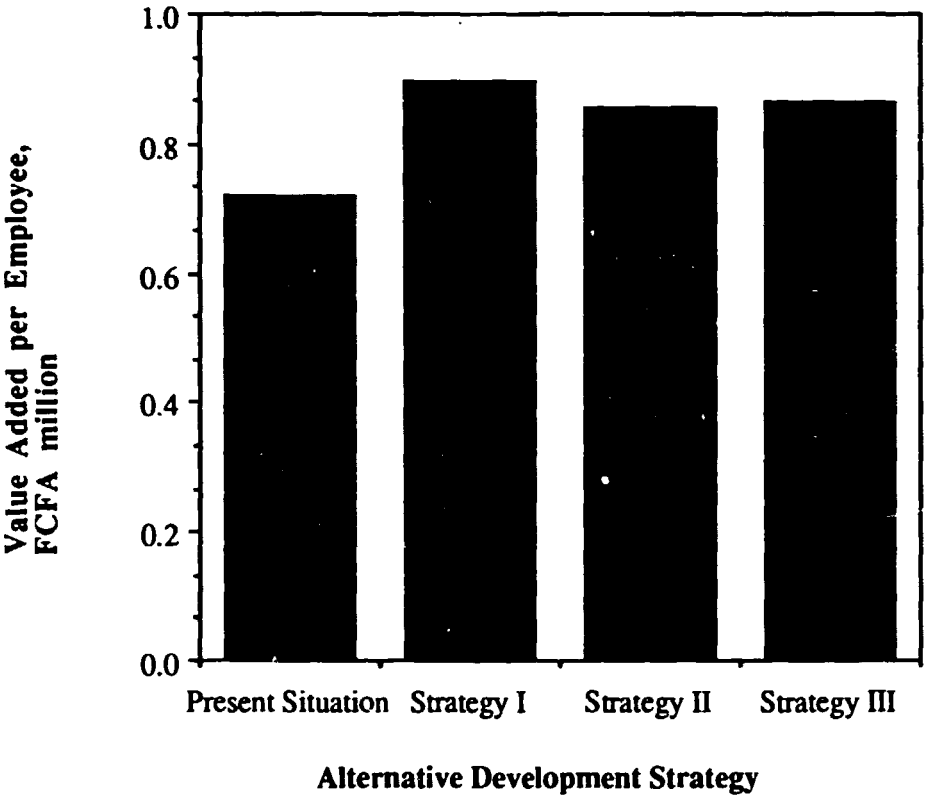


Fig. 10. Value Added per Employee

Capacity utilization would also greatly improve for most of the processing activities (see Fig. 11 below that shows the weighted average capacity utilization in all fishing activities and all industrial fishery processing, respectively). The only activity which would operate at substantially less than its installed capacity is the production of fish meal. There are not simply enough tuna offals to feed the existing two fish meal plants and it would not be economical to substitute sardinella that can fetch higher prices when destined for human consumption. Other alternative sources of raw material such as imports would not be economical. Therefore it appears best to reduce the installed capacity to enable this activity to be carried out in a profitable manner. Further study is necessary to determine alternative uses of the excess capacity.

Table 41 below details the quantified impact of the preferred development strategy on certain system performance indicators. These are rough estimates based upon the MEPS analysis and they do not consider uncertainties in the empirical data. It should also be noted that indirect effects are not explicitly considered in these estimates.

Table 43. IMPACT OF PREFERRED STRATEGY ON SENEGAL'S FISHERIES

| Activity | Production (FCFA Million) Current | Production (FCFA Million) Anticipated | Employment Current | Employment Anticipated |
|---|---|---|---|---|
| Fishing Operation | | | | |
| Tuna Fishery | 9 360 | 14 040 | 1 056 | 1 746 |
| Trawl Fishery | 21 269 | 26 531 | 3 193 | 3 751 |
| Sardinella Fishery | 251 | 1 068 | 70 | 230 |
| Artisan Fishery | 18 219 | 18 961 | 35 840 | 36 040 |
| Total | 49 099 | 60 600 | 40 159 | 41 767 |
| Processing | | | | |
| Freezing | 25 840 | 38 760 | 4 200 | 6 301 |
| Curing | 608 | 912 | 138 | 207 |
| Canning | 18 075 | 27 113 | 2 316 | 3 474 |
| Reduction | 375 | 563 | 165 | 248 |
| Total | 44 898 | 67 348 | 46 979 | 51 997 |

| | Net Exports (FCFA Million) Current | Net Exports (FCFA Million) Anticipated | Capacity Utilization (%) Current | Capacity Utilization (%) Anticipated |
|---|---|---|---|---|
| Processing | | | | |
| Freezing | 25 840 | 38 760 | 45.3 | 68.0 |
| Curing | 608 | 912 | 40.0 | 60.0 |
| Canning | 9 834 | 26 001 | 57.1 | 85.7 |
| Reduction | 250 | 377 | 25.0 | 37.5 |
| Total | 36 532 | 66 050 | 46.3 | 69.5 |

Source: UNIDO Secretariat

The impact of the Preferred Strategy is measured in terms of the differences between current levels and those that would be expected to prevail once the strategy had been fully implemented. The emphasis is, as can clearly be seen from the table, on increasing the freezing and canning operations - and the fishing activities feeding these plants - because of their high export earnings potential. The employment effects are probably overstated as they assume no increase in labor productivity. However, with certain policy and management changes (see Chapter 6) the anticipated levels of output ought to be achievable with considerable less labor than foreseen in Table 41 above.

The capacity utilization rates are based on production levels required to reach the goal of a 50 per cent increase in export earnings. However, given adequate markets, or in the case of reduction (fish meal) more tuna offal as raw material, these rates could easily go even higher.

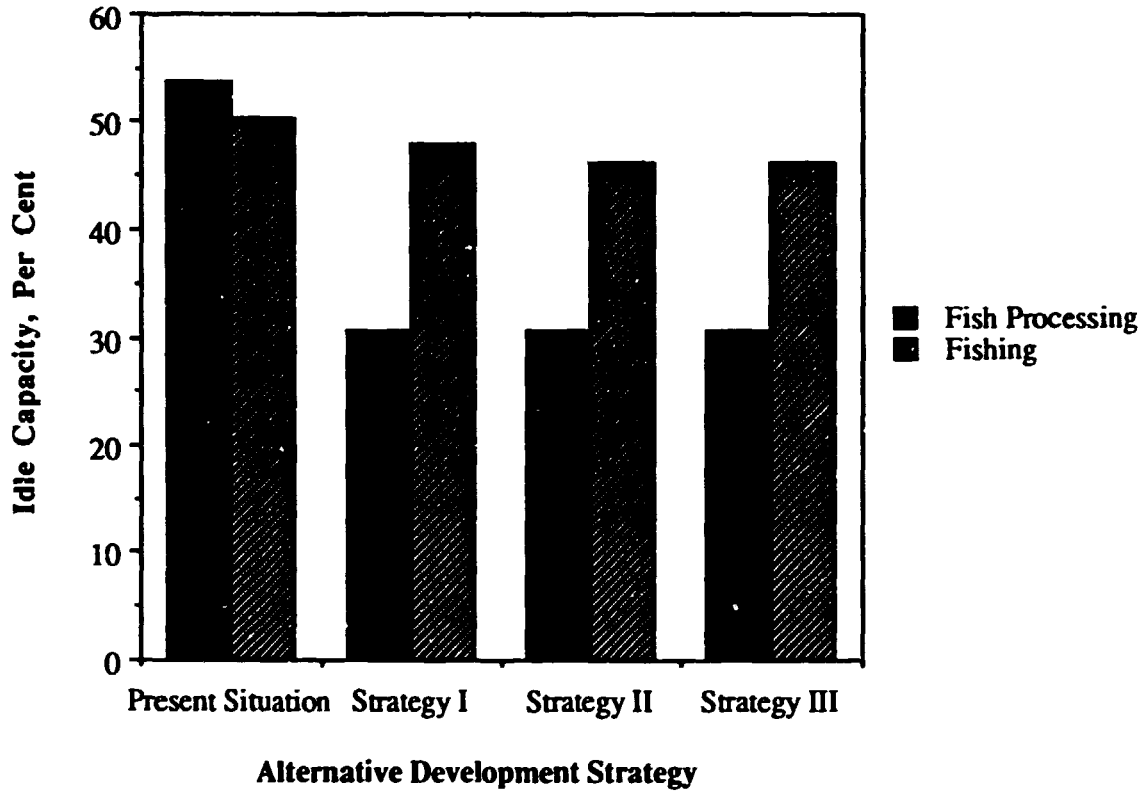


Fig. 11. Idle Capacity in Fish Processing and Fishing

The implementation of the preferred strategy must be supported by a substantial increase in the level of processing. Right now Senegalese exporters fail to exploit fully the potential export markets. Value Added is unnecessary low due to the low level of processing of final products - most of the exports are in simple frozen or fresh form. Indeed, Senegalese fish exports now often are re-processed or re-packaged in Europe for ultimate sale to supermarket and restaurant chains. Senegal can transfer much of the so generated income to itself if such further processing or packaging is accomplished locally.

But to maximize fish export earnings, it is also essential that completely new, high Value Added products are developed and a well coordinated marketing strategy embarked upon, targeting European supermarket and restaurant chains, untapped North American markets as well as traditional African market. The exact specifics - what products, which marketing strategy, and how much to invest (scale of operations) - can only be determined through detailed market studies.

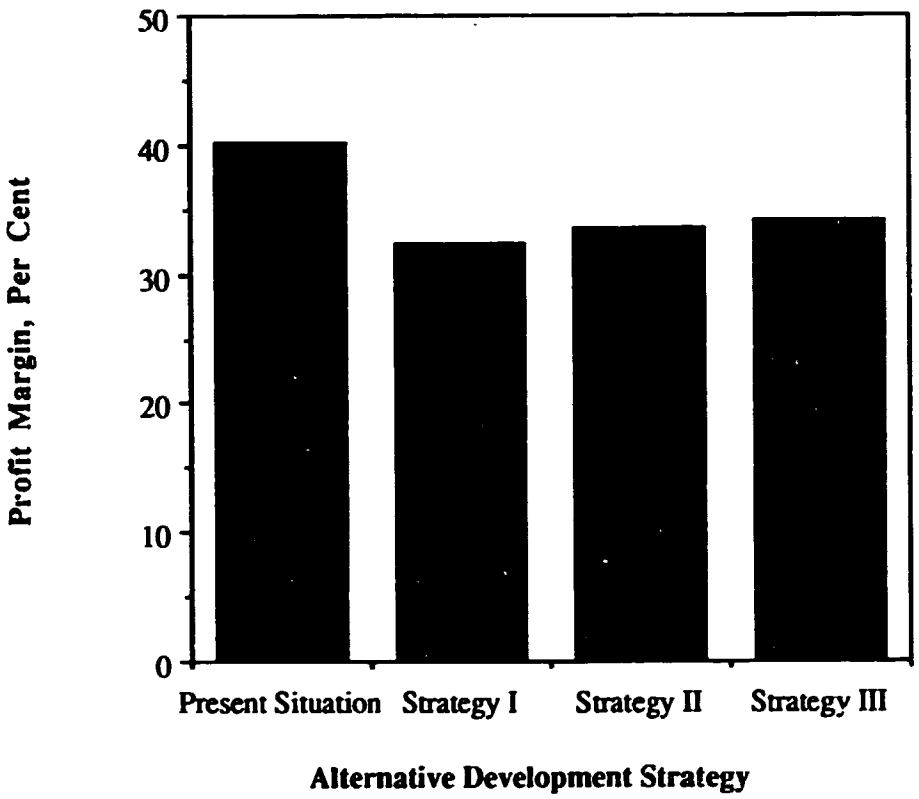


Fig. 12. Average Profit Margins

Profit margins would not under any of the tested development strategies be quite as high as presently (see Fig. 12) but would nonetheless seem to be quite acceptable by international standards. Furthermore, an improvement in labor productivity and/or a lowering of present interest rates would have a direct bearing on profits.

# 6. Design of A Support Program

Following the MEPS philosophy, a proper support program for any industrial branch consists of policy recommendations, investment activities, and technical assistance projects. These all are derived - as often as possible in a quantitative way within the MEPS model framework - from the Preferred Strategy and the identified constraints.[34] Most paramount, it is necessary to implement all the projects jointly in a harmonious way in order to have a balanced and integrated development program for the production system in question. Only then can a country hope to reap maximum national benefits from a given resource-production-consumption situation.

## 6.1 Policy Recommendations

In the following a number of policy recommendations are made for the consideration of the Senegalese authorities. Some are developed to some detail whereas others rest more at a concept stage. All the recommended policies are accompanied by certain main arguments. The full supporting analysis and underlying facts, however, are to be found in the previous text under appropriate headings. The policies are not presented in any particular order but we do want to reiterate that they or equivalent policies must really all, together with the derived investment actions and technical assistance projects, be implemented in order to maximize the benefits to the Senegal people from their considerable fishery resources, skills and already sunk capital in the fishing fleets and the rest of the fisheries industrial and artisan systems.

UNIDO is not insensitive to the fact that the implementation of policy measures normally entails certain costs as well. These must be weighted against the achievable benefits taking into account adjustments that can be made in order to mitigate negative impacts. Sectorial measures and sub-targets can also be conflicting especially when exogeneous factors such as national goals are considered. Such dissonance must be resolved through comprehensive policy analysis in order to arrive at a final harmonized policy package.

Present Government policies that either directly or indirectly affect the fisheries industrial system are so numerous and uncoordinated that the net appearance is that of no (coherent) policy at all. Revisions are necessary in the following areas:

- Privatization;
- Interest charges;
- Investment incentives and subsidies;
- Surveillance;
- Taxes, fiscal charges, and fuel, electricity, and water rates;

[34] The system-wide implications of the individual projects as well as the entire program could be quantitatively assessed within the MEPS framework. This has not been done here because of financial and time constraints.

- Labor code;
- Fishing treaties; and
- The FCFA

**Privatization**

The Government's current policy of disinvestment from the productive sector is good but it needs to be supplemented by measures to ensure that prospective investors from the private sector have the financial means to take over. Financing at reasonable terms is now sorely lacking in many instances, especially within the fisheries industrial system. A State supported but industry managed export credit guarantee[35] or insurance scheme as already suggested by GAIPES would seem to be one possibility worth investigation by a financial expert.[36]

**Interest Charges**

One of the major obstacles to expansion and modernization of the fishing fleet as well as the fish processing plants has been high interest charges. With the collapse of marine credit schemes introduced by the Government as well as external aid agencies, Senegalese fish producers and processors are now compelled to obtain loans from the commercial banks who view investment in fishing operations as entailing high risk.

Not only has access to these loans become difficult, but also interest rates of 15 per cent or more are often demanded. This is considerably higher than in other countries where fishing investment often are subsidized. Furthermore, because of the seasonality of the fishing operations, liquidity problems at critical stages can have dire consequences not only for the efficient use of capacity in the processing plants but also for maintaining confidence among suppliers and buyers. If Senegalese fishing operators are to remain competitive with their French, Spanish and Italian counterparts who fish in the region, access to credit as well as repayment conditions should be eased. Terms of loans should also be compatible with the seasonal demand for cash. Investment tax credit is another policy tool that could be utilized to ease the current investment problems.

We must stress that that the current high cost of capital for the operators in the fisheries industrial system is not only for the Government to solve through its policies and other measures. The operators themselves can significantly affect the final cost of especially

35 For main considerations in operating an export credit insurance agency, see "Export Credit Insurance: Key Factors for Successful Operations," Forum No 2/1988, International Trade Centre UNCTAD/GATT, Geneva, Switzerland

36 See Reunion Sectorielle sur la Pêche Maritime (Dakar, 29-30 October 1986), Document Final. Secrétariat d'Etat aux Ressources Animales, Ministère du Développement Rural, République du Sénégal, Dakar, Nov 1986, p. 18 -19

working capital. The proper coordination of stocks and operations and the proper scheduling of purchases and processing minimizes a plant's requirements for working capital. For example, shipping charges for large regular shipments can be significantly lower than for irregular ones resulting from erratic production; moreover, such shipments may be delayed or accommodated only on a space—available basis only leading to further real costs. All this requires an intimate knowledge of processes and materials flows, especially since raw fish is a perishable product, as well as expertise in modern business management.

Sardinella operators are worst hit by the credit problems. The MEPS analysis has shown that Sardinella purse seiners can operate profitably at interest rates of 13.5 per cent or less.

## Investment incentives and subsidies

Senegal's fisheries industrial system is for most parts badly in need of investment in new but not additional equipment. For the Government it is crucial to understand that it is the political and economic conditions much more than incentives that draws investors to one country rather than another. Investment stimulants alone cannot compensate for the lack of a policy environment that allows entrepreneurs and investors the freedom to make their own crucial business decisions. Many studies in different parts of the world have shown that tax holidays, for example, have a fairly small impact on location decisions and that governments may be giving up revenue unnecessarily by offering such incentives.[37] More effective are policies that reduce restriction on the share of ownership that is permitted to foreign investors.

Protection and subsidies may be financially attractive to individual companies but frequently they turn out to be less favorable in the long run for the nation as a whole. Thus, for example, an open trade regime attracts investment in economically sound projects rather than in ventures that offer artificially high financial profits behind protective barriers, to the detriment of consumers.

Clearly, however, there must be a multilateral and coordinated program among the countries of the region to eliminate unnecessary and uneconomic incentives. Otherwise individual countries cannot unilaterally dismantle them without risking losing investments to other countries who persist in providing such incentives.

The production capacities of the Senegalese fish processing industry, particularly the fish meal plants, far exceed the amount of fish producers can or are willing to supply. Part of the solution could come from a revitalized fishing operation to increase the availability of raw material. To the extent that more supply is not forthcoming, excess capacity particularly in the fish meal industry should be converted to the production of other goods such as smoked

37 David Goldsbrough, "Foreign direct investment in developing countries," Finance & Development, Mar 1985, p. 33; see also Investeringar i företag — analys och intervjuer (Investment in enterprises — analysis and interviews), Statens Industriverk, SIND, 1983:5, Göteborg, Sweden

products by the curing plants or fish sausage by the freezing plants. Such conversions should be encouraged. But issuing licenses for the installation of additional plants should be discouraged.

The incentives for shrimp capture have been removed as the resources are already over-exploited or nearly so. The same goes for squid although the catch in Senegal is small and it is difficult to ascertain the degree of exploitation because of great variability in the supply.

### Surveillance

The exploitation of shrimp resources has intensified lately in both the artisan and industrial sectors. Other High Unit Value species are equally being actively harvested. Of particular concern has been the heavy exploitation - indeed over-exploitation - of cuttlefish by foreign vessels.

Thus there is a need to monitor and control the operations of foreign flag trawlers in order to curtail overfishing in Senegal's EEZ. Incursions by industrial vessels into the artisan zone should also be controlled to ensure that the coastal fish stocks are not harmed as well as safeguard the viability of the artisan fishery.

The task of surveillance (as well as the larger question of protection of natural resources in general) should be entrusted to a new Governmental agency.[38] This Agency would be in charge of the issuance of fishing licenses, surveillance and upholding of the Fishing Code (net sizes, zones, etc.) and Treaties, and the monitoring of catches to ensure that MSYs are not exceed.

In organizing the surveillance, careful attention should be given to the fact that the deterrent effect of any such system equals the probability of getting caught times its financial consequences. Thus, whereas increasing the probability of catching violators beyond a certain point may prove very costly (indeed uneconomic), fines can be set sufficiently high to create a real deterrent effect without incurring unreasonable own costs. The acceptance and legal validity of the surveillance system, especially with respect to foreign operators, should be made part and parcel of the fishing license itself.

### Fishing Treaties

Due to the high migratory characteristics of the tuna resources, it is essential that Senegalese tuna fleet fish in the waters of their neighbors. The fishing treaties, however, have been

[38] It could be called Direction de la Protection et de la Surveillance and, given its national importance and inter-sectoral domain, be located in the President's Office. The Minister for Animal Resources has made the suggestion that, rather than creating a totally new State Agency, it would be preferable to strengthen existing ones charged with the task of surveillance.

biased in favor of outside parties. Senegalese tuna operators fishing in Mauritania are reportedly paying three times what their Mauritanian counterparts would be paying for fishing in Senegal.[39] The tuna fishing treaty with Guinea is also biased but to a lesser degree.

The present fishing treaties, therefore, ought to be renegotiated to put Senegalese operators on a more equal footing with their competitors. The revenue implications must be investigated in order to determine whether it would be possible to substantially reduce the present license fees and thus lower the total costs of operating a fishing vessel in Senegal. This would be important for Senegal's competitive position with respect to countries outside the region (Thailand, Fiji, etc.) that would likely remain outside any treaty.

**Taxes, fiscal charges, and fuel, electricity, and water rates**

For Senegalese fishery products to remain competitive, they must lower their production costs. Although this has a great deal to do with the present low productivity, certain cost items are undeniably high in comparison with international norms. Thus, current electricity and water charges are exceptionally high which has a wide-ranging effect on operating costs. Unless a way is found to lower these costs in general, a preferential industrial rate for electricity and water consumption should be considered. In calculating the impact on Government revenues of such lowered rates, the positive effect of the resulting increased economic activity should be taken into account.

Fuel prices are also high, much higher than those charged in, for example, Las Palmas. Although industrial operators can procure gasoil at FCFA 63 per liter from the international bunker at Dakar Port[40], it is still higher than what non-Dakar based operators need to pay. And artisan fishermen have to pay FCFA 170 or more for a liter of diesel fuel. Fuel costs having such significant effect of total operating costs, the international competitive position of the Senegalese fishing fleets is clearly adversely affected. Again, the revenue loss of lowered fuel prices should be carefully weighted against increased income resulting from a more favorable competitive position and greater economic activity.

Fuel prices for artisan fishermen are subsidized and they rightfully do not have to pay the road tax charged to other purchasers of diesel. However, the rapid increase in fuel price over the last few years has largely nullified the effect of the subsidy. Moreover, this deterioration in economic conditions has not been compensated for by increasing fish prices at the artisan level. Thus, at the artisan level, fuel costs are taking an unusually big bite from the revenues generated by the fishermen. A policy whereby future increases in fuel price would be tied to improvement in fish prices might be considered.

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39 The fact that there are today no Mauritanian vessels fishing in Senegalese waters is somewhat besides the point — the question is really about principle and policy.

40 albeit only against dollars earned from export trade

Today operators within Senegal's fisheries industrial system face a myriad of taxes and fiscal charges that individually may be small but that do add up to significant burdens. Granted, some of these costs are, for some of the operators, offset by certain subsidies or reduced rates. Most important, all of these regulations and conditions, opportunities to earn a little here or there or avoid a certain cost adds up to another, hidden cost, namely that of uncertainty.

Trade taxes and tariffs on necessary inputs to the industry such as cans, spare parts etc. ought to be lowered and removed completely when intended for the production of export items. In general, the policy should be that of taxing consumption rather than production. That is, taxation should move from trade taxes to broadly based sales taxes, preferably to a Value Added Tax. A VAT can raise substantial amounts of revenue at comparatively low tax rates as there are few possibilities to escape them.[41] It does not discriminate between production for the domestic and external markets and it leaves producers free to chose the optimal (i.e. efficient) mix of imported and domestic inputs, labor, and capital. Finally, a VAT avoids the "cascading" effect of turn-over taxes whereby production and distribution is taxed at each stage at the full value of the product at that stage thus adding tax on top of tax.

**Labor code**

Fishing and the related industrial activities are highly seasonal and are also characterized by a high degree of randomness and perishable nature of the product. Labor legislation in Senegal, however, is rigid and not in tune with these characteristics of the sector. Thus, for example, the vast majority of the workforce in this sector are hired on permanent basis and have to be paid for 40 hours per week regardless of the actual level of activities. Regulations concerning over-time work are inflexible and consequently frequently violated leading to unnecessary labor disputes. Recent changes in the Labor Code removing the limits on renewal of short term employment contracts - these contracts can now be renewed indefinitely - will have a positive impact in the longer run as present permanent contracts can be gradually replaced by shorter term hiring. However, short term measures are still needed.

Statutory requirements seem to favor payment by the hour rather than by piece. Competitors in other countries, however, normally pay according to a piece rate or a statutory minimum wage. Clearly, this puts the Senegalese producers at an disadvantage.

The crucial provision preventing companies from laying off workers for economic or technical reasons without prior Government approval should be repealed as soon as possible in order to protect the industry and its jobs in the long run. The present formulation serves only those now employed, and only as long as the firms manage to operate.

The present (forced) use of Longshoremen in unloading and handling fish in Port of Dakar

41 even for those who often manage to pay no taxes at all although they have substantial incomes and personal wealth!

should be actively discouraged through the effective enforcement of existing regulations and the permission to obtain temporary help elsewhere.

Changing the basic principle for labor contracts to piece-rate and allowing short term contracts would effectively deal with most of the present labor problems within the fisheries industrial system in Senegal by opening up existing job opportunities to greater competition among job seekers. The permanent workforce should be trimmed down in favor of seasonal labor.

New approaches to management as well as worker education is needed for employers to deal effectively with such abuses as absenteeism, unnecessary prolonged sick leave, and refusal to work standing up.

### The FCFA

Senegal's membership in the CFA (French African Community) franc zone ensures free convertibility of its currency and offers certain other benefits as well. But it also makes it difficult for the country to manage its own affairs in face of external disturbances and it rules out the possibility of using devaluation as a means to increase the competitiveness of Senegalese products on international markets.

Although there no doubt exists powerful political realities and existing financial interests wishing to preserve the status quo, time has come to carefully re-evaluate the benefits and costs not only with respect to the fisheries industrial system but to the entire national economy. A similar evaluation might be in order among the other CFA countries, too. From this a new regional policy or at least approach could evolve. Perhaps all that is needed in the short run is a mechanism by which the international value of the FCFA could be adjusted as necessary? Another possibility might be a uniform devaluation in all CFA countries that would retain most of the present benefits of the system but that would help in restoring the international competitiveness of the region's exporting firms. The evaluation, whether on an individual country or regional basis, should be entrusted to a competent, independent body such as the IMF.

## 6.2 Investment Opportunities

In general, investment opportunities in Senegal's fisheries industrial system appear limited as there is much slack capacity in the system. Several projects are currently underway of which at least the project by Africain Sea Food to increase its sardinella capacity is dubious.[42] Nonetheless, the systemic evaluation of the system has revealed certain possibilities, especially in modernizing fleets and equipment but also in diversification of operations into new markets and products.

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42 Claude Freud, op. cit., p. 11

**Fishing/Processing Vessels**

The preferred strategy calls for a selective expansion in the fishing fleet as well as the development of a national tuna fleet. To implement this strategy, certain policy changes to encourage national ownership and operation of an expanded tuna fleet and some FCFA 24.3 billion or US $ 75 million in new investments will be required (for details, see Table 42 repeated below ).[43] This does not include capital requirements that might become necessary if processing plants are to be rehabilitated and retooled to operate more efficiently. Such investments conceivably would also have a detrimental effect on those land based processing facilities that now operate with low capacity utilization.

Given present high operating costs and low labor productivity, the feasibility of investing in highly automated trawling - fish processing vessels should be investigated. Such vessels are capable of large catches per trip. They process the fish with computerized filleting machines that adjust to the size of the fish, gut them, and remove heads, tails and skins at a rate three times that of most shore side facilities, before freezing the fillets. These on-board facilities enable the production of fresher, higher quality product because the time elapsed between capture and freezing the filleted catch can be reduced to as little as four hours. Compared to fish that is caught and frozen whole, then later thawed, processed, and refrozen - which alters both color and taste - the quality is superior, and fetches a premium of 20 to 25 per cent in developed country markets. Furthermore, such advanced trawlers can operate and process in almost any weather. Given the present labor conditions in Dakar Port, this could also amount to a significant comparative advantage. However, the required amount of capital would be sizeable: such highly automated 50 meter trawlers described above could cost upwards of $7 million, and the filleting machines each perhaps $160 000 [44].

Table 42. REQUIRED NEW INVESTMENT IN VESSELS, FCFA million

| Type of Vessels | Required Number of Vessels | Required Investment FCFA Million |
|---|---|---|
| Ice Tuna Vessel | 7 | 2 940.0 |
| Freezer Tuna Vessel | 17 | 7 650.0 |
| Ice Trawler | 5 | 1 750.0 |
| Freezer Trawler | 26 | 9 360.0 |
| Sardinella Purse Seiner | 8 | 2 560.0 |
| Canoe | 12 | 21.6 |
| Total | | 24 281.6 |

Source: UNIDO Secretariat

43 The strategy may have to include a revision of the present prohibition against the operation of factory ships in Senegalese waters.

44 Price charged by Baader North America Corp., Woburn., Mass. according to Businessweek May 28, 1984

Investment opportunities present themselves also in the low-technology spectrum of boat building. The traditional canoes are getting increasingly expensive to build because of a shortage of suitable wood material. New boat designs based on alternative materials and/or less wasteful use of timber resources are becoming an absolute necessity if the artisan fishery is to survive in the long run. Similarly, many of the small and old vessels in the industrial fleet should be scrapped and replaced by more efficient types for economic reasons.

Such vessels could be produced from kits by smaller boat yards linked to main manufacturers. With some $400 000 from the Dutch Government, UNIDO has undertaken exactly such a project in Indonesia. There it was found that modern laminated wood and marine plywood boats could bridge the gap between traditional crafts built on the beach and more sophisticated boats without exceeding the currently available labor skills. So far the effort has attracted more than $500 000 in investments, with an additional $4 million in the pipeline. Suitable adapted, the Indonesian experience could be replicated in Senegal.[45] (For related activities, see also Technical Assistance Projects 1 and 6 below.)

**Shrimp and other HUV products**

The biggest markets for shrimp are Japan, the United States, the United Kingdom, France, Canada, Hong Kong, the Netherlands, Spain, Federal Republic of Germany, Belgium and Luxemburg, Sweden, Australia, Italy, Switzerland, and Singapore. These markets easily account for more than 90 per cent of the international shrimp trade, and they are expanding in both quantity and value terms.

Senegal is today a sizeable supplier of shrimp to certain of these world markets. Its future role on these markets, however, is linked to its continuing supply capability. The present resource is now fully exploited, with the possible exception of some remote, roadless areas in Casamance. Therefore, future (increases in ) supplies will have to come from shrimp farming that, given the generally good profitability of the shrimp business (it is a sellers' market), should offer relatively attractive investment opportunities in farms themselves but also in hatcheries, pumping equipment, chilling and freezing facilities, packaging, quality and disease control etc. Since several years now, Senegal has pursued a project to determine the biological and technical feasibility of raising "pénéides" under local conditions. This project should now be followed by pre-investment feasibility study of an industrial size operation.

Similarly, there would be good possibilities in high quality, high Value Added processing facilities for consumer-packed products for European and North American export markets where the demand for canned shrimp, for example, is growing. Emphasis should be on impeccable quality, large quantities, reliable deliveries, and appealing and convenient packaging.

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[45] Indeed, a UNIDO mission to Cameroon last year found considerable potential for setting up a boat building industry to serve fishery and other activities.

Investment in plants and/or facilities to produce certain relatively new products such as breaded and/or battered shrimp and fish filets, and shrimp or shrimp and fish bisque (made from scrap such as heads) in dried, powder form appear interesting. It might also be possible to extract chitin (a polymer with many possible applications) from the shells of crustaceans in sufficiently large quantities to make it commercially viable.

Appropriate technology for such undertakings could come from joint ventures with companies from technologically advanced countries.[46] This includes several developing countries such as Taiwan Province, Thailand and India where shrimp aquaculture is well developed. Language, however, may represent a problem.[47] Japanese companies might also be suitable partners because of their accumulated know-how in pond engineering, hatchery operations and disease control, their direct access to one of the most important market areas, and their generally strong financial base. At any rate, investments should not be undertaken before feasibility studies and market surveys have been completed.

Pre-feasibility studies indicate that a shrimp farm of 500 acres (202 hectares) would require a capital outlay of around $5 million. The pay-back period could be approximately three years. The rate of return on investment can be expected to be high.

**Trigger fish - Surimi**

Surimi is a processed fish paste made from a whitefish and flavored and shaped to taste and look like various seafood products. It has been a staple of the Japanese diet for centuries and the demand for it is now picking up elsewhere as well, particularly in the U.S. In 1984, Americans consumed 75 million lb of surimi-based products, worth about $200 million wholesale. By some estimates, those figures could increase 15-fold by 1990. Surimi's potential does not end with being a substitute for low cost seafood. Producers hope that one day it can be used as tofu now.

Trigger fish, abundant in West African waters, is hardly utilized at all because it is very bony and its skin is equally tough. However, the feasibility of using this resource for surimi should be looked in to. The pay-off from a technologically innovative project could be handsome.

Another possible use for trigger fish could be in feeding the fish meal plants in Senegal that

[46] Trade Wind Industries, Ltd., a Caribbean concern funded primarily by U. S. investors is already involved in joint ventures in aquaculture in the Caribbean islands. Texas based Maritek Corporation farms shrimp on some 20 000 acres of water on Bahamas Long Island. Such companies with already accumulated experience might be interested in expanding into Senegal.

[47] In Martinique a government agency has been promoting shrimp farming in its waters and in neighboring Guadeloupe. This could present a possibility for some TCDC (technical cooperation among developing countries) and language (French) would present no problems.

are now starved for raw material (tuna offal). Here the boniness of this fish could be a plus as it ought to translate into a high calcium content, a desirable quality in fish meal used for chicken feed.

### Freezing

New investment is currently being made in additional on-shore freezing facilities. This appears ill-advised as our analysis shows that there is no system-wide lack of capacity in this respect, the Value Added in this activity is null[48], and the tendency is towards on-board freezing of the catch.

## 6.3 Technical Assistance Projects

The options for developing Senegal's fisheries industrial system are to be found among the following areas:

(a) expanding certain types of off-shore fishing while limiting currently over-exploited fisheries;
(b) developing aquaculture and integrating it with other rural activities;
(c) improving infrastructure, especially along the cold chain and in transportation;\
(d) upgrading training systems for fishing crews as well as plant managers;
(e) upgrading extension and research services
(f) strengthening statistical and administrative capabilities within the Government;
(g) develop credit and insurance institutions geared to the specific characteristics of the sector;
(h) restructuring and rehabilitation of existing processing facilities; and
(i) market studies

Twelve project concepts have been derived from the Preferred Strategy and the available options, and elaborated to some detail in order to facilitate eventual donors' evaluation of their interest in assisting in their implementation. It must be stressed that these are by no means final project designs but concepts ready for fine tuning and only then financing and implementation. An additional 15 technical assistance project concepts have been derived from the foregoing analysis However, time and other staff resources have not permitted the establishment of detailed project budgets. Therefore, only the estimated total cost of these projects are presented. The total budget for these technical assistance projects exceeds $ 6 million.

The management of the entire program would best be carried out under an umbrella project. In addition to the management function, such a project could also engage in the monitoring of the impact of implemented projects on the industrial fisheries system using the MEPS model. Undoubtedly, the monitoring and analysis would lead to the 'discovery' of new demands for

48 Claude Freud, op. cit., p. 12

technical assistance, investment opportunities, and policy recommendations. In other words, the programming exercise would become a dynamic one, responding to the changing system requirements. The project concept for this Management Project has not been elaborated below and as such is not part of the project concepts presented below.

The Management Project would benefit from the support of a Technical Assistance Facility (TAF) that would be geared solely to the effective demand for various forms of technical assistance coming from private sector operators within Senegal's industrial fisheries system.[49] An essential feature of the TAF is that it would support and undertake only projects directly requested by private operators and to which they would contribute by paying part of the costs. The projects could be among those presented below. A draft project proposal for the TAF is presented as Project 28.[50]

49 The idea for such a facility stems from the World Bank and was presented to UNIDO first as part of the Bank's review of the here presented analysis and derived development program.

50 The project proposal has been worked out by UNIDO's Industrial Planning Branch.

Table 44. TECHNICAL ASSISTANCE PROJECT CONCEPTS

| PROJECT TITLE | BUDGET: $ |
|---|---|
| 1. Improvement in Traditional Canoe Design and Fabrication | 200 786 |
| 2. Introduction of Fishing Technology for Optimal Exploitation of Demersal Resources | 321 993 |
| 3. Development of A National Tuna Fleet | 359 933 |
| 4. Market Studies | 233 152 |
| 5. Restructuring of the Fish Meal Industry | 97 473 |
| 6. Modernization and Expansion of Industrial Fleet | 647 631 |
| 7. Credit to the Fisheries Sector | 100 428 |
| 8. Fisheries Industrial System Information and Investment Promotion Center | 137 379 |
| 9. Study to Improve Inland Fish Distribution | 176 630 |
| 10. Technical Support to Ancillary Industries | 210 671 |
| 11: Rehabilitation of Fish Processing Plants | 274 799 |
| 12. Improved Utilization of "Little Tuna" | 273 386 |
| 13. Utilization of Sea Snail Shells | 80 000 |
| 14 Increased Utilization of Shrimp Heads: Feasibility Study | 180 000 |
| 15. Low Cost Packaging of Artisan Fishery Products for Internal Distribution; Feasibility Study of Shrink-On Vacuum Packaging | 180 000 |
| 16. Develop Machine for Skinning, Boning, and Filleting of Trigger Fish | 300 000 |
| 17. Organization of Wholesale Buying and Marketing of Artisan Fishery Products to African Markets | 50 000 |
| 18. Analysis of the Senegalese Insurance Business to Determine Efficiency and Make Recommendations for Restructuring | 80 000 |
| 19. Setting-up of a Quality Control Scheme with Laboratory | 100 000 |
| 20. Introduction of Diesel Inboard Engines | 140 000 |
| 21. Utilization of By-Catch | 60 000 |
| 22. Upgrading of Crew Skills to Meet Demands of Modern Onboard Processing | 160 000 |
| 23 Training in Vessel Maintenance | 160 000 |
| 24. Training in Plant Management | 260 000 |
| 25. Study of African Markets | 600 000 |
| 26. Enterprise-specific studies to determine actual possibilities to lower operating costs | 600 000 |
| 27. Study to determine market integration of complementary activities | 100 000 |
| 28. Establishment of a Technical Assistance Facility | 93 420 |
| Grand Total | 6 177 681 |

# PROJECT 1. Improvement in Traditional Canoe Design and Fabrication

## 1. Background and Justification

With a fleet of about 6 000 canoes and annual landings close to 200 000 Mt, Senegal's artisan fishery is very active and contributes greatly to the national economy and general welfare.

Artisan fishing is practised with traditional canoes. Their frames are made from trunks on to which wooden boards are fixed. These canoes can be large in size, reaching 20 meters in length and 20 Mt in capacity. They have a peculiar characteristic of lacking interior internal frames. This makes for a weak structure and unsatisfactory water tightness. Furthermore, their very poor draught provides a resistance in very shallow water but reduces their stability just as much.

Taking these technical imperfections into account, several foreign agencies have since the last two decades tried to introduce new types of boats - some based on the Senegalese model, others not. They have been constructed of various materials such as wood, plywood and fiberglass. But no attempt has been conclusive for several reasons - exorbitant costs, shape not adaptable to sea conditions, excessive weight, inadequate motorization, and poor technical performance.

Although the traditional Senegalese canoe has survived all attempts of fiberglass replacements by other models, the scarcity of wood and especially trunks to make the main frame is a growing major concern. Indeed, for the past 15 years, problems of desertification and deforestation have intensified so that the Senegalese authorities have been forced to ban the cutting of wood in the country.

Since the fleet is made up of nearly 6 000 canoes with a lifespan of 10 to 12 years, 400 to 500 canoes would have to be constructed each year to maintain the current fleet size. This is probably far more than what is actually being built today. Thus, the fleet is aging and becoming increasingly obsolete. Furthermore, the Preferred Strategy calls for an additional 12 canoes to be built.

To augment the number of canoes constructed each year, two alternatives have been offered - the construction of new boats either from fiberglass or wood imported from other African countries. In both instances, the boats must comply with the following specifications, arrived at in association with Senegalese fishermen:

i. acceptable costs, shape and weight;
ii. local construction;

iii. better technical performance than the traditional canoes; and
iv. improvement of fish preservation conditions on board

The importance of deriving the design characteristics of the new canoe type as well as implementing the program in very close association with artisan fishermen cannot be stressed too much. There is evidence that previous attempts at designing and building a new canoe for the Senegalese artisan fishery have failed precisely because of a lack of sensitivity to traditions and local preferences.

Initially, each technical alternative will have its advantages and disadvantages and it is only by experimenting in a fishing environment that a judicious choice can be made.

This project would also have a certain regional significance as a new design, if accepted in Senegal (and Ghana), would also very likely be accepted in the entire region. And since most of the region suffers from a lack of material for traditional wooden canoes, the development of a new design based either on a more judicious use of wooden material or altogether another material would be highly beneficial to all the countries of the region.

## 2. Objectives

### 2.1 Development Objectives

To ensure the viability of the artisan fisheries in accordance with its socio-economic importance.

### 2.2 Immediate Objectives

Demonstrate feasibility of replacing traditional canoe with new designs based on fiberglass or improved wood.

## 3. Expected Results

### 3.1 Expected Results 1

Construction of 3 types of fiberglass canoe

#### 3.1.1 Activities to be Undertaken

i. Recruitment of a technologist to work in close collaboration with fishermen's groups;
ii. Recruitment of fishermen who will participate in planning this new canoe;
iii. Defining and implementing the plan and frame of the canoe;
iv. Operating the canoe on trial basis under local fishing conditions;
v. Analysing the technical, economic, socioeconomic and other constraints;

vi. Introducing the canoe to the fishing communities.

### 3.2 Expected Results 2

Construction of 3 types of improved wooden canoe

#### 3.2.1 Activities to be Undertaken

Same as i to vi under 3.1.1

### 3.3 Expected Results 3

Audiovisual material for demonstration of optimal new canoe type

#### 3.3.1 Activities to be Undertaken

i. Chose optimal canoe design
ii. Produce audiovisual material
iii. Train trainers in using prepared audiovisual material

## 4 Project Contribution

### 4.1 The Government of Senegal

The Senegalese Government will provide administrative support for the project and also provide office accommodation and facilities for the consultant.

### 4.2 UNIDO

| | | Person Months | US$ |
|---|---|---|---|
| Marine Technologist | | 8.0 | 83 438 |
| Project Travel | | | 3 000 |
| Staff Travel | | 0.5 | 5 250 |
| National Experts | | 10 | 12 000 |
| Total Personnel | | 18.5 | 103 688 |
| Total Subcontracts (CRODT) | | | 20 000 |
| Expendable Equipment | 6 Canoes | | 22 000 |
| | Outboard Motors | | 6 000 |
| Nonexpendable Equipment | Training Material | | 17 000 |
| Total Equipment | | | 45 000 |

| | | |
|---|---|---|
| Sundries | Report Printing | 2 000 |
| | Operating Cost | 7 000 |
| Total Miscellaneous | | 9 000 |
| Project Total | | 177 688 |
| UNIDO Overhead | | 23 099 |
| Total | | 200 786 |

# PROJECT 2. Introduction of Fishing Technology for Optimal Exploitation of Demersal Resources

## 1. Background and Justification

For the past 10 years, strong growth of the Senegalese trawl fishery has resulted in a significant decline in yield particularly within the flat continental shelf. The rocky surface that represents about one half of the continental shelf, however, has not been exploited at all except by small artisan fishermen using rods and the semi-industrial fleet that is not profitable under current conditions.

These rocky surfaces are rich in "noble" fish such as the serranidae and lutjanidae that are of large size and have a high market value. The rod fishing being practised now is inefficient and could be improved using a technique known as "palangre". This method has been successful in Europe.

At the initiative of CRODT, a prototype of the "palangre" specially adapted to the Senegalese canoe has been constructed and tested. The initial results have been encouraging and this type of fishing technology appears to be well accepted by the artisan fishermen.

"Palangre" fishing has the advantage of being very selective. In effect, from a very simple, easy to accomplish change in the rigging, one can change the target species according to fishing area and season. The technique makes it possible to capture only mature fish without harming fish stocks.

## 2. Objectives

### 2.1 Development Objectives

Without harming stocks, increased production of HUV fish for domestic consumption and exports. Reduce fishing effort in the coastal zone in favor of zones farther from the coast thus optimizing the exploitation of resources within the continental shelf

### 2.2 Immediate Objectives

i. Improvement in artisan fishermen's income;
ii. Making the semi-industrial fleet more profitable;
iii. Disseminate new fishing technology throughout West Africa; and
iv. Examining the possibilities of producing line winches and other fishing gear in Senegal.

## 3. Expected Results

### 3.1 Expected Results 1

Development and introduction of new fishing technology in the artisan set-up.

#### 3.1.1 Activities to be Undertaken

i. Intensification of the experiment on "treuil vire-palangre" by CRODT and DOPM to measure impact with regard to fishing zone, season and species;
ii. Monitoring of economics of the experiment;
iii. Training of Senegalese fishermen in using echo-sounder, compass and "palangre";
iv. Introduction of technology to the artisan community and campaign to ensure acceptance; and
v. Determining the scope of "palangre" fishing based on available and accessible resources.

### 3.2 Expected Results 2

Making the Senegalese semi-industrial fleet operation profitable

#### 3.2.1 Activities to be Undertaken

i. Adaptation of hydraulic circuit for semi-industrial boats with a "vire palangre" system and adapted riggings;
ii. Economic analysis of new technology; and
iii. Training of fishermen in new technology.

### 3.3 Expected Results 3

New fishing technology introduced to West African coastal fishing communities.

#### 3.3.1 Activities to be Undertaken

i. Survey of countries having important rocky surfaces;
ii. Make authorities and boat owners of these countries aware of the possibilities offered by this fishing technology; and
iii. Plan training sessions in the countries concerned.

### 3.4 Expected Results 4

Feasibility studies on the production of line winches and other fishing gear in Senegal.

### 3.4.1 Activities to be Undertaken

i. Identification of Consultant to undertake study;
ii. Survey of Senegalese plants capable of constructing "treuil";
iii. Determine financial viability Value Added of local construction taking into account imported material; and
iv. Conclusions as to whether local construction is appropriate or not.

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultant.

### 4.2 UNIDO

| | Person Months | US$ |
|---|---|---|
| Fish Technologist | 12.0 | 99 700 |
| Total International Experts | 12.0 | 99 700 |
| Project Travel | | 3 000 |
| Staff Travel (to 4 African countries to present the technology) | 0.5 | 7 250 |
| National Experts | 2.0 | 4 000 |
| Total Personnel | 14.5 | 113 950 |
| | | |
| Socioeconomic Study (CRODT) | | 25 000 |
| Feasibility Study (CRODT) | | 6 000 |
| Total Subcontracts | | 31 000 |
| | | |
| Expendable Equipment | | |
| 5 line winches, materials and tools for canoes (echo-sounder, etc.) | | 32 000 |
| "Wire-palangre" and other materials for a semi-industrial boat. | | 20 000 |
| Nonexpendable Equipment Video film, photos and brochure for training | | 17 000 |
| Total Equipment | | 69 000 |
| | | |
| Sundries — Report Printing | | 2 000 |
| Costs of Operating Canoe | | 40 000 |
| Costs of Operating Semi-industrial Boat | | 25 000 |
| Total Miscellaneous | | 71 000 |
| | | |
| Project Total | | 284 950 |
| UNIDO Overhead | | 37 044 |
| Total | | 321 993 |

# PROJECT 3. Development of A National Tuna Fleet

## 1. Background and Justification

The tuna industry remains one of the most important sectors of the Senegalese economy. Canned tuna exports in particular have been contributing substantially to the country's trade balance accounting for between seven and twelve per cent of the country's export earnings since 1980. Nonetheless, the sector is operating far below its economic potential.

The tuna fleet based in Dakar has declined steadily from 30 vessels in 1980 to 22 in 1987. Thus, this fleet plays a diminishing role in the supply of fresh and frozen tuna to feed the country's three canneries. In 1978, it accounted for 78 per cent of the volume of raw tuna purchased by the canneries. A decade later, their share fell to 36 per cent. Today the three canneries operate at a little over one half of their installed capacities due primarily to the inadequate supply of raw tuna. They are compelled to import more than one half of their raw tuna requirements - representing a substantial drain on foreign exchange earnings.

Of even greater concern has been the small contribution from Senegalese tuna vessels. They accounted for a mere 5 per cent of all tuna landings in 1987. Together with the other Dakar based tuna fleet, a total of 10 968 Mt of tuna were produced that year, far from enough to feed the three local canneries. Thus much of the raw tuna requirements for these canneries have to be satisfied through imports. To reduce this drain on scarce foreign exchange reserves, the local tuna fleet ought to be built up urgently.

Tuna fishing agreements with neighboring countries should be reviewed to ensure conformity. Today, Senegalese tuna boats operating in Mauritania are charged a license fee of US $ 250 per GRT while Mauritanian vessels would pay only FCFA 25000 or US $ 80 per GRT in Senegal.[51] Due to the highly migratory characteristics of the tuna resource, the Senegalese tuna fleet cannot escape this fee as it must also fish in the waters of neighboring countries. Thus, license fees now account for a substantial share of all operating costs. It would seem both necessary and possible for the Government to negotiate more favorable and equitable terms for the Senegalese operators in order to ensure long term profitability and indeed competitivity of the Senegalese industry vis-a-vis the fleet of other nations.

Following the liquidation of SOSAP (Société d'Etat d'armement à la pêche thoniere), a program to revive the Senegalese tuna fleet through private initiative was started in 1981. At first the number of Senegalese tuna vessels grew from one to five but has since shown no expansion, reflecting the current problems with vessel obsolescence, frequent vessel breakdowns, excessive repair and maintenance charges, high interest charges, lack of skilled crew and rather unfavorable tuna fishing treaties with neighboring countries. One striking

51 The fact that there are today no Mauritanian vessels fishing in Senegalese waters is somewhat besides the point — the question is really about principle and policy.

observation is the substantial amount of money being spent on fishing crews. Crew salaries account for a greater share of the total expenditure in tuna fishery than in sardinella purse seining or trawling. Tuna fishing demands more advanced techniques and as such calls for highly skilled crew that is often lacking.

### 2.1 Development Objectives

To minimize dependence on imported inputs for the production of canned tuna and maximize foreign exchange earnings.

### 2.2 Immediate Objectives

To produce a set of policy measures to promote private sector interest in expanding the existing tuna fleet with 7 new ice vessels and 17 new freezer vessels.

## 3. Expected Results

### 3.1 Expected Results 1

Policy measures for establishing an effective credit scheme

#### 3.1.1 Activities to be Undertaken

i. Analyze present credit schemes;
ii. Develop realistic alternatives; and
iii. Determine the feasibility of an investment tax credit

### 3.2 Expected Results 2

Training of fishing crew

#### 3.1.2 Activities to be Undertaken

i. Formulate training program;
ii. Train crew in all facets of fishing and in the use of equipment; and
iii Initiate program to absorb crew in gainful employment

### 3.3 Expected Results 3

Guidelines for renegotiating favorable tuna fishing treaties

### 3.1.3 Activities to be Undertaken

i. Develop guidelines for negotiations with Mauritania
ii. Develop guidelines for negotiations with Guinea

## 4. Project Contribution

### 4.1 The Government of Senegal

The Senegalese Government will provide administrative support for the project.

### 4.2 UNIDO

| | Person Months | US$ |
|---|---|---|
| Credit Specialist | 3.5 | 43 125 |
| Training Specialist | 3.5 | 43 125 |
| Fishing Treaty Expert | 3.5 | 46 775 |
| Total International Experts | 10.5 | 133 025 |
| Staff Travel | 1 | 10 500 |
| National Experts | 2 | 4 000 |
| Total Personnel | 13.5 | 147 525 |
| | | |
| Fellowships | 30 | 105 000 |
| In-service Training | | 45 000 |
| Total Training | 30 | 150 000 |
| | | |
| Expendable Equipment | | |
| Nonexpendable Equipment | Training Material | 15000 |
| Total Equipment | | 15000 |
| Sundries | | 6 000 |
| Total Miscellaneous | | 6 000 |
| | | |
| Project Total | | 318 525 |
| UNIDO Overhead | | 41 408 |
| Total | | 359 933 |

# PROJECT 4. Market Studies

## 1. Background and Justification

Senegal is one of the world's major exporters of fish and fish products (see Fig. 2 and Table 10 above). The sector accounts for the majority of the country's export earnings today. Over the ten year period between 1977 and 1986, nominal export earnings in dollars more than quadrupled. More recently export earnings have exceeded $250 million per year. On average, 82 per cent of all exports come from the industrial activities with the artisan fisheries providing the rest. Among others, quality concerns have hampered exports from the artisan sector. Nonetheless, a substantial portion of the shrimp exports originates in the artisan catch.. Canned tuna is the single most valuable export product accounting for between seven and twelve per cent of Senegal's total export earnings since 1980.

Senegal's traditional heavy dependence on France as the major outlet for its products is now starting to cause concern to the country's big exporters. Although they may not have in the past enjoyed a formal preferential or protected status, fact is that these exporters have been favored on the French market for various reasons. This cozy state of affairs, it is feared in Senegal, will come to an end at the latest with the event of 1992 and the full integration of the European markets. This is probably true although EEC in Brussels assures everyone that no new trade barriers will be set up against exports from developing countries and thus that nothing should change for existing exporters to Europe. But, the mere fact that after 1992, tuna exports from Fiji to Germany for example, can easily be transported to France for sale there will mean substantially increased competition for the traditional Senegalese products. And with Senegalese production costs higher and labor productivity lower than in many other countries, notably Asian ones, the fear of lost market shares or even complete markets appear justified. Besides trying to deal with the cost and productivity issues, Senegal's exporters must now look to new marketing strategies and distribution channels (partners), new markets, and improved, differentiated products.

### The African Market

Although Senegal today has relatively strong fish trade links with its African partners, the share of the African market in the total external trade is steadily dwindling. In 1983, the African market accounted for 56 per cent of the total volume of Senegal's fish exports. This decreased to 48 per cent in 1985 and present indications are that the situation has not improved since. This is attributed largely to the near collapse of the sardinella fleet.

It should also be noted that the constantly changing trade policies in a number of fish importing countries in Africa have not been conducive to developing reliable trade relationships. Often, governments curtail fish imports as a measure to conserve foreign exchange by imposing high tariff barriers. In addition, liquidity problems have emerged

lately in a number of African countries making the African market a very uncertain one.

Still, it is prudent to participate actively in this market considering the great demand potential and the proximity that allows Senegalese producers to respond to marketing opportunities swiftly and efficiently. To bring down the currently unnecessarily high transportation charges, some way has to be found to assembly larger lots for shipment.

The European Market

Senegal's fish trade with non-African countries has been gradually increasing. The trade with France has remained steady and strong absorbing nearly a third of the volume of Senegal's fish exports. In value terms, France plays an even more important role.

But, Senegalese fish exporters are not deriving the maximum benefits due to the low Value Added content of their products. The bulk of the Senegalese fish exports are whole frozen. The bulk of the Senegalese fish exports are whole frozen and where fish has been sold ready packed, it has been less attractive to the European consumer. To capture a greater share of this market as well as to increase the Value Added content, the products have to be processed further and presented in a more appealing form.

Another concern is a set of largely self-imposed limitations with respect to these markets. Today, Senegalese fish exporters deal with only a few importers because of traditional ties, common language, and ease in currency transaction. While such arrangement can be appropriate for small exporters; those who deal in large consignments could probably find better deals by looking at new marketing channels and altogether alternative markets.

The Japanese Market

The Japanese market has become a major outlet for Senegalese cuttlefish exports. Again, these exporters could substantially increase their revenues if they were to process their catch into semi-finished or finished products. Now virtually all the cuttlefish are exported whole and frozen.

To maintain or improve its market share, it is essential that the Senegalese exporters emphasize quality. Japan is a major fish consuming country and a sophisticated one in its appreciating for fishery products. High quality translates into substantial price increases.

The North American Market

Senegalese fishery products hardly find their way at all to the North American markets. Current consumer trends on these markets favor lighter and healthier foods such as fish. Moreover, ready made (pre-cooked etc) meals have for a long time now found a receptive market among both individual households and institutions, offering an excellent opportunity

for Senegalese producers to increase the Value Added content of their export products. Here also, as on the Japanese market, emphasis must lie on impeccable quality, large quantities, reliable deliveries, and appealing and convenient packaging. Quite possibly very attractive investment opportunities present themselves within the larger framework of such activities as they are presently fairly unexploited in Senegal.

## 2. Objectives

### 2.1 Development Objectives

Expand fish exports and maximize earnings.

### 2.2 Immediate Objectives

i. Export of new high Value Added fish products;
ii. Identify new markets;
iii. Develop new marketing strategy including targeting supermarket and restaurant chains.

## 3. Expected Results

### 3.1 Expected Results 1

Marketing strategy for the European market

#### 3.1.1 Activities to be Undertaken

i. Assess the effect of an integrated European market (in 1992) on fisheries exports originating from Senegal.
ii. Identification and of new Value Added fish products for specific markets.
iii. Assess the adequacy of present marketing channels and make recommendations for future arrangements
iv Development of three new market strategies targeting supermarket and restaurant chains.

### 3.2 Expected Results 2

Marketing strategy for the North American market

#### 3.2.1 Activities to be Undertaken

i. Concise description of the North American market for fish and fishery products -

types of products, quantity traded, prices, trade regulations, distribution networks, freight rates, quality requirements, trade barriers, emerging consumption trends, etc

ii. Develop alternative marketing strategies

iii. Evaluate the competitiveness of Senegalese fisheries products in this market

### 3.3 Expected Results 3

Marketing strategy for the African market

#### 3.3.1 Activities to be Undertaken

i. Evaluate the market potential in Africa for Senegalese fisheries products with particular reference to trade barriers and payment procedures

ii. Develop innovative marketing strategies for traditional fisheries products

iii. Identify promising test markets for new products such as canned sardinella and outline alternative marketing strategies.

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultant.

### 4.2 UNIDO

| | Person Months | US$ |
|---|---|---|
| Expert on European Markets | 3.0 | 97 100 |
| Expert on N. American Markets | 3.0 | 61 100 |
| Expert on African Markets | 2.0 | 39 500 |
| Total International Experts | 8.0 | 197 700 |
| | | |
| Project Leader | 0.5 | 1 420 |
| Project Leader | 0.5 | 4 210 |
| Staff Travel | 1.0 | 5 630 |
| Total Personnel | 9.0 | 203 330 |
| | | |
| Sundries | | 3 000 |
| Hospitality | | |
| Total Miscellaneous | | 3 000 |
| | | |
| Project Total | | 206 330 |
| UNIDO Overhead | | 26 822 |
| Total | | 233 152 |

# PROJECT 5. Restructuring of the Fish Meal Industry

## 1. Background and Justification

Senegal's fish meal industry comprises two companies - AFRIC AZOTE and SENEGAL PROTEINES - with a combined annual production capacity of 10 000 Mt. In 1987, however, only a quarter of the production goal was realized. The fish meal plants are old and operate inefficiently, frequently breaking down with spare parts either difficult to find or expensive to purchase. But the most serious problem facing this activity is the inadequate supply of raw fish.

The fish meal industry depends more on tuna offal than sardinella to feed its plants. Therefore, even if the tuna canneries were to operate at 80 per cent of their installed capacities the offal generated would only be adequate to support a 35 per cent utilization of the production capacities at the fish meal plants. To increase their production beyond this level, the fish meal producers would have to increase their purchases of sardinella which is not only expensive but would decrease the supply of sardinella for human consumption.

One alternative to deal with the situation is be to convert one of the plants to other uses. Also trimming the work force, saving on energy use, reducing repair and maintenance expenditure and improving the capacity utilization rate would go some ways in ensuring commercial viability.

## 2. Objectives

### 2.1 Development Objective

Improving the viability of Senegal's fish meal industry.

### 2.2 Immediate Objectives

i. Improve the profitability of fish reduction activities;
ii. Convert one of the fish meal plants to other uses;
iii. Reduce the installed fish meal production capacity.

## 3. Expected Results

### 3.1 Expected Results 1

Study on the possibilities of increasing the profitability of the two existing fish meal plants through conversion of one of the plants

### 3.1.1 Activities to be Undertaken

i. Identify possible alternative uses for fish meal plant;
ii. Evaluate economic feasibility for the identified alternatives;
iii. Formulate conditions for conversion in close collaboration with the fish meal producers.

### 3.2 Expected Results 2

Study on the possibilities of increasing the profitability of fish reduction through rehabilitation

### 3.2.1 Actions to be Undertaken

i. Identifying other sources of raw material besides tuna offal and sardinella focusing particularly on trigger fish which occurs in abundance in Senegalese waters but are virtually unexploited;
ii. Rehabilitate the plant to improve operations;
iii. Provide training for the work force to improve efficiency.

### 3.3 Expected Results 3

Plan for the conversion and/or rehabilitation of existing fish meal plants

### 3.3.1 Actions to be Undertaken

i. Identify investment requirements
ii. Determine need for technical assistance to improve operations;
iii. Provide training for the work force to improve efficiency;
iv. Make policy recommendations to the Government.

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultants.

### 4.2 UNIDO

| | Person Months | US$ |
|---|---|---|
| Expert on Fish Meal Production | 3.0 | 39 000 |
| Expert on Training | 1.0 | 13 200 |
| Total International Experts | 4.0 | 52 200 |
| Staff Travel | 0.5 | 8 560 |
| Total Personnel | 4.5 | 60 760 |
| | | |
| Fellowships | 5.0 | 17 500 |
| Study Tours | | 5 000 |
| Total Training | 5.0 | 22 500 |
| | | |
| Sundries | | 3 000 |
| Total Miscellaneous | | 3 000 |
| | | |
| Project Total | | 86 260 |
| UNIDO Overhead | | 11 213 |
| Total | | 97 473 |

# PROJECT 6. Modernization and Expansion of Industrial Fleet

## 1. Background and Justification

Senegal's fishing industry is characterized by an aging fleet that needs to be gradually replaced or modernized if the sector is to remain the backbone of the economy. Studies carried out by the DOPM in 1983 indicated that the average age of sardinella vessels was 27 years, trawlers 20 years and tuna fleet 31 years. Little has changed since then. Now the country's industrial fleets are increasingly spending more days at port undergoing repairs and fewer days at sea fishing.

Difficult access to credit and the accompanying high interest charges have been the major obstacles to fleet modernization. This has resulted in an inefficient fishing operation marked by mounting operating expenditure and dwindling revenue.

UNIDO's MEPS analysis of Senegal's fisheries industrial system has demonstrated that if an existing old 24-meter ice sardinella vessel is replaced by a new one with similar tonnage, revenue could double while repair and maintenance costs could drastically be reduced. Nonetheless, the high interest charges, currently fixed at a rate of 15 per cent by most commercial banks in Senegal, could prevent a new purse seiner from recording a profit. However, if interest charges were reduced to 13.5 per cent or less, new sardinella vessels could operate profitably.

For the trawl fleet, if an existing old vessel is replaced by a new one with identical specifications, the increase in revenue and decline in repair and maintenance costs could be enough to assure its profitability despite the 15 per cent interest rate. Tuna vessels are currently operating at a profit but the profitability could be substantially increased if the fleet is modernized.

The trawl fishery without doubt is the most valuable but it is still being exploited in a grossly inefficient manner. The problems encountered here are similar to those in the sardinella fishery. The aged trawlers that operated in 1987 made fewer trips than usual, harvesting a much lower tonnage of fish than a new trawler with identical specifications would have done.

Fleet modernization could turn Senegal's trawl industry profitable even at the 15 per cent rate of interest charged by most local commercial banks. In 1987, a loss of FCFA 7.9 million in operating an old ice trawler could have turned into a profit of FCFA 11.0 million if it had been replaced by a new one. Freezer trawlers have fared much better than ice trawlers and this is reflected in the gradual but steady replacement of ice vessels by freezer types.

Fleet modernization could substantially add to the revenue generated by tuna vessel operators, too. An operator of a 26 meter pole and line tuna vessel could increase his profits

by 40 per cent if he replaces his old vessel by a new one. This issue is addressed separately through Project 3 above.

## 2. Objectives

### 2.1 Development Objectives

Improve the commercial viability of vessel operators.

### 2.2 Immediate Objectives

i. Modernize the aging fleet;
ii. Expand the fishing fleet by adding:
- 7 ice tuna vessels
- 17 freezer tuna vessels
- 5 ice trawlers
- 26 freezer trawlers
- 8 sardinella purse seiners and
- 12 canoes

to ensure maximum economic benefits without harming resources.

## 3. Expected Results

### 3.1 Expected Results 1

Expanded and modernized tuna fleet (under Project 3)

### 3.2 Expected Results 2

Expanded and modernized trawl fleet

#### 3.2.1 Activities to be Undertaken

i. Identify investors and credit possibilities (in connection with Project 7 below)
ii. Train additional fishing crew

### 3.3 Expected Results 3

Expanded and modernized sardinella fleet

#### 3.3.1 Activities to be Undertaken

Same as item 3.2.1

### 3.4 Expected Results 4

Expanded and modernized artisan fleet

### 3.4.1 Activities to be Undertaken

Same as item 3.2.1

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultants.

### 4.2 UNIDO

| | | Person Months | US$ |
|---|---|---|---|
| Trawling Expert | | 3.5 | 43 125 |
| Sardinella Expert | | 3.5 | 43 125 |
| Artisan Fishing Expert | | 3.5 | 43 125 |
| Credit Specialist | | 3.5 | 43 125 |
| Training Specialist | | 3.5 | 43 125 |
| Total International Experts | | 17.5 | 215 625 |
| Project Travel | | | 3 000 |
| Staff Travel | | 1.0 | 10 500 |
| National Experts | | 4.0 | 8 000 |
| Total Personnel | | 22.5 | 237 125 |
| Fellowships | | 60.0 | 210 000 |
| In-service Training | | | 90 000 |
| Total Training | | 60.0 | 300 000 |
| Expendable Equipment | Training Material | | 30 000 |
| Total Equipment | | | 30 000 |
| Sundries | | | 6 000 |
| Total Miscellaneous | | | 6 000 |
| Project Total | | | 573 125 |
| UNIDO Overhead | | | 74 506 |
| Total | | | 647 631 |

## PROJECT 7. Credit to the Fisheries Sector

### 1. Background and Justification

Difficult access to credit and the accompanying high interest charges have been the major obstacles to fleet as well as plant modernization. This has resulted in an inefficient operation both at the fishing and processing levels. It is essential that a new credit policy is enacted to safeguard these operations.

Fisheries is considered a high risk endeavor in Senegal by the financial institutions and as such, access to credit has become very difficult. Recognizing the need to make more credit available to the sector to enable fish producers and processors to modernize or expand their operations, the Government has put in place a number of programs for execution by both the existing financial institutions and some newly created ones. Those mostly involved in fisheries include;

i. BNDS (Banque Nationale de Développement du Sénégal)
ii. SOFISEDIT (Societé Sénégalaise pour le Développement de l'Industrie et du Tourisme)
iii. CNCAS (Caisse Nationale de Crédit d'Agricole du Sénégal
iv. SONAGA (Societé Nationale de Guarantie, d'Assistance et de Crédit)
v. CEPIA (Caisse de l'Encouragement à la Pêche et à l'Industrie Animale)

The BNDS was a third co-beneficiary of a line of credit for the motorization of canoes established with the assistance of CIDA. SOFISEDIT operates an equipment loan for the artisan fish processors and distributors. In addition, this institution handles a marine credit scheme.

CNCAS was established in 1984. It is a joint venture company with the participation of two French institutions - CCCE and Credit Agricole. The foreign partners hold 20 % of the capital and provide direct assistance. CNCAS is responsible for providing loans to artisan fishermen and also operates a marine credit scheme. It is the third co-beneficiary of a line of credit for fishermen equipment established by the ADF under an in-shore artisan fishery development project.

SONAGA, too, operates a loan scheme for artisan fishermen. CEPIA is a special treasury account fed by contributions from the fish producers, processors and traders.

Not only have these efforts to stimulate fisheries investment by making credit readily available at reasonable terms been concentrated - for whatever reasons - in the artisan sub-sector but they have not yielded the expected results. This had led to a dependence on commercial banks for fisheries loans, especially in the industrial part of the sector. But the

excessive guarantees that these institutions demand because of inadequate understanding of the sector, coupled with high financial charges, have discouraged operators in the fisheries sector from utilizing their services. The sector has thus been neglected despite its position as the leading foreign exchange earner. Clearly, it deserves a new and effective credit policy. Industrial fishing operators are obliged to make substantial investments to ensure the replacement of fishing fleets and modernization of factories. Worldwide the fisheries sector is basically export-oriented and as such often enjoy tax rebates for profit reinvested. But this is not the case in Senegal where fisheries is is regarded not as an industrial but as commercial activity.

To stimulate investment activities in this sector, it is necessary to introduce a modern investment tax credit scheme. This would facilitate efforts by shipowners and processors in expanding or modernizing their operations.

## 2. Objectives

### 2.1 Development Objective

Revitalizing the fishing industry through expansion and modernization of existing fishing fleet and processing plants and improvement in support services.

### 2.2 Immediate Objectives

i. Establish effective marine credit scheme, facilitating credit access and easing credit conditions;
ii. Introduction of a modern investment tax credit scheme.

## 3. Expected Results

### 3.1 Expected Results 1

Study report including concrete recommendations for Government policies regarding investment tax credit and guidelines for new marine credit scheme.

#### 3.1.1 Activities to be Undertaken

i. Review existing facilities and identify bottlenecks
ii. Determine requirements for an effective credit scheme for the industrial fisheries system in close cooperation with GAIPES
iii. In consultation with GAIPES, identify a body - whether an existing financial institution or a newly created one - to administer the program
iv. Make policy recommendations
v. Draft operating guidelines for new marine credit scheme

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultant.

### 4.2 UNIDO

| | | Person Months | US$ |
|---|---|---|---|
| Credit Specialist | | 3.5 | 46 625 |
| Total International Experts | | 3.5 | 46 625 |
| Staff Travel | | 0.5 | 5 250 |
| National Experts | | 2.0 | 7 000 |
| Total Personnel | | 6.0 | 58 875 |
| Study Tours | | | 20 000 |
| Total Training | | | 20 000 |
| Expendable Equipment | Microcomputer | | 8 000 |
| Total Equipment | | | 8 000 |
| Sundries | | | 2 000 |
| Total Miscellaneous | | | 2 000 |
| Project Total | | | 88 875 |
| UNIDO Overhead | | | 11 554 |
| Total | | | 100 428 |

# PROJECT 8. Fisheries Industrial System Information and Investment Promotion Center

## 1. Background and Justification

Senegal's fishing industry is characterized by an aging fleet which needs to be gradually replaced or modernized if the sector is to remain the backbone of the economy. Studies carried out by the DOPM in 1983 indicated that the average age of sardinella vessels was 27 years, trawlers 20 years and tuna fleet 31 years. Little has changed since then. Now the country's industrial fleets are increasingly spending more days at port undergoing repairs and fewer days at sea fishing. An analysis of this constraint demonstrates that if an existing old 24-meter ice sardinella vessel is replaced by a new one with similar tonnage, revenue could double while repair and maintenance costs could drastically be reduced.

To ensure its continued financial viability, this sector is not only expanding but also undergoing significant structural changes. The vessels with GRT of 50 Mt or less are gradually being replaced by larger ones. Some old ice boats are dilapitaded and are becoming increasingly uneconomical as costs mount and the price for fresh fish remains very low in Dakar. The shipowners are showing a preference for freezer vessels over ice trawlers, gradually abandoning the latter type through conversion or replacement.

The Senegalese industrial fishing fleet, especially the trawler fleet, is often bought second-hand from Europe. Already it has been technically obsolete for many years, and it is poorly maintained for lack of spare parts, cash, skilled labor, and management foresight. The fleet's modernization is widely seen as a necessary condition for the very survival of the sector. This could take place either through the purchase of newer second-hand vessels or the building or commissioning of entirely new boats. A major obstacle is financing. Another is lack of information covering alternative sources for new or used vessels.

Second-hand boats are now bought mainly in France, some in Spain. The reason for this are the traditional ties between France and its former colony and ease of communications (common language but also quick telecommunication links). This arrangement may be cozy but probably not the most economical one as used vessels could be obtained cheaper from for example the US or Mexico. There is, however, a relative lack of information about offerings and communication (language) capabilities.

There are major problems for the ship owners in getting spare parts in Dakar Port: they are expensive and hard to come by. Therefore, practically every owner maintains his own shop and parts inventory, in addition to having a partner in Europe who can assist in getting a needed part to Dakar quickly - a small part can get there via air within a week, including time to clear customs etc. But, of course, this is a rather costly solution.

Most of the equipment utilized in the fish processing sector is obsolete and technically outdated. This has adversely affected all factors of production: energy consumption is high, repair and maintenance costs are excessive, labor costs continue to mount as the functions remain more labor intensive than necessary due to the low level of automation. The situation is aggravated by a lack of accurate, relevant information on alternative technologies, equipment etc.

### 2.1 Development Objectives

Revitalizing the fishing industry through expansion and modernization of existing fishing fleet and processing plants and improvement in support services.

### 2.2 Immediate Objectives

Establishment of a Vessel and Equipment Exchange and Information Center.

## 3. Expected Results

### 3.1 Expected Results 1

Information network on fishing investment to advise on types of fishing vessels, processing equipment as well as sources of supply and prices. It should be in line with INFOPECHE, an FAO regional fish project that advises the fishing industry on matters concerning fish trade.

#### 3.1.1 Activities to be Undertaken

i. Set up information network on fishing investment;
ii. Establish an up-to-date, computerized register on suppliers of fishing vessels, fish processing equipment, other relevant materials for the fishing and fish processing industry;
iii. Devise an investment promotion strategy for the industry;
iv. Establish an up-to-date, computerized register on providers of repair and maintenance services.

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultant.

### 4.2 UNIDO

| | Person Months | US$ |
|---|---|---|
| Technical Procurement Expert | 5.5 | 66 825 |
| Total International Experts | 5.5 | 66 825 |
| Staff Travel | 0.5 | 5 250 |
| National Experts | 2 | 7000 |
| Total Personnel | 8.0 | 79 075 |
| | | |
| Study Tours | | 20 000 |
| In-service Training | 2.0 | 10 500 |
| Total Training | 2.0 | 30 500 |
| | | |
| Expendable Equipment | Microcomputer | 10 000 |
| Total Equipment | | 10 000 |
| | | |
| Sundries | | 2 000 |
| Total Miscellaneous | | 2 000 |
| | | |
| Project Total | | 121 575 |
| UNIDO Overhead | | 15 805 |
| Total | | 137 379 |

# PROJECT 9. Study to Improve Inland Fish Distribution

## 1. Background and Justification

Utilization of fish in the fresh form is very popular in Senegal. In 1987, more than half of the artisan catch was distributed in this form. The bulk of fresh fish that enters the distribution chain originates from the Thies region. Dakar is by far the leading market for the fresh fish products.

Fish distribution problems are rather acute in the artisan sector. The Government has initiated a number of programs to improve the distribution of artisan catch but management problems have turned these efforts fruitless. A cold chain has been established with the installation of seven new cold stores along the Senegalese coast and eight stores inland with the assistance of Danish and Japanese aid. Together with previously installed ice making facilities and stores, through Canadian aid, they serve as short term storage for fish prior to traditional processing. However, energy costs are very high and add to product costs. Moreover, maintenance problems and at least in some instances inappropriate location have rendered most of the facilities ineffective - some of them hardly function at all.

Other cold stores, primarily in Dakar and at Casamance, serve to hold supplies for industrial export products. Due to the high cost of power and frequent black-outs, the operating costs of these stores are also unduly high, ultimately affecting the international competitiveness of the end product.

Quality control and product standards in processing, packaging, storage, and transportation need considerable attention. Each year, substantial volumes of fish mostly from the artisan sector, are wasted through spoilage. To significantly reduce the volume of fish lost annually through spoilage - a loss representing several millions of FCFA to the country - new measures have to be effected to streamline the distribution activities.

Cured fish distribution has equally become difficult partly due to the rising costs of transportation. The distribution of cured fish products follows three main channels in Senegal (see Table 9 above for an explanation of the local names):

(a) "guedj", "yeet", and "ketiakh" for the urban markets;
(b) "tambadiang" for the rural markets; and
(c) "metorah" and "saly" usually for the export markets.

The cured fish distribution is dominated by small, women traders who get their supplies from such major fish processing centers as Joal, Mbour, Djifere, Kayar, Rufisque, and Zuiguinchor.

Inland fish distribution is usually concentrated in cities and towns with good access roads. Those with deteriorated roads usually suffer from inadequate supplies. As a consequence, a low per capita fish intake is observed in several inland towns and villages.

The often poor conditions of the cold stores, the utilization of ordinary trucks for transportation, the partial thawing of frozen fish between landing and storage and/or during transportation, and frequent breakdowns of refrigeration equipment and trucks, power failures, etc. all contribute to spoilage and a lowering of quality. Re-freezing of once thawed product also lowers the quality a great deal although perhaps not enough to render the product unfit for local markets. Smoked products are some times re-smoked several times before final consumption in order to retard inherent deterioration due to poor quality standard in the first place.

Lack of ice or the application of too little ice as a major factor in the deterioration of the quality of fresh, chilled and frozen fish and shrimp. Improper handling also contributes to lower than necessary quality. The quality of smoked, salted, or dried product is mostly affected by poor handling, and unsanitary and inadequate packaging and storage. At times no packaging or other protection at all against insects and rodents is used.

It has been estimated that the losses between landing and consumption vary from 15 to 35 per cent for the artisan sector. Undoubtedly, the reduction in these losses through proper handling, processing, packaging, and storage offers the greatest opportunity to increase the local consumption of fish and fishery products with no increase in actual captures.

## 2. Objectives

### 2.1 Development Objectives

While fish intake remain high in Dakar and most coastal cities and towns, it remains low in the inland areas. It is the Government aim to improve fish intake in the inland areas by making inland fish distribution more efficient.

### 2.2 Immediate Objectives

i. Facilitate and promote the distribution of fresh and cured fish to inland areas;
ii. Minimized post-harvest losses through an efficient domestic marketing set up.

## 3. Expected Results

### 3.1 Expected Results 1

Concrete suggestions for improvement in fresh fish distribution

### 3.1.1 Activities to be Undertaken

i. Assess existing ice making and cold storage facilities in the central wholesale fish markets, namely Kayar, Joal and Rufisque;
ii. Assess existing cold storage facilities located in inland areas including those in Tambacounda, Louga, Bambey, Fatick, Touba, Matam, Bakel, Kolda and Zuiguinchor;
iii. Assess adequacy of present road transportation system;
iv. Identify problems preventing efficient operation;
v. Suggest realistic measures for improvement in distribution;
vi. Determine feasibility and conditions for private ownership.

## 3.2 Expected Results 2

Concrete suggestions for improvement in cured fish distribution

### 3.2.1 Activities to be Undertaken

i. Improve artisan processing techniques to upgrade traditional products and increase shelf life;
ii. Assess adequacy of present distribution channels;
iii. Suggest realistic measures for improvement in distribution and marketing.

## 3.3 Expected Results 3

Improved fish handling and storage

### 3.3.1 Activities to be Undertaken

i. Provide training in the techniques of fish handling and storage, especially to women;
ii. Provide training in the effective use of handling and storage equipment
iii. Initiate program to ensure that equipment are efficiently used and adequately maintained.

## 3.4 Expected Results 4

Feasibility study of shrink-on vacuum packaging of artisan fishery products

### 3.4.1 Activities to be Undertaken

i. Assess the commercial profitability of vacuum packaging of artisan fishery products;
ii. Suggest technological alternatives for improving packaging and reducing spoilage.

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultant.

### 4.2 UNIDO

| | | Person Months | US$ |
|---|---|---|---|
| Cold Chain Expert | | 1.5 | 23 350 |
| Artisan Processing Expert | | 1.5 | 23 350 |
| Packaging Specialist | | 1.5 | 23 350 |
| Training Specialist | | 2.5 | 36 950 |
| Total International Experts | | 7.0 | 107 000 |
| Project Travel | | | 5 000 |
| Staff Travel | | 0.25 | 4 210 |
| National Experts | | 2.0 | 9 100 |
| Total Personnel | | 9.25 | 125 310 |
| In-service Training | | | 10 000 |
| Total Training | | | 10 000 |
| Expendable Equipment | Training Material | | 15 000 |
| Total Equipment | | | 15 000 |
| Sundries | | | 6 000 |
| Total Miscellaneous | | | 6 000 |
| Project Total | | | 156 310 |
| UNIDO Overhead | | | 20 320 |
| Total | | | 176 630 |

# PROJECT 10. Technical Support to Ancillary Industries

## 1. Background and Justification

Adequate infrastructure for the handling and processing of fish is provided at Dakar Port. There fish is handled in a much better way than in the artisan sector. Ice is manufactured by two specialized enterprises established at the fishing harbor - one produces slab ice and the other flake ice. In addition, some individual companies have ice making facilities to provide their own needs.

The combined production capacity of ice plants located at the fishing port reaches 300 Mt per day. AFRICAMER alone accounts for more than one half of this capacity. With the diminishing number of ice vessels, ice supply problems are not likely to be encountered any time soon, provided the existing facilities are well maintained.

Senegal has adequate cold storage facilities, too. The freezing plants can handle 150 000 Mt of fish each year but are currently utilizing only half the capacity. Nonetheless, occasionaliy during the tuna season there is a storage problem when the cold storage facilities are fully utilized forcing some tuna vessels to off-load in Abidjan.

Currently there are two major repair yards at Dakar Port - Dakar Marine and Manutention Africaine. The former can handle large vessels. In addition, most of the large fishing companies at the Port have their own limited repair shops, referring work beyond their own capabilities to the two above mentioned repair yards. These repair operations are not without their problems either. Employee motivation is low, quality of work does not measure up to the high charges, and repair work is often stretched out over a long time, representing substantial losses of earnings to the ship owners. There are also substantial problems with obtaining spare parts in the Port, and they are expensive. Thus, virtually every ship owner maintains his own stock of parts which of course gets to be more expensive than a central depot. It also helps to have a partner in Europe who can have a needed part air freighted to Dakar within a week, including clearing customs.

The weakness of the ancillary industries is particularly felt in the fish processing sector. To reduce the dependence on importation of inputs for the canneries, companies have been established to produce cans, oil and packaging materials, among other things. Société ELMAF-CARNAUD produces cans locally but has to import a substantial amount of its raw material making the price expensive. Thus the canneries still import about 15 per cent of their can requirements each year. Cans account for over 12 per cent of the total expenditure incurred in the canning industry.

The canneries receive over two thirds of their oil supply from a local source - SONACOS. The remaining one third is imported. Oil took a 10 per cent share of total expenditures in

1987. The company La ROCHETTE manufactures packaging materials locally. But there are complains of inferior products. This is an issue of growing importance because for Senegalese fish products to remain competitive in the overseas market, it is imperative that packaging is upgraded.

## 2. Objectives

### 2.1 Development Objective

Increase the local content in the production of the ancillary industries and upgrade their services to the Senegalese fish processing sector.

### 2.2 Immediate Objectives

i. Upgrade the quality of locally manufactured packaging materials;
ii. Promote economies in the production of Société ELMAF-CARNAUD, SONACOS and la ROCHETTE.

## 3. Expected Results

### 3.1 Expected Results 1

Report analyzing the problems at the packaging company la ROCHETTE with specific recommendations for improving product quality.

#### 3.1.1 Activities to be Undertaken

i. Attach a production expert to la ROCHETTE
ii. Train production staff to improve quality

### 3.2 Expected Results 2

Report analyzing the potentials for expanded production and rational operations at can producer ELMAF-CARNAUD, oil supplier SONACOS, and packaging company la ROCHETTE as well as identifying new sources of raw material.

#### 3.2.1 Activities to be Undertaken

i. Attach production experts to above listed companies;
ii. Identify new sources of raw material for expanded operations;
ii. Identify new African markets in order to enable an increase in outputs.

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultants.

### 4.2 UNIDO

| | | Person Months | US$ |
|---|---|---|---|
| Production Expert 1 | | 3.5 | 45 575 |
| Production Expert 2 | | 1.5 | 23 350 |
| Production Expert 3 | | 1.5 | 23 350 |
| Training Specialist | | 2.5 | 34 950 |
| Total International Experts | | 9.0 | 127 225 |
| Staff Travel | | 0.25 | 4 210 |
| National Experts | | 3.0 | 9 000 |
| Total Personnel | | 12.25 | 140 435 |
| | | | |
| Study Tours | | | 15 000 |
| In-service Training | | | 10 000 |
| Total Training | | | 25 000 |
| | | | |
| Expendable Equipment | Training Material | | 15 000 |
| Total Equipment | | | 15 000 |
| | | | |
| Sundries | | | 6 000 |
| Total Miscellaneous | | | 6 000 |
| | | | |
| Project Total | | | 186 435 |
| UNIDO Overhead | | | 24 237 |
| Total | | | 210 671 |

# PROJECT 11. Rehabilitation of Fish Processing Plants

## 1. Background and Justification

The fish processing sector has emerged as the leading foreign exchange earner for Senegal. Among these activities, freezing and canning are by far the most important. Virtually all frozen and cured fish products are exported. Occasionally small quantities of canned fish products are utilized for domestic consumption; otherwise, the canned fish products are also produced for the export market. About a third of the fish meal is utilized locally (although according to the official statistics, all the production is exported).

Despite the important role this sector plays in the economy, it faces an array of problems and it has to be restructured to become competitive. Now it has to depend on Government subsidies to keep afloat or generate profit. In 1987 alone, the sector received an export subsidy of FCFA 4.48 billion or about ten per cent of its export earnings.

All the four industrial fish processing activities in the country, namely, freezing, curing, canning and the production of fish meal are facing problems with inadequate raw fish supply. Capacity utilization has been very low, ranging from 25 per cent for the fish meal industries to 57 per cent for the canneries. It has had disastrous consequences for the freezing companies many of which have ceased operating. Even with the export subsidy, the profitability of the fish meal plants can no longer be assured if they continue to produce at a dismal 25 per cent of capacity.

The fish meal industry depends more on tuna offal than sardinella to feed their plants. Thus, even with the tuna canneries operating at 80 per cent capacity, the offal generated would only be adequate to enable the fish meal plants to operate at 35 per cent of their capacity, given the present tuna offal to sardinella ratio of 3:1. The fish meal producers would thus have to increase their dependence on sardinella to beef up their production . This is not only expensive but could also deprive consumers some of their demands. The two present fish meal plants could fare better if they were incorporated into one entity and/or vertically integrated into the existing tuna canning operations.

UNIDO estimates that an industrial fish curing operation, processing only 2 500 Mt of fish annually is not an economically viable activity if the plant is established as a separate entity. Only if such an industrial curing activity were integrated into an existing freezing plant could it be operated profitably at such a small scale. In fact, the calculations show that it could generate profits even without the present export subsidy, assuming that almost all the fixed costs and a number of the variable costs, except the major items such as raw fish and salaries, are absorbed by the freezing operation.

Overcapitalization is not only a problem in the fish meal sector but also extends to the canning

and freezing plants. The production capacities of these plants far exceed the amount of raw fish producers can now supply. A revitalized fishing fleet could partly provide an answer in increasing the availability of raw material. However, regrouping or merging some of the fish processing units could provide a financially attractive alternative, at least until the raw fish supply could be augmented. Importing more raw fish would also provide an alternative although this would have to be balanced against the resulting increased export earnings in order to determine the economic feasibility of such a move.

For Senegal's fish processing industry to remain competitive, it is essential to establish a preferential industrial rate for energy utilization. Energy costs are far lower in Thailand or even closer, in Ghana enabling them to produce canned fish at a much cheaper cost. Operations using ice are also adversely affected by the current high charges for power in Senegal. For the long run, however, it is important to make the industry competitive and decrease its dependence on imported inputs as well as Government subsidies. This is truly a daunting task given that the Senegalese canneries are now operating at 50 per cent higher cost than their competitors from Thailand and the event of 1992 may well remove their favored position on French markets.

Most of the equipment utilized in the fish processing sector is obsolete and technically outdated. This has adversely affected all factors of production: energy consumption is high, repair and maintenance costs are excessive, labor costs continue to mount as the functions remain more labor intensive than necessary due to the low level of automation.

Labor legislation in Senegal is rigid and not favorable to the fish processing industries where labor requirements are highly seasonal. Of the 6 800 people employed by the fish processing plants in 1987, more than two thirds were permanent staff despite the seasonal character of the operations. To significantly minimize expenditure in this industry, the permanent work force will have to be trimmed down in favor of seasonal labor. Labor productivity is also low, far lower than in competing countries. Socioeconomic and attitudinal factors are at play here and it will take far more skilled management practices than present ones as well as new incentive structures to bring about changes necessary for the long term viability of fish processing (and indeed other types of ) industries in Senegal.

## 2. Objectives

### 2.1 Development Objectives

Increase the international competitiveness of the Senegalese fish processing industry thus enabling a reduction in the present level of subsidies, or the elimination subsidies altogether.

### 2.2 Immediate Objectives

i. Improve profitability of fish processing plants;

ii. Increase capacity utilization of fish processing activities.

## 3. Expected Results

### 3.1 Expected Results 1

Detailed study of present situation within the Senegalese fish processing industry with concrete recommendations for increased efficiency in operations.

#### 3.1.1 Activities to be Undertaken

i. Rehabilitation analysis of fish processing plants to reduce operating costs
ii. Provide in-plant training of workforce

### 3.2 Expected Results 2

Detailed study of present situation within the Senegalese fish processing industry with concrete recommendations for increased utilization rates in operations.

#### 3.2.1 Activities to be Undertaken

i. Operations analysis of fish processing plants to increase capacity utilization;
ii. Analysis of merger opportunities and possibilities to vertically integrate operations;
ii. Management training

## 4. Project Contribution

### 4.1 Government of Senegal

The Senegalese Government will provide administrative support and also provide office accommodation for the consultants.

### 4.2 UNIDO

| | Person Months | US$ |
|---|---|---|
| Cannery Expert | 1.5 | 23 350 |
| Training Specialist | 3.5 | 45 575 |
| Cold Store Expert | 1.5 | 23 350 |
| Fish Meal Expert | 1.5 | 23 350 |
| Fish Curing Expert | 1.5 | 23 350 |
| Total International Experts | 9.5 | 138 975 |
| | | |
| Project Travel | | 3 000 |
| Staff Travel | 0.25 | 4 210 |
| National Experts | 4 | 10 000 |
| Total Personnel | 13.75 | 156 185 |
| Fellowships | 6 | 21 000 |
| In-service Training | | 30 000 |
| Total Training | 6 | 51 000 |
| | | |
| Expendable Equipment | Training Material | 30 000 |
| Total Equipment | | 30 000 |
| | | |
| Sundries | | 6 000 |
| Total Miscellaneous | | 6 000 |
| | | |
| Project Total | | 243 185 |
| UNIDO Overhead | | 31 614 |
| Total | | 274 799 |

# PROJECT 12. Improved Utilization of "Little Tuna"

## 1. Background and Justification

"Little tuna" includes the following species

- black skipjack (thonine), euthynnus alletteratus
- frigate tuna (auxide), auxis thazard
- West African spanish mackerel (maquereau bonite), scomberomorus tritor
- Atlantic bonito, (bonite à dos raye), sarda sarda

Studies by CRODT indicate that total production of "little tuna" in Senegal reached 13 000 Mt in 1975. This has since shown a dramatic decline. Little tuna production dropped to 6 112 Mt in 1986 but gained the following year reaching 9 052 Mt.

PRODUCTION OF "LITTLE TUNA", by Fishery and Major Species, 1987 (Mt)

| Major Species | Artisan | Industrial | Total |
|---|---|---|---|
| Black Skipjack | 3 086 | 2 606 | 5 692 |
| Frigate Tuna | - | 1 047 | 1 047 |
| West African Spanish Mackerel | 1 700 | - | 1 700 |
| Atlantic Bonito | 613 | - | 673 |
| Total | 5 399 | 3 653 | 9 052 |

Source: CRODT, Dakar

It is believed that the country's fishing grounds support a significant volume of these species but several constraints have prevented their exploitation, processing and marketing.

The little tuna stocks are harvested mostly by artisan fishermen. The industrial tuna fleet, particularly the seiners, have also been catching significant volumes of these species. But the operators of these vessel are showing little interest in exploiting these resources due to the weak domestic demand, storage problems, lack of appropriate technology to can them, and the unexplored export potentials.

Black skipjack market price averaged FCFA 148 per kilo in Dakar and FCFA 202 in Diourbel in 1986 according to studies undertaken by CRODT. These prices remain about the same today. Thus, with rising operating costs, industrial fishermen are abandoning this fishery in favor of more profitable ones.

Similarly, there has been no enthusiasm on the part of either the freezing companies or the

canneries to process "little tuna" as frozen or canned products for the export markets mainly due to the lack of appropriate technology for the industrial processing. Due to the relatively tough skins of "little tuna", current freezing techniques do not yield a product of desired quality. Reportedly, however, the technological problems have been overcome in Taiwan Province of China and in the Republic of Korea. Another potential problem is inadequate production volumes today for canneries to instal specialized processing lines to can "little tuna".

## 2. Objectives

### 2.1 Development Objective

To promote the exploitation of "little tuna" resources

### 2.2 Immediate Objectives

i. Technological feasibility study of processing "little tuna" including establishing minimum production volumes;
ii Financial feasibility study including studies of market potentials in Africa and Europe (especially Federal Republic of Germany)

## 3. Expected Results

### 3.1 Expected Results 1

Assessment of "little tuna" stocks and earning potential for fishing operations

#### 3.1.1 Activities to be Undertaken

i. Estimate the annual catch potential by species and by fishing zone;
ii. Determine costs and earnings for boats operating in this fishery

### 3.2 Expected Results 2

Assessment of technological and financial feasibility of processing "little tuna"

#### 3.2.1 Activities to be Undertaken

i. Identification of alternative technologies;
ii. Technological feasibility study;
ii. Determination of volumes of fish required to profitably operate alternative capacities.

### 3.3 Expected Results 3

Assessment of financial feasibility of processed "little tuna"

### 3.1 Activities to be Undertaken

i. Examine potential demand in Cameroon, Gabon, Zaire and Congo for cured products;
ii. Examine potential demand in the European market particularly Federal Republic of Germany mainly for the canned product;
iii Determine financial feasibility by market and product group.

## 4. Project Contribution

### 4.1 Government of Senegal

The Government will provide administrative support and office accommodation for the consultants.

| 4.2 UNIDO | Person Months | US$ |
|---|---|---|
| Technology Expert | 3.5 | 42 650 |
| African Market Expert | 2.0 | 31 075 |
| Total International Experts | 5.5 | 73 725 |
| Project Travel | | 1 000 |
| Staff Travel | 0.25 | 4 210 |
| National Experts | 2.0 | 5 000 |
| Total Personnel | 7.75 | 83 935 |
| Subcontracts | Assessment of Stocks | 60 000 |
| | Profitability of Boats | 20 000 |
| | European Market Study | 60 000 |
| Total Subcontracts | | 140 000 |
| Study Tours | | 6 000 |
| Total Training | 0 | 6 000 |
| Expendable Equipment | Microcomputer | 10 000 |
| Total Equipment | | 10 000 |
| Total Miscellaneous | | 2 000 |
| Project Total | | 241 935 |
| UNIDO Overhead | | 31 452 |
| Total | | 273 386 |

# PROJECT 13. Utilization of Sea Snail Shells

## 1. Background and Justification

Today a great deal of sea snail shells go completely unutilized, effectively only littering artisan landing beaches. As the example of the Philippines and other Asian countries shows, such shells could be turned into decorative items and small jewelry through small cottage industries, and sold to domestic urban markets and to tourists.

## 2. Objectives

### 2.1 Development Objective

Deal with a litter problem (discarded shells on the beach) while at the same time generate rural income and develop industrial skills.

### 2.2 Immediate Objectives

i. Establish technological feasibility of utilizing sea snail shells for decorative items and small jewelry;
ii Establish financial feasibility including studies of market potentials.

## 3. Expected Results

### 3.1 Expected Results 1

Technological and financial feasibility studies

#### 3.1.1 Activities to be Undertaken

i. Estimate the annual production potential;
ii. Determine technological feasibility;
iii. Determine costs and earnings for cottage operations.

### 3.2 Expected Results 2

Market assessment

#### 3.2.1 Activities to be Undertaken

i. Survey domestic market potential;
ii. Survey tourist market potential;

### 3.3 Expected Results 3

Trained entrepreneurs/handicraft workers.

### 3.3.1 Activities to be Undertaken

i. Provide training in working sea shell material and designs;
ii. Provide training in small scale business management

### 4. Project Contribution

Estimated approximate total project cost: $80 000

## PROJECT 14. Increased Utilization of Shrimp Heads: Feasibility Study

### 1. Background and Justification

In some markets today, the consumer preference is for the (peeled and ) headless form of shrimp. In the United Sates, shrimp is almost never served with the head on. In Japan, too, headless shrimp is the most popular form. With the exception of Spain, the European countries are all major markets for headless shrimp. In France there is a less marked preference for whole, unpeeled shrimp.

The discarded head generally represents a waste that could be used for making shrimp or shrimp and fish bisque (made from scrap such as heads) in dried, powder form appear interesting. It might also be possible to extract chitin (a polymer with many possible applications) from the shells of crustaceans in sufficiently large quantities to make it commercially viable.

If such production is found financially feasible, investment in plants and/or facilities should follow.

### 2. Objectives

### 2.1 Development Objective

Deal with a litter problem (discarded heads and shells) while at the same time generate export earnings through high Value Added products and develop industrial skills.

## 2.2 Immediate Objectives

i. Establish technological feasibility of utilizing shrimp heads for making shrimp or shrimp and fish bisque in dried, powder form;
ii Establish financial feasibility including studies of market potentials;
iii. Establish requirements for investment in plant and equipment;
iv Establish labor and training requirements.

## 3. Expected Results

### 3.1 Expected Results 1

Technological and financial feasibility studies

#### 3.1.1 Activities to be Undertaken

i. Estimate the annual production potential;
ii. Determine technological feasibility;
iii. Determine costs and earnings for industrial operations.

### 3.2 Expected Results 2

Market assessment

#### 3.2.1 Activities to be Undertaken

i. Survey domestic market potential;
ii. Survey European market potential;

### 3.3 Expected Results 3

Investment and labor requirements

#### 3.3.1 Activities to be Undertaken

i. Provide technical specifications for plant and equipment;
ii. Outline labor and management requirements for plant
iii. Make corresponding cost estimates

## 4. Project Contribution

Estimated approximate total project cost: $180 000

# PROJECT 15. Low Cost Packaging of Artisan Fishery Products; Feasibility Study of Shrink-On Vacuum Packaging

## 1. Background and Justification

The often poor conditions of the cold stores, the utilization of ordinary trucks for transportation, the partial thawing of frozen fish between landing and storage and/or during transportation, and frequent breakdowns of refrigeration equipment and trucks, power failures, etc. all contribute to spoilage and a lowering of quality. Re-freezing of once thawed product also lowers the quality a great deal although perhaps not enough to render the product unfit for local markets. Smoked products are some times re-smoked several times before final consumption in order to retard inherent deterioration due to poor quality standard in the first place.

Lack of ice or the application of too little ice as a major factor in the deterioration of the quality of fresh, chilled and frozen fish and shrimp. Improper handling also contributes to lower than necessary quality. The quality of smoked, salted, or dried product is mostly affected by poor handling, and unsanitary and inadequate packaging and storage. At times no packaging or other protection at all against insects and rodents is used.

It has been estimated that the losses between landing and consumption vary from 15 to 35 per cent for the artisan sector. Undoubtedly, the reduction in these losses through proper handling, processing, packaging, and storage offers the greatest opportunity to increase the local consumption of fish and fishery products with no increase in actual captures. However, these losses also represent a major challenge for adaptive technology in low-cost packaging of stable products acceptable to the consumer. Since small packs are best suited to the purchasing power of most families, the cost of a 4 oz. tin can per unit of protein is too high although its shelf life is indefinite. Shrink-on or plastic vacuum packaging of stable products would seem a more appropriate alternative.

## 2. Objectives

### 2.1 Development Objective

Increase the amount of processed fish actually available for consumption through a reduction spoilage.

### 2.2 Immediate Objectives

i. Establish technological feasibility of using shrink-on or plastic vacuum packaging of stable fishery products;

ii Establish financial feasibility including studies of market potentials;

iii. Establish requirements for investment in plant and equipment;
iv Establish labor and training requirements.

## 3. Expected Results

### 3.1 Expected Results 1

Technological and financial feasibility studies

#### 3.1.1 Activities to be Undertaken

i. Estimate the annual production potential;
ii. Determine technological feasibility;
iii. Determine costs and earnings for industrial operations.

### 3.2 Expected Results 2

Market assessment

#### 3.2.1 Activities to be Undertaken

i. Survey domestic market potential;
ii. Survey African market potential;

### 3.3 Expected Results 3

Investment and labor requirements

#### 3.3.1 Activities to be Undertaken

i. Provide technical specifications for plant and equipment;
ii. Outline labor and management requirements for plant
iii. Make corresponding cost estimates

## 4. Project Contribution

Estimated approximate total project cost: $180 000

# PROJECT 16. Develop Machine for Skinning, Boning, and Filleting of Trigger Fish

## 1. Background and Justification

Surimi is a processed fish paste made from a whitefish and flavored and shaped to taste and look like various seafood products. It has been a staple of the Japanese diet for centuries and the demand for it is now picking up elsewhere as well, particularly in the U.S. In 1984, Americans consumed 75 million lb of surimi-based products, worth about $200 million wholesale. By some estimates, those figures could increase 15-fold by 1990. Surimi's potential does not end with being a substitute for low cost seafood. Producers hope that one day it can be used as tofu now.

Trigger fish, abundant in West African waters, is hardly utilized at all because it is very bony and its skin is equally tough. However, the feasibility of using this resource for surimi should be looked in to. The pay-off from a technologically innovative project could be handsome. But, it is well to remember that surimi requires the fish to be processed to be absolutely fresh.

Another possible use for trigger fish could be in feeding the fish meal plants in Senegal that are now starved for raw material (tuna offal). Here the boniness of this fish could be a plus as it ought to translate into a high calcium content, a desirable quality in fish meal used for chicken feed.

## 2. Objectives

### 2.1 Development Objective

Increase the utilization of trigger fish.

### 2.2 Immediate Objectives

i. Establish technological feasibility of machine for skinning, boning, and filleting of trigger fish;
ii Establish financial feasibility including studies of market potentials for processed trigger fish;
iii. Establish requirements for investment in plant and equipment;

## 3. Expected Results

### 3.1 Expected Results 1

Technological and financial feasibility studies

### 3.1.1 Activities to be Undertaken

i. Determine technological feasibility;
ii. Determine development requirements and costs;
iii. Determine earnings potential.

### 3.2 Expected Results 2

Market assessment

### 3.2.1 Activities to be Undertaken

i. Survey domestic market potential;
ii. Survey African market potential;
iii. Survey European market potential

### 3.3 Expected Results 3

Investment requirements

### 3.3.1 Activities to be Undertaken

i. Provide technical specifications for plant and equipment for skinning, boning, and filleting of trigger fish;
ii. Outline labor and management requirements for plant
iii. Make corresponding cost estimates

### 4. Project Contribution

Estimated approximate total project cost: $300 000

## PROJECT 17. Organization of Wholesale Buying and Marketing of Artisan Fishery Products to African Markets

### 1. Background and Justification

Representatives of the packing factories and small traders (fish mongers) purchase the landed fish from the fishermen.

Approximately ten per cent of the artisan landings are consumed locally. Some 60 per cent are sold on local markets and the rest is absorbed by traders. There are some 1 200 fish mongers but only 20 per cent of them operate in a regular fashion. Cold store facilities are

inadequate. Quality of the processed products as well as packaging often leaves a lot to be desired. Thus, both the quantity and quality of the distributed product is irregular and prices are unstable much depending on season, geographical region and even hours of the day.

Senegal has traditionally had strong links with the African markets - approximately ten per cent of the artisan processed product is exported to Guinea, Guinea-Bissau, Ghana, Nigeria and Gambia. The share of total exports going to these markets, however, has been steadily declining. In 1983, the African markets accounted for 56 per cent of the total volume of Senegal's fish exports. This share declined to 48 per cent by 1985 and indications are the situation has not changed much since then. This trend is attributed to the near collapse of the Senegalese sardinella fleet as well as to deteriorating financial conditions (convertibility of currencies, export credit financing, and risk) making these markets very uncertain. The currency devaluations in certain countries outside the FCFA zone has also made exports difficult to these markets.

It should also be noted that the constantly changing trade policies in a number of fish importing countries in Africa have not been conducive to maintaining stable trade relationships. Often the governments of these countries curtail fish imports with short notice by imposing high tariffs in response to acute foreign exchange shortages. Nonetheless, Senegalese exporters should, and do, regard the African markets with interest given their vast demand potential and geographical proximity that allows Senegalese producers to respond to marketing opportunities swiftly and efficiently. In addition, many low unit value species that are unsuitable for European, Japanese and North American markets, make good export products for the African markets. To bring down the currently unnecessarily high transportation charges, some way has to be found to assembly larger lots for shipment.

These problems are disproportionally magnified for the small trader. Conversely, their impact, especially as far as risk and transportation costs are concerned, could be lessened if small operations were combined into a larger scale wholesale buying and marketing scheme for artisan fishery products.

## 2. Objectives

### 2.1 Development Objective

Increase exports of artisan processed fishery products to African markets.

### 2.2 Immediate Objectives

Organization of Wholesale Buying and Marketing of Artisan Fishery Products to African Markets

### 3. Expected Results

### 3.1 Expected Results 1

Report on the feasibility of organizing a wholesale buying and marketing scheme for artisan fishery products to African markets, and corresponding recommendations.

#### 3.1.1 Activities to be Undertaken

i. Determine feasibility;
ii. Determine development requirements and costs;
iii. Determine earnings potential;
iv. Make recommendations.

### 3.2 Expected Results 2

Investment requirements

#### 3.3.1 Activities to be Undertaken

i. Provide financial plan for scheme;
ii. Outline labor and management requirements;

### 4. Project Contribution

Estimated approximate total project cost: $50 000

## PROJECT 18. Analysis of the Senegalese Insurance Business to Determine Efficiency and Make Recommendations for Restructuring

### 1. Background and Justification

The Government's current policy of disinvestment from the productive sector is good but it needs to be supplemented by measures to ensure that prospective investors from the private sector have the financial means to take over. Financing at reasonable terms is now sorely lacking in many instances, especially within the fisheries industrial system. A State supported but industry managed export credit guarantee[52] or insurance scheme as already

[52] For main considerations in operating an export credit insurance agency, see "Export Credit Insurance: Key Factors for Successful Operations," Forum No 2/1988, International Trade Centre UNCTAD/GATT, Geneva, Switzerland

suggested by GAIPES is one possibility worth investigation by a financial expert.[53]

## 2. Objectives

### 2.1 Development Objective

Develop credit and insurance institutions geared to the specific characteristics of the fisheries industrial system

### 2.2 Immediate Objectives

Lower the cost of insurance to Senegalese operators within the fisheries industrial system.

## 3. Expected Results

### 3.1 Expected Results 1

Analysis of the Senegalese insurance business to determine efficiency including recommendations for restructuring

#### 3.1.1 Activities to be Undertaken

i. Determine present modes of operations within the Senegalese insurance business;
ii. Develop recommendations acceptable to both insurance and industry operators;

## 4. Project Contribution

Estimated approximate total project cost: $80 000

# PROJECT 19. Setting-up of a Quality Control Scheme with Laboratory

## 1. Background and Justification

In Senegal, quality control and product standards in processing, packaging, storage, and transportation need considerable attention, especially when the product is destined for sophisticated export markets. Other developing countries, Chile for example, have found that establishing a rigorous quality control scheme not only increases and stabilizes quality levels at set standards but also enhances the acceptability of certified product consignments

53 See Reunion Sectorielle sur la Pêche Maritime (Dakar, 29-30 October 1986), Document Final. Secrétariat d'Etat aux Ressources Animales, Ministère du Développement Rural, République du Sénégal, Dakar, Nov 1986, p. 18 -19

on export markets. This has a direct bearing on profitability of export operations.

To maintain or improve its share on major markets, it is essential that the Senegalese exporters emphasize quality. High quality translates into substantial price increases.

Senegalese fishery products hardly find their way at all to the North American markets. Current consumer trends on these markets favor lighter and healthier foods such as fish. Moreover, ready made (pre-cooked etc) meals find a receptive market among both individual households and institutions, offering an excellent opportunity for Senegalese producers to increase the Value Added content of their export products. As on the Japanese market, emphasis must lie on impeccable quality, large quantities, reliable deliveries, and appealing and convenient packaging.

The exports of cuttlefish now go mainly to Japan but more attention than presently must be paid to quality if the market share there is to be maintained. Japan is a major fish consuming country and a sophisticated one in its appreciating for fishery products.

## 2. Objectives

### 2.1 Development Objective

Increase exports of processed fishery products.

### 2.2 Immediate Objectives

Organization of a Quality Control Scheme with laboratory

## 3. Expected Results

### 3.1 Expected Results 1

Report on the feasibility of organizing a quality control scheme scheme for fishery products to export markets, and corresponding recommendations.

#### 3.1.1 Activities to be Undertaken

i. Determine feasibility;
ii. Determine development requirements and costs;
iii. Determine operating costs and earnings potential;
iv. Make recommendations.

### 3.2 Expected Results 2

Investment requirements for quality control laboratory

#### 3.2.1 Activities to be Undertaken

i. Provide technical specifications for laboratory and equipment ;
ii. Outline labor and management requirements
iii. Make corresponding cost estimates

### 4. Project Contribution

Estimated approximate total project cost: $100 000

## PROJECT 20. Introduction of Diesel Inboard Engines

### 1. Background and Justification

With a fleet of about 6 000 canoes and annual landings close to 200 000 Mt, Senegal's artisan fishery is very active and contributes greatly to the national economy and general welfare.

Artisan fishing is practised with traditional canoes. Their frames are made from trunks on to which wooden boards are fixed. These canoes can be large in size, reaching 20 meters in length and 20 Mt in capacity. They have a peculiar characteristic of lacking interior internal frames. This makes for a weak structure and unsatisfactory water tightness. Furthermore, their very poor draught provides a resistance in very shallow water but reduces their stability just as much.

Although the cost of fuel and lubrication is the major concern for artisan fishermen, there are also complaints about frequent breakdowns of outboard motors and problems with repairs and maintenance. CAMP, a project set up to promote the motorization of canoes, has gone a long way in providing answers. Thus, centers have been established in major production areas to supply spare parts for outboard motors and provide necessary technical assistance. But the long term effectiveness of the CAMP motorization campaign is not clear, and there is still more to be done. For example, canoes ought to be a redesigned and fitted with inboard engines for better adaptation.

This project would also have a certain regional significance as a new design, if accepted in Senegal (and Ghana), would also very likely be accepted in the entire region.

## 2. Objectives

### 2.1 Development Objectives

To ensure the viability of the artisan fisheries in accordance with its socio-economic importance.

### 2.2 Immediate Objectives

Demonstrate feasibility of replacing outboard engines with inboard diesel engines for artisan canoes.

## 3. Expected Results

### 3.1 Expected Results 1

Construction of 3 types of canoes with inboard diesel engines

#### 3.1.1 Activities to be Undertaken

i. Recruitment of a technologist to work in close collaboration with fishermen's groups;
ii. Recruitment of fishermen who will participate in planning this new canoe;
iii. Defining and implementing the plan and frame of the canoe;
iv. Operating the canoe on trial basis under local fishing conditions;
v. Analysing the technical, economic, socioeconomic and other constraints;
vi. Introducing the canoe to the fishing communities.

### 3.2 Expected Results 2

Audiovisual material for demonstration of optimal new canoe with inboard diesel engine

#### 3.2.1 Activities to be Undertaken

i. Chose optimal canoe design
ii. Produce audiovisual material
iii. Train trainers in using prepared audiovisual material

## 4 Project Contribution

Estimated approximate total project cost: $140 000

# PROJECT 21. Utilization of By-Catch

## 1. Background and Justification

A major problem facing Senegal's fisheries industrial system is the current inadequate level of raw fish supply. Capacity utilization in the various processing plants, in particular in the fish meal business, is low. Human per capita consumption is also down due to low supply and consequent high prices.

The increasing demand will have to be met by use of fish that are now incidentally caught by vessels fishing for certain species only and thrown away at sea - the so-called by-catch. The single largest and most readily available supply is the by-catch of the shrimp trawler fleet.[54]

## 2. Objectives

### 2.1 Development Objective

Reduce waste of fish resources.

### 2.2 Immediate Objectives

Organization of a follow-up regional conference to the Technical Consultation on Shrimp By-Catch Utilization held in Georgetown, Guyana, 27-30 October 1981, sponsored jointly by FAO and International Development Research Centre (IDRC) of Canada.

## 3. Expected Results

### 3.1 Expected Results 1

Report on the progress made in solving technological and economic problems associated with retrieval and processing of fish by-catch since 1981, and corresponding recommendations.

#### 3.1.1 Activities to be Undertaken

i. Organize regional conference;
ii. Disseminate proceedings and recommend ions to fishing operators, fish processing plants, and Governments;

## 4. Project Contribution

Estimated approximate total project cost: $60 000

[54] See Fish By-Catch ... Bonus from the Sea. Report of a Technical Consultation on Shrimp By-Catch Utilization held in Georgetown, Guyana, 27-30 October 1981, FAO, Rome, and IDRC, Ottawa, 1982

# PROJECT 22. Upgrading of Crew Skills to Meet Demands of Modern Onboard Processing

## 1. Background and Justification

Tuna fishing demands advanced techniques and therefore calls for a highly skilled crew. Availability of crew of such calibre in Senegal is often lacking. Therefore shipowners usually depend on foreign expertise that is quite expensive. This has caused a major drain on the financial resources of most tuna vessel owners. In 1987, crew wages alone accounted for nearly 20 per cent of the total costs incurred in operating a tuna vessel.

## 2. Objectives

### 2.1 Development Objective

Reduce operating costs and increase efficiency in fishing operations.

### 2.2 Immediate Objectives

Upgrading of crew skills to meet demands of modern onboard processing

## 3. Expected Results

### 3.1 Expected Results 1

Training of fishing crews

### 3.1.2 Activities to be Undertaken

i. Formulate training program;
ii. Train crew in all facets of fishing and in the use of equipment; and
iii Initiate program to absorb crew in gainful employment

## 4. Project Contribution

Estimated approximate total project cost: $160 000

# PROJECT 23. Training in Vessel Maintenance

## 1. Background and Justification

Senegal's fishing industry is characterized by an aging fleet which needs to be gradually replaced or modernized if the sector is to remain the backbone of the economy. Studies carried out by the DOPM in 1983 indicated that the average age of sardinella vessels was 27 years, trawlers 20 years and tuna fleet 31 years. Little has changed since then. Now the country's industrial fleets are increasingly spending more days in port undergoing repairs and fewer days at sea fishing. UNIDO's analysis of this constraint demonstrates that if an existing old 24-meter ice sardinella vessel is replaced by a new one with similar tonnage, revenue could double while repair and maintenance costs could drastically be reduced.

For the trawl fleet, if an existing old vessel is replaced by a new one with identical specifications, the analysis indicates that the increase in revenue and decline in repair and maintenance costs could be enough to assure profitability despite the 15 per cent interest rate. Tuna vessels are currently operating at a profit but the profitability could be substantially increased if repair and maintenance costs could be reduced.

Weak sardinella prices, escalating repair and maintenance costs as well as high interest charges are the major reasons for the losses recorded by sardinella vessel operators. In 1987, repair and maintenance costs together with interest charges accounted for more than a third of the total expenditures incurred in the operation of a 30 year old, 24-meter purse seiner. On the average, the sardinella purse seiners made only 115 trips per vessel, probably because of a combination of low rentability and repair and maintenance problems with the old vessels. A new vessel, or an older one but in good condition, on the other hand could make about 250 trips a year and land some 2 100 Mt of fish. Considering the enormous stocks of small pelagic resources in Senegal's waters, there appears to be ample scope for a program to revitalize this fishery and make it profitable.

## 2. Objectives

### 2.1 Development Objective

Reduce operating costs and increase efficiency in fishing operations.

### 2.2 Immediate Objectives

Upgrading of vessel maintenance skills

### 3. Expected Results

### 3.1 Expected Results 1

Training of maintenance personnel

### 3.1.2 Activities to be Undertaken

i. Formulate training program;
ii. Train personnel in all facets of vessel maintenance and in the use of equipment; and
iii Initiate program to absorb crew in gainful employment

### 4. Project Contribution

Estimated approximate total project cost: $160 000

## PROJECT 24. Training in Plant Management

### 1. Background and Justification

It must be stressed that that the current high cost of capital for the operators in the fisheries industrial system in Senegal is not only for the Government to solve through its policies and other measures. The operators themselves can significantly affect the final cost of especially working capital. The proper coordination of stocks and operations and the proper scheduling of purchases and processing minimizes a plant's requirements for working capital. For example, shipping charges for large regular shipments can be significantly lower than for irregular ones resulting from erratic production; moreover, such shipments may be delayed or accommodated on a space—available basis only leading to further real costs. All this requires an intimate knowledge of processes and materials flows, especially since raw fish is a perishable product, as well as expertise in modern business management.

The Senegalese industrial fishing fleet, especially the trawler fleet, is often bought second-hand from Europe. Already it has been technically obsolete for many years, and it is poorly maintained for lack of spare parts, cash, skilled labor, and management foresight. The fleet's modernization is widely seen as a necessary condition for the very survival of the sector.

Fish distribution problems are rather acute in the artisan sector. The Government has initiated a number of programs to improve the distribution of artisan catch but management problems have turned these efforts fruitless.

Senegalese labor productivity in the fisheries industrial system is low, far lower than in

competing countries. Socioeconomic and attitudinal factors are at play here and it will take far more skilled management practices than present ones as well as new incentive structures to bring about changes necessary for the long term viability of fish processing (and indeed other types of ) industries in Senegal. New approaches to management as well as worker education is needed for employers to deal effectively with such abuses as absenteeism, unnecessary prolonged sick leave, and refusal to work standing up.

### 2. Objectives

### 2.1 Development Objective

Reduce operating costs and increase efficiency in industrial fisheries operations.

### 2.2 Immediate Objectives

Increased management efficiency and effectiveness

### 3. Expected Results

### 3.1 Expected Results 1

Training of management personnel

### 3.1.2 Activities to be Undertaken

i. Formulate training program;
ii. Train operators in all facets of modern business management; and

### 4. Project Contribution

Estimated approximate total project cost: $260 000

## PROJECT 25. Study of African Markets

### 1. Background and Justification

Senegal has traditionally had strong links with the African markets - approximately ten per cent of the artisan processed product is exported to Guinea, Guinea-Bissau, Ghana, Nigeria and Gambia. The share of total exports going to these markets, however, has been steadily declining. In 1983, the African markets accounted for 56 per cent of the total volume of Senegal's fish exports. This share declined to 48 per cent by 1985 and indications are the situation has not changed much since then. This trend is attributed to the near collapse of the

Senegalese sardinella fleet as well as to deteriorating financial conditions (convertibility of currencies, export credit financing, and risk) making these markets very uncertain. The currency devaluations in certain countries outside the FCFA zone has also made exports difficult to these markets.

It should also be noted that the constantly changing trade policies in a number of fish importing countries in Africa have not been conducive to maintaining stable trade relationships. Often the governments of these countries curtail fish imports with short notice by imposing high tariffs in response to acute foreign exchange shortages. Nonetheless, Senegalese exporters should, and do, regard the African markets with interest given their vast demand potential and geographical proximity that allows Senegalese producers to respond to marketing opportunities swiftly and efficiently. In addition, many low unit value species that are unsuitable for European, Japanese and North American markets, make good export products for the African markets.

Clearly, the above mentioned problems stem to a great deal from a lack of relevant information on the structure of and conditions on key African markets.

## 2. Objectives

### 2.1 Development Objective

Increase Senegalese export earnings.

### 2.2 Immediate Objectives

Increased transparency of key African markets.

## 3. Expected Results

### 3.1 Expected Results 1

Study on how to remove present trade and payment difficulties, develop and introduce new artisan products, promote standard qualities, establish price and quantity stabilization schemes, and how to improve the flow of timely market information.

### 3.1.2 Activities to be Undertaken

i. Identify suitable subcontractors for 10 key market areas;
ii. Conduct individual studies for each market area; and
iii Make recommendations for marketing strategies

### 4. Project Contribution

Estimated approximate total project cost: $600 000

## PROJECT 26. Enterprise-Specific Studies to Determine Actual Possibilities to Lower Operating Costs

### 1. Background and Justification

Senegalese fisheries industrial operators are now frequently operating at significantly higher cost than their competitors from other countries. For example, it is estimated that in a developed country, the running costs of a small (9 to 24 meter) trawler was around $200 000 a year in 1984 and that it could catch, say, 600 tons of cod or 1 500 tons of sardines. Table 24 shows that a Senegalese operator does not come even close to such operational efficiency. Another example: energy costs are far lower in Thailand or even closer, in Ghana enabling them to produce canned fish at a much cheaper cost than Senegal.

Interest payments have been accounting for a substantial share of the costs of operating a vessel in Senegal's industrial fisheries sector. They represented 19 % of the total costs incurred from operating a 24-meter sardinella vessel in 1987. For a new 24-meter sardinella purse seiner, interest charges could reach a third of the total costs at the current 15 % rate charged by local commercial banks. In Europe, operators of competing fleets can obtain financing at far better terms.

Cold stores, primarily in Dakar and at Casamance, serve to hold supplies for industrial export products. Due to the high cost of power and frequent black-outs, the operating costs of these stores are unduly high, ultimately affecting the international competitiveness of the end product.

Most of the equipment utilized in the fish processing sector is obsolete and technically outdated. This have adversely affected all factors of production: energy consumption is high, repair and maintenance costs are excessive, labor costs continue to mount as the functions remain more labor intensive than necessary due to the low level of automation.

Only a few companies are any more involved in freezing despite the large number of registered firms. A typical plant that handled 2 000 Mt of frozen fish products in 1987 generated FCFA 760 million in revenue. However, the total costs incurred far exceeded the earnings and the operators had to rely on Government subsidies to make gains. The expenditure on labor has been unusually high compared to competitors in other countries.

An industrial fish curing operation, processing only 2 500 Mt of fish annually is not an economically viable activity if the plant is established as a separate entity. Only if such an

industrial curing activity were integrated into an existing freezing plant could it be operated profitably at such a small scale. In fact, calculations show that it could generate profits even without the present export subsidy, assuming that almost all the fixed costs and a number of the variable costs, except the major items such as raw fish and salaries, are absorbed by the freezing operation.

The Senegalese tuna canneries generated over FCFA 18 billion in foreign exchange in 1987 underlying the importance of this sector in the economy. Moreover, at least in nominal dollars the terms of trade appear to have improved for the Senegalese exporters (see Fig. 6 above). Despite the heavy dependence on imported inputs the Government is still keen on subsidizing this industry to keep it operational. However, for the long run, it is important to make the industry competitive and decrease its dependence on imported inputs as well as Government subvention. This is truly a daunting task given that the Senegalese canneries are now operating at 50 percent higher cost than their competitors from Thailand and the event of 1992 may well remove their favored position on French markets.

Undoubtedly much of the relatively high cost structure for Senegalese industrial operators are caused by factors exogeneous to the companies themselves. Equally obvious, however, is the finding that there are numerous things within the direct sphere of influence of specific enterprises that have more than a marginal bearing on operational costs. Waste through spoilage or leakage, high fuel costs due to rusting vessel hulls, low labor morale, inefficient management of materials flows etc. These factors are perhaps individually small but significant in aggregate. They are best tackled through enterprise specific investigations into their operations rather than by policies and/or sector-wide measures.

## 2. Objectives

### 2.1 Development Objective

Increase Senegalese export earnings.

### 2.2 Immediate Objectives

Increased efficiency through lowered operating costs among fisheries industrial operators..

## 3. Expected Results

### 3.1 Expected Results 1

Set of enterprise-specific audits to determine actual possibilities to lower operating costs

### 3.1.2 Activities to be Undertaken

i. Identify 8 suitable operating industrial fisheries companies willing to cooperate with an operations and management review;
ii. Conduct individual audits of each company and prepare individual, confidential reports; and
iii Make recommendations for improved operations.

### 3.2 Expected Results 2

Summary report without confidential details, suitable for wider distribution

### 3.2.1 Activities to be Undertaken

i. Consolidate results from individual company audits to arrive at more generally applicable recommendations for improved operations.

### 4. Project Contribution

Estimated approximate total project cost: $600 000

## PROJECT 27. Study to Determine Market Integration of Complementary Activities

### 1. Background and Justification

The Senegalese tuna canneries generated over FCFA 18 billion in foreign exchange in 1987 underlying the importance of this sector in the economy. Moreover, at least in nominal dollars the terms of trade appear to have improved for the Senegalese exporters (see Fig. 6 above). Despite the heavy dependence on imported inputs the Government is still keen on subsidizing this industry to keep it operational. However, for the long run, it is important to make the industry competitive and decrease its dependence on imported inputs as well as Government subvention. This is truly a daunting task given that the Senegalese canneries are now operating at 50 percent higher cost than their competitors from Thailand and the event of 1992 may well remove their favored position on French markets.

On the whole, the canneries obtained more than half of their raw materials including cans, labels, oil, tomato and cartons through imports. There are local companies which manufacture cans, oil and packaging materials but they, too, have to import most of their raw material requirements and also do not enjoy economies of scale due to their limited production making their products expensive.

Not surprising the canneries have been looking for relatively cheaper and better quality imported inputs. However, more vertical integration between the processing and ancillary industries might prove to their mutual benefit.

Faced with a very limited supply of tuna offal, the two now existing Senegalese fish meal producers have to compete for sardinella meant for human consumption. They are, however, finding the prices high for their operation. Thus in 1987, capacity utilization rate was only 25 %, the lowest rate within the fisheries industrial system in Senegal. If capacity utilization does not improve, these plants will soon produce at a loss even with the export subsidy.

An industrial fish curing operation, processing only 2 500 Mt of fish annually is not an economically viable activity if the plant is established as a separate entity. Only if such an industrial curing activity were integrated into an existing freezing plant could it be operated profitably at such a small scale. In fact, calculations show that it could generate profits even without the present export subsidy, assuming that almost all the fixed costs and a number of the variable costs, except the major items such as raw fish and salaries, are absorbed by the freezing operation.

## 2. Objectives

### 2.1 Development Objective

Improved profitability within the fisheries industrial system in Senegal.

### 2.2 Immediate Objectives

Reduced excess capacity and reliance on imported cans, oil and packaging materials

## 3. Expected Results

### 3.1 Expected Results 1

Report on feasibility and modalities for integration of certain complementary activities.

### 3.1.2 Activities to be Undertaken

i. Identify possible candidates for vertical or horizontal integration;
ii. Determine feasibility and modalities for integration of identified complementary activities; and
iii Make recommendations for integration strategies.

## 4. Project Contribution

Estimated approximate total project cost: $100 000

## PROJECT 28. Establishment of a Technical Assistance Facility

The management of the entire program above (27 technical assistance projects, investment activities, and policy reforms) would best be carried out under an umbrella project. In addition to the management function, such a project could also engage in the monitoring of the impact of implemented projects on the industrial fisheries system using the MEPS model. Undoubtedly, the monitoring and analysis would lead to the 'discovery' of new demands for technical assistance, investment opportunities, and policy recommendations. In other words, the programming exercise would become a dynamic one, responding to the changing system requirements. The project concept for this Management Project has not been elaborated below and as such is not part of the project concepts presented below.

The Management Project would benefit from the support of a Technical Assistance Facility (TAF) that would be geared solely to the effective demand for various forms of technical assistance coming from private sector operators within Senegal's industrial fisheries system.[55] An essential feature of the TAF is that it would support and undertake only projects directly requested by private operators and to which they would contribute by paying part of the costs. The projects could be among those presented below. A project proposal for the TAF is presented as an annex to this report.[56]

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55 The idea for such a facility stems from the World Bank and was presented to UNIDO first as part of the Bank's review of the here presented analysis and derived development program.

56 The project proposal has been worked out by UNIDO's Industrial Planning Branch. At present, only a French language version exists.

ORGANISATION DES NATIONS UNIES POUR LE DEVELOPPEMENT INDUSTRIEL

PROPOSITION DE PROJET

Titre: **Etablissement d'une facilité d'assistance technique pour le développement du système industriel de la pêche au Sénégal**

Date prévu pour le début d'exécution: Juin 1990 Durée: 4 mois

Numéro: US/SEN/Pays: Senegal

Contribution de l'ONUDI: 93 420 dollars des Etats-Unis (13% de frais d'agence non compris)

Service de l'ONUDI chargé d'assurer l'appui technique: Service de la Planification Industrielle

Indicatif de l'Elément de programme:

Organisme d'exécution du gouvernement:

Requête officielle du gouvernement: Date:

# I. ORIGINE ET JUSTIFICATION DU PROJET

En juin 1989, l'Organisation des Nations Unies pour le développement industriel (ONUDI) a entrepris une analyse approfondie du Système industriel de la pêche au Sénégal (SIP). L'objet de cette étude prospective a porté sur l'ensemble du système des pêches et de la consommation de poisson. Les données, traitées dans les équipements de planification du programme MEPS développé par l'ONUDI (Méthodologie pour l'évaluation et la programmation des systèmes de production/consommation) ont eu pour résultat le choix d'une stratégie optimale pour présenter et formuler des propositions couvrant des recommandations au niveau politique, 27 projets d'assistance technique ainsi que des principes d'investissements. L'ONUDI a maintenant l'intention d'établir les organisations et les procédés nécessaires à la réalisation harmonieuse des activités proposées et des autres opérations qui en découlent.

Le SIP englobe toutes les activités de la pêche industrielle, la transformation, la commercialisation et la vente sur le marché intérieur et l'exportation. Sa participation pour plus de 40 % (soit 220 millions de dollars en 1988) aux revenus totaux du commerce extérieur montre bien son importance au niveau de l'économie. Le SIP assure environ 100000 emplois à plein temps dans les pêcheries et près de 140 000 emplois dans les activités dérivées.

La mise en service progressive de canots/bateaux à moteur et de techniques plus modernes telles que la pêche à la senne dans le sous-secteur artisanal a sensiblement amélioré l'efficacité. Les frais de production sont estimés à 12 000 francs CFA/t. Le potentiel socio-économique devrait être en progrès. Les prises annuelles d'environ 170 000 t sont encore loin d'atteindre le Rendement maximum acceptable (RMA) de 220 000 t.

Cependant, la réalisation du potentiel socio-économique est handicapée par des contraintes physiques comme le manque local de bois, qui a fait que l'on a dû importer du bois à un prix trop élevé, ou le manque de pièces de rechange pour les moteurs. Le progrès est aussi freiné par d'autres difficultés, comme les traditions culturelles, le manque d'information sur les options techniques possibles et les services de renseignements, les lacunes des systèmes de crédit et les coûts actuels de crédit (14 à 15 % d'intérêt), ainsi que le prix élevé du carburant.

La flotte hauturière du Sénégal (chalutiers, porteurs de senne, bateaux de pêche à la ligne ou à la perche) se compose en majeure partie de navires d'occasion assez anciens et peu efficaces. Les travaux de réparation et d'entretien sont onéreux et sans effet en raison du manque de pièces de rechange adaptées. Les sorties pour aller pêcher sont donc moins nombreuses. La prédominance de glaçons à la congélation déclasse la valeur des prises. Le monopsone de commercialisation dans le port (seulement deux acheteurs principaux pour le poisson industriel) continue d'abaisser le niveau des prix au producteur. Les frais moyens de

production d'un sennier à sardines s'élèvent à 54 0[illegible]ancs CFA/t, soit plus de quatre fois ce que coûte la production artisanale. Les prises totales annuelles sont estimées à 90 000 t, quantité bien inférieure au RMA de 220 000 t. Seuls les céphalopodes semblent avoir été surexploités.

La flotte de chalutiers basés à l'étranger se compose de bâtiments efficaces avec congélation, et comprend même des bâteaux-usines. Une partie des prises sont débarquées directement dans les ports étrangers, privant ainsi l'économie sénégalaise d'un revenu supplémentaire.

Les entraves principales sont : l'inexistence d'un système ouvert de marché aux enchères, le manque d'informations sur les options techniques possibles et le manque de financement pour les modernisations ou pour l'achat de nouveaux bateaux. L'industrie de transformation du poisson se fait dans 30 unités dont 27 situées à Dakar et trois en Casamance. Les activités de traitement comportent la mise en boîtes, la congélation et la production de farine de poisson. La salaison industrielle du poisson n'existe pratiquement pas. Le traitement artisanal (séchage, salage, fermentation, salaison et cuisson) est réalisé à petite échelle pour pallier les besoins du marché local.

La capacité globale installée de production est évaluée à environ 150 000 t pour les installations de congélation et à 35 000 t pour les conserveries. Cependant, seule la moitié de cette capacité est utilisée actuellement en raison de la pénurie de poissons frais. L'industrie absorbe environ un tiers des prises annuelles. On a donc dû augmenter les importations de sardines du Maroc et de thon, par exemple, provenant des bateaux de pêche étrangers.

Quant à l'industrie de congélation, le nombre croissant de navires congélateurs étrangers est une sérieuse concurrence. Bon nombre d'industries ont été forcées de fermer leurs portes au cours des cinq dernières années car les prix fixes et onéreux du carburant ne sont pas compensés par le niveau d'activité qui reste faible.

En ce qui concerne les marchés africains d'exportation pour les sardines congelées entières, les principales difficultés rencontrées sont les mesures restrictives prises par les gouvernements des pays importateurs, ainsi que la non-convertibilité de certaines devises africaines.

Les contraintes rencontrées sur les marchés d'Europe pour des produits tels que le thon en boîte, les denrées congelées en entier (crevettes et crustacés) et les filets de poisson sont dues aux normes de qualité et de protection qu'exigent les marchés français. Si le Sénégal veut maintenir sa position sur le marché après 1992 et les changements des conditions du Marché commun, l'industrie de la pêche devra assurer une meilleure qualité et des mesures de protection plus efficaces. Enfin, pour le marché japonais, la contrainte future sera la qualité.

Le Gouvernement sénégalais a pris récemment des mesures de soutien pour réaliser les objectifs de libéralisation et de privatisation du secteur. Cependant, la conversion complète du potentiel du secteur et l'effet total des mesures politiques prises seront inutiles si les contraintes mentionnées ci-dessus ne sont pas éliminées.

L'étude de l'ONUDI a fait l'objet de discussions avec la Banque mondiale pour que la Banque fasse connaître son point de vue au niveau de l'implantation du programme et des projets proposés ci-dessous. Les aspects discutés portaient sur l'établissement possible d'organismes d'évaluation et de financement. Le point de vue de la Banque était qu'il fallait assurer une orientation fonctionnelle visant à satisfaire les exigences des opérateurs privés, c'est-à-dire une ouverture aux projets nouveaux formulés par des entrepreneurs et des investisseurs privés.

Suivant la programmation du développement du secteur et les commentaires de la Banque, l'ONUDI est préparée à essayer une approche en principe innovatrice au niveau de l'implantation du programme. L'aspect innovateur est d'essayer d'établir un système intégré d'activités d'assistance technique impulsé par la demande des opérateurs privés.

Du côté de l'assistance technique, l'intention est de procéder rapidement à des évaluations des projets proposés ainsi que des concepts présentés dans l'étude de l'ONUDI et des propositions de nouveaux projets conçus et formulés par les opérateurs du secteur c'est-à-dire de chercher à satisfaire les exigences futures du secteur et surtout celles des entrepreneurs privés.

Du côté du financement, il est prévu d'établir un fonds qui aurait pour objectif de financer les activités de la Facilité d'assistance technique. Il est donc prévu que le fonds coordonnera les contributions initiales des donateurs internationaux et que les bénéficiaires sénégalais contribueront à réapprovisionner le fonds par des apports qui seront estimés de projet à projet en fonction des services rendus.

Même si les premières réactions des autorités sénégalaises à l'égard de l'idée générale du système ont été favorables, des efforts seront nécessaires pour qu'elle soit pleinement acceptée. Le soutien direct et actif de la Banque mondiale dans ce domaine est impératif.

Le système proposé d'assistance technique sous l'égide de l'ONUDI serait en mésure prendre rapidement les décisions nécessaires pour un développement technique économique profitable, les informations sur les options disponibles et les services de renseignements faisant partie intégrante des travaux. Le fonds de financement, envisagé aussi au titre de l'assistance, pourrait être périodiquement renfloué par l'ONUDI, par des donateurs externes et par un prélèvement sur les bénéfices.

Une mission composée de deux experts devrait étudier au plus tôt les conditions et modalités de l'établissement de la Facilité d'assistance technique et du fonds, prenant toutes dispositions pour la mise en place des instances d'approbation du projet et pour établir une recommandation globale des aspects financiers organisationnels (voir annexe).

## II. ANALYSE DU PROJET

### (a) Objectifs du projet

Les objectifs du projet sont de mettre en place des structures propres à favoriser, d'une part, une réalisation harmonieuse des objectifs du développement du secteur de la pêche par une assistance à des projets techniquement et économiquement valables demandés par les opérateurs privés, du secteur et d'autre part, l'amélioration des méthodes de sélection des projets qui sera au bénéfice du secteur et qui assurera une modernisation graduelle des opérations sectorielles.

### (b) Résultats escomptés

Les résultats attendus seront :

1. Encadrement institutionnel; le type d'organisation et l'identification d'une contrepartie sénégalaise pour la mise en place sous l'égide de l'ONUDI et en coopération avec la Banque mondiale d'une Facilité d'assistance technique (FAT) qui pourrait servir à l'approbation des projets dans le domaine des activités du programme du SIP.

2. Définition de règles et de lignes de conduite précises qui pourraient assurer une réponse rapide et un accès facile aux propositions des projets des opérateurs privés du secteur et contribuer ainsi à la réalisation efficace de la marche à suivre pour des offres techniquement et économiquement viables;

3 .Définition des organismes et des mesures qu'il faudrait sauvegarder pour que cette Facilité soit une instance unique habilitée à évaluer, apprécier et approuver les activités soumises. Il serait donc nécessaire d'intégrer directement les organismes représentatifs des opérateurs privés, comme, par exemple, le Groupement des armateurs et industriels de la pêche au Sénégal (GAIPES);

4. Définition des conditions opérationnelles de la Facilité, identification de sa structure, de ses fonctions et de la nature de son personnel;

5. Identification de l'encadrement institutionnel d'un fonds pour le financement des activités de la FAT. Le fonds doit être le seul point de réception des contributions au

financement provenant soit des donateurs internationaux (Banque mondiale) soit des sources bilatérales, soit des sources bénéficiaires sénégalaises. Par conséquent, il sera impératif de définir les rôles des contributeurs dans la gestion du fonds; de définir, par exemple, si le fonds doit être géré par un seul organisme, comme la Banque mondiale. Comme fonction supplémentaire, cette Facilité serait l'instance de coordination des contributions des donateurs aux activités établies par le programme;

6. Identification des mesures qui pourraient assurer une contribution du côté des bénéficiaires sénégalais au financement de ces activités après l'étude de la répartition des frais;

7. Identification des relations entre les sources de financement des crédits au niveau de l'implantation des projets, surtout celles des bénéficiaires privés.

(c) <u>Activités du projet</u>

Afin d'obtenir ces résultats, une équipe de deux experts internationaux est nécessaire pour effectuer les tâches suivantes en collaboration et en consultation avec les autorités sénégalaises compétentes, les organismes des opérateurs privés sénégalais et les donateurs internationaux :

| | Date et lieu des <u>activités en 1990</u> |
|---|---|
| 1. Collecte d'informations sur le SIP, les organismes d'assistance technique et de financement de l'ONUDI | Début mai, Vienne (Autriche) |
| 2. Identification d'un cadre institutionnel approprié pour la FAT sous l'égide de l'ONUDI, si la FAT est un organisme indépendant ou bien intégré dans des structures sénégalaises existantes. L'expert devrait donc préconiser les manières de renforcer les organes existants ainsi que les liaisons entre eux, et les responsabilités de la FAT et des homologues sénégalais devront être dûment définies. | Mai, Sénégal |
| 3. Evaluation de la demande des services de la FAT ainsi qu'une indication des moyens financiers nécessaires pour assurer une opération professionnelle satisfaisante. | Mai, Sénégal |

| | | Date et lieu des activités en 1990 |
|---|---|---|
| 4. | Le personnel le plus qualifié devra être identifié, ce qui impliquera une estimation du genre de personnes recherchées, des travaux à effectuer et des conditions de leur emploi. | Mai, Sénégal |
| 5. | Identification des dispositifs d'évaluation et d'approbation des projets. Les standards d'évaluation devraient suivre les directives de l'ONUDI et le cadre institutionnel établi de la FAT devrait garantir que seule cette estimation est nécessaire et valable. | Mai, Sénégal |
| 6. | Définition des dispositifs pour l'homologation finale du projet par l'ONUDI, la FAT et les autorités sénégalaises. | Mai-juin, Sénégal |
| 7. | Identification de la localisation - en dehors des autorités publiques - pour la mise en place d'un fonds de financement des activités de la FAT. L'expert devrait faire des recommendations sur la gestion et sur l'intégration avec la FAT de ce fonds. | Mai-juin, Sénégal |
| 8. | Identification des organismes et procédés de suivi et de contrôle du fonds, soit au niveau des inspections spécifiques, soit au niveau de l'évaluation finale et de l'impact. | Mai-juin, Sénégal |
| 9. | Identification des sources et modalités du financement initial et du renflouement du fonds par l'ONUDI, les contributions des donateurs internationaux et les organismes et procédés de contribution des bénéficiaires sénégalais qui soient acceptables pour eux. | Mai-juin, Sénégal |
| 10. | Analyse des comportements des sources de crédits, internationaux ou sénégalais, sur la question de financement de l'implantation des projets. En outre, il faudra définir le rôle de la FAT en ce qui concerne les contacts aux institutions | Juin-juillet, Sénégal, Etats-Unis |

| | | Date et lieu des activités en 1990 |
|---|---|---|
| | financières dans les cas où des projets d'investissement résulteront de d'assistance donnée par la FAT. | |
| 11. | Identification des groupes d'objectifs et élaboration d'une ébauche de programme d'activités d'encouragement et d'information pour l'utilisation de la FAT. | Juin, Sénégal |
| 12. | Préparation d'un document de projet qui définira les conditions de l'établissement de la FAT, du fonds et des autres organismes nécessaires, fourni avec un calendrier détaillé de toutes les activités en dérivant. De même, le document précisera les interventions financières réparties par sources de contribution et les programmes de formation nécessaires des homologues sénégalais. | Fin juin, Sénégal |
| 13. | Réunion de synthèse au Sénégal pour discuter du programme et du document de projet. | Fin juin, Sénégal |
| 14. | Discussion avec la Banque africaine de développement (BAD), la Banque mondiale et autres donateurs importants soit internationaux, soit bilatéraux pour obtenir leurs points de vue sur le concept et les dispositions relatives au financement et à l'implantation du projet. | Début juillet, Afrique, Etats-Unis, Europe |
| 15. | Activités à l'ONUDI. Discussions sur les propositions élaborées et le document du projet. | Mi-juillet, Vienne (Autriche) |
| 16. | Réunion de suivi à l'ONUDI. | Août, Vienne (Autriche) |

## (d) Contributions apportées au projet

### (i) Apports du Gouvernement sénégalais

Le Gouvernement sénégalais fournira les services de contrepartie et tout l'appui logistique dans le cadre de la réalisation du projet au Sénégal.

| (ii) Contribution de l'ONUDI | En homme/mois | En dollars |
|---|---|---|
| Deux experts internationaux qui s'occuperont, l'un, des aspects financiers du secteur de la pêche, l'autre, des aspects techniques | 6,5 | 65 000 |
| DSA - Sénégal (90 jours à 90 dollars/j) | | 8 100 |
| - Vienne (20 jours à 120 dollars/j) | | 2 520 |
| - Washington D.C. (15 jours à 200 dollars/j) | | 3 000 |
| - Europe (10 jours à 180 dollars/j) | | 1 800 |
| Frais d'aéroport | | 1 500 |
| Frais de transport aériens (Domicile/Vienne/ Dakar/Etats-Unis/ Vienne + Domicile/Vienne/ Domicile) | | 5 000 |
| En Europe | | 1 500 |
| En Afrique | | 1 000 |
| Rapport | | 2 000 |
| Divers | | 2 000 |
| | | 93 420 |
| Frais d'agence, 13% | | 12 145 |
| TOTAL | | 105 565 |

## III. ACTIVITES DE SUIVI

Une réunion de synthèse aura lieu au Sénégal fin juin 1990 pour examiner le programme et les recommandations élaborées par l'expert. La réunion est prévue avec la participation des experts, des autorités sénégalaises et des autres organismes locaux intéressés. Un séjour à l'ONUDI est prévu après la fin de la mission au Sénégal pour débattre des résultats obtenus. Une réunion de suivi aura lieu à Vienne à la fin du mois de juillet 1990 pour discuter du rapport final et du document de projet.

Annexe

Descriptions de poste

I. Chef d'équipe - Expert en développement institutionnel et aspects de financement du secteur de la pêche

Durée : Quatre mois et demi (deux mois au Sénégal; un mois aux Etats-Unis et en Europe; 15 jours à Vienne et un mois pour rédiger le rapport).

Tâches :
- Responsabilités globales des activités du projet, de la soumission des rapports et toutes liaisons avec les autorités sénégalaises concernées et les donateurs internationaux;
- Politique sénégalaise vis à vis du programme de secteur proposé pai l'ONUDI;
- Encadrement institutionnel de la Facilité d'assistance technique et du niveau d'intégration et de la structure du fonds de financement;
- Liaisons entre la Facilité, le fonds et les institutions et autorités sénégalaises;
- Aspects opérationnels de la Facilité et organigramme;
- Système d'approbation et d'homologation des projets;
- Lignes de conduite pour l'établissement du fonds, sa gestion et son financement;
  a) Financement initial par des donateurs internationaux et leur participation dans le réapprovisionnement du fonds,
  b) Système de participation des bénéficiaires sénégalais au financement des services rendus.
- Organismes et procédés de coordination des actions des participants et donateurs au niveau de la Facilité et du fonds;
- Analyse des relations entre la FAT et les sources d'extension de crédit aux financements de l'implantation des projets.

Qualifications exigées : Expert principal (planificateur général et économiste) dans les domaines du développement institutionnel, et surtout d'institutions de financement, d'investissement et de développement.

## II. Expert en assistance technique et aspects techniques du secteur de la pêche

Durée — Deux mois (un mois au Sénégal; 15 jours à Vienne; et 15 jours pour rédiger le rapport).

Tâches
- Fonctions opérationnelles de la Facilité d'assistance technique, sa structure et les descriptions générales de postes ci-dessous;
- Estimation de la demande de services de la FAT et les besoins financiers qui en découlent;
- Développement des critères et d'une schématique pour une sélection préliminaire des projets destinés à une analyse plus approfondie;
- Elaboration des organismes et procédés d'autorisation et d'évaluation rapide des projets;
- Conception des standards, des règles d'évaluation, du suivi et du contrôle des projets proposés;
- Contacts avec les associations des opérateurs du secteur;
- Conception des campagnes de motivation des investisseurs privés;
- Schématique des crédits pour les petites et moyennes entreprises.

Qualifications exigées : Expérience dans tous les aspects techniques du secteur de la pêche et dans les conditions socio-culturelles des communautés de pêcheurs et consommateurs sénégalais.