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fisheries and marketing in the yemen arab republic

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FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

Technical Reports No. 13

FISHERIES AND MARKETING IN THE YEMEN ARAB REPUBLIC
(YEM/10/YEM)
by

G. Campleman, V. Perovic and B. Simons

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
UNITED NATIONS DEVELOPMENT PROGRAMME
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1. INTRODUCTION

1.1 Terms of Reference

The Government of the Yemen Arab Republic assisted by the United Nations Development Programme and the Food and Agriculture Organization of the United Nations are engaged in a project whose main purpose is to:

(i) provide the data required for the preparation of an investment project for the development of small-scale fisheries production, mainly for the domestic market. The project would cover a period of from 5 to 10 years

(ii) give recommendations for the improvement of landing places, handling, storage, processing, transportation, marketing and distribution of fish internally, based on the data obtained in studying the market potential

(iii) recommend the number, type and size of fishing craft of the traditional type and/or improved traditional type which will be required for an increase in production, and will advise on institutional and training requirements

(iv) study outlets for fish in neighbouring countries and the international market

As part of the project operation, FAO assigned Mr. B. Simons (Fisheries Generalist and Project Manager of Project YEM/74/003), Mr. G. Campleman (Consultant, Economics/Sociology) and Mr. V. Perovic (Consultant, Fisheries Processing) from June through August 1976 with the following terms of reference:

Mr. B. Simons

"To assist the Government in the Implementation of approved recommendations, arising from the report of the YEM 10 (YEM) Study concerning, inter alia, the measures to improve the Artisanal Fisheries and Marketing methods in the Yemen Arab Republic."

Mr. G. Campleman

"To carry out the activities contemplated by the project document. More particularly, he will make a survey of the situation of existing fisheries at the various fishing centres. A socio-economic study should be conducted at each of the main centres to determine the development requirements of each community and the production potential. As far as resources are concerned, this production potential should be estimated on the basis of present catch rates; no stock assessment studies, besides those already carried out by the FAO/UNDP Fisheries Development Project (YEM/74/003) are required. The various types of existing fisheries will be identified and their economics studied. Attention will be paid to the social structure of the fishing communities as well as to the administrative and taxation system.

As part of the foregoing, the consultant, in collaboration with Government, will evaluate past project studies on fisheries credit schemes of the revolving fund type and if necessary will revise and update the findings to conform with the economic situation now obtaining. He will make recommendations as to present applicability, timing, sources of funding and administration."

Mr. V. Perovic

"To make a socio-economic study of the potential markets for fish in Yemen covering the structure of the existing marketing channels and customs, the present form of processing (salted, dried, smoked, etc.) noting any seasonal changes, the food habits of the population, the part of their income that they can use for buying fish, price structure and fluctuation, distribution of benefits etc.. The outcome of this study

should indicate the equipment and facilities needed for developing the market, the methods by which the market should be developed and the phasing of the possible productive developments."

2. ARTISANAL FISHERIES DEVELOPMENT IN THE YEMEN ARAB REPUBLIC

2.1 Background Information

The following discussion on Artisanal Fisheries Development in the Yemen Arab Republic prepared by G. Campleman, deals with the Mission activity in the analysis of the existing situation in the artisanal fisheries of North Yemen, the definition of an appropriate development strategy and proposals for action. It forms a composite review of the fisheries situation with the specialized marketing study undertaken by Mr. Perovic. (Annex I)

During the Mission all fish landing places of any size or significance were visited by the team, with the exception of Bab al Mandab and Dhubab for which permission to visit was not forthcoming within the period of assignment. It had been hoped that the team would be able to spend several days in various isolated locations, but due to delay in the arrival of necessary camping equipment this was not possible on the scale intended, and in the north of the country the Mission travelled and slept on the project vessel "ORION". During these visits numerous meetings were held with fishermen, auctioneers, local sheiks and officials, and supplemented by interviews in Hodeida and Sana'a with Government officials, banks, the UNDP, etc. and, despite the difficulties, the Mission considered that it had achieved good contact with the fishing community and its operations. It should be mentioned here, and earlier reports have referred to this matter, that the fishermen at Hodeida, for some unknown reason, were uncompromising in their refusal to meet and talk with the Mission, despite the intervention of the Governor of Hodeida and of the local Development Association. This may have sprung from the personal attitudes of the fishermen's leaders, and a professed disagreement with the earlier results of the FAO/UNDP Project and their practical worth to the fishermen. The real reason, however, may be a desire on the part of the older fishermen and their leader to limit, not only project, but Government interest in their affairs. There is clearly a need in the future for some public relations activity by the project, and an effort to restore good relations with the fishermen before practical development initiatives can be taken.

The purpose of this report is:

(1) To define an appropriate development strategy for the small-scale artisanal fisheries. No account is therefore taken of the possibilities of developing a shrimp fishery, or, except incidentally, of offshore trawling.

(2) To propose specific investment and aid projects to this end.

(3) To propose appropriate methods of implementation and administration, and the most effective use of current project resources.

There are a number of factors which make a comprehensive, rational approach difficult to implement, and certainly there is some lack of firm information concerning the extent of resources available and of desirable improvements in technology. It is believed, however, that it would be wrong to defer action. The fishermen's economic status is very low and, in the north, emigration is continuing. There is little prospect of alternative livelihoods, and it is concluded that early action to improve the fishermen's situation should be taken as and where possible.

2.2 The present Status of the Artisanal Fisheries

General

The fishery extends all along the Yemen coast from Bab al Mandab in the south to North of Luhaiya near the border with Saudi Arabia, located in settlements ranging from

substantial towns (Hodeida, Mocha) through large villages (e.g., Khoba, 7 000 population) to small fishing hamlets numbering perhaps three or four households.

The standard method of fishing is floating gillnets, supplemented by handlining. At places there are stakenets and, in season there is a fairly extensive beach seine fishery for immature sardine and anchovy ("wasif"), which are sun-dried on the beach. Two principal types of vessel are in use, the larger "sambuk" of distinctive form, of between 10 and 15 m long, and the "houri", a small canoe type of vessel, flat bottomed and inherently unstable, of between 6 and 10 m. At Khoba there is an intermediate type of large houri, or small sambuk of some 12 m. Almost all sambuks are powered with 25 hp diesel or petrol engines, and about a fifth of the houris are powered with outboard engines. These vessels exploit the inshore waters up to a range offshore of some 15 to 20 miles, though at times the larger sambuks may fish off the Ethiopian coast.

Vessels and Fishermen

Under the conditions of the Yemen, where there are poor road communications and many scattered villages and because of the relatively short period of the survey, a proper census of vessels was not possible. Table 1 gives an estimate of the existing fleet, built up from interviews, beach counts, and available data from the project. It does not include 70 mechanized sambuks nominally owned at Luhaiya, but which fish in Saudi waters and land all their catch directly in Jizan, Saudi Arabia. Their visits to Luhaiya are largely in the nature of rest and refitting trips.

Table 1

Numbers of Vessels and Fishermen

	Vessels	Fishermen
Sambuks	284	1 846
Mechanized houris	144	346
Sail houris	643	1 286
Rafts	100	100
Total	1 171	3 578

The rafts are small, 2 or 3 m^2, constructions of rough logs, on which single fishermen set nets and do handlining. Their contribution to landings is very small, and they are largely employed for subsistence and part-time fishing, and perhaps, by older fishermen. In future considerations of landings and marketing in this report, they are ignored.

It is only fair to say that the Mission's estimate differs from that of the Project Biologist, Mr. P. Walczak, essentially in the estimated number of sambuks at Khoba. His experience and knowledge of the country is, of course, considerably extensive but the estimate given by this Mission was obtained independently by two members of the Mission from two different sources, the fish merchant and the village sheik (100 and 112 sambuks, respectively). It is believed that part of the explanation lies in the classification of the intermediate type of vessel found at Khoba; the size of a rather large houri (12 m) with the hull form of the sambuk. Some allowance has been made for this in calculating the total catch, but on balance it was found advisable to retain the Mission's estimate.

Landings

Based on the method of Walczak (Project Reports numbers 66, 44) using our figures of vessels, and Mr. Walczak's current estimates of days fished and average daily catch, it is estimated that the current total landings of fish in the Yemen Arab Republic are to be shown in Table 2.

ESTIMATED LANDINGS 1976 Table 2

Based after method of Walczak (Reports 23, 44 48, 35, 68) but on estimated and reported vessels at June-July 1976

	No.	Days Fishing (p.a.)	Average Daily Catch (kg)	Annual Catch (t)	Sub-Total	Remarks
HODEIDA						
Sambuks	82	290	165	3 924		
Mech. Houris	29	250	50	362		
Sail Houris	82	250	20	410	4 696	
MOCHA						
Mech. Houris	22	250	40	220		
Sail Houris	50	220	20	220	440	
KHAWHAH KHATABA						
Sambuks	15	220	200	660		
Mech. Houris	21	220	40	185		
Sail Houris	131	150	20	393	1 238	
CENTRE VILLAGES						IBIN ABBAS to
Sambuks	50	250	140	1 750		AL FAZIH excl.
Mech. Houris	22	220	35	169		HODEIDA
Sail Houris	260	220	10	572	2 491	
KHOBA						
Mech. Sambuks	100	290	140	4 060		Smaller vessels than HODEIDA
Mech. Houris	50	240	60	4 780		Larger Houris than normal
LUHAIYA						
Sail Houris	80	250	20	400	400	
OTHER						LUHAIYA to
Sambuks	15	290	140	609	609	SAUDI ARABIA
BAB AL MANDAB						
Sambuks	22	220	65	799		
Sail Houris	40	150	20	120	919	
					15 573	
WASIF FISH (Dried Anchovy and Sardine)					1 500	
			TOTAL		17 073	

The Mission's estimate of total landings of 15 500 t is appreciably higher than previous ones. Agger, 1973, gives 7 500 ± 1 000 t, Gudmumsson and Walczak, 1975, 11 - 12 000 t and Walczak, 1976, 12 500 t. It is believed both that Agger's original estimate was too low, and that there has been over the past few years, a significant increase in landings through mechanization of houris and improvements in efficiency through better gear. As remarked above, the difference between the current project estimate of 11 500 t and the Mission figure of 15 500 is largely due to the belief that the fleet at Khoba includes 100 sambuks, as opposed to 12. Allowance has been made in Average Daily Catch (140 kg/day to 165 kg/day) for the smaller size of these vessels. The total fleet size is almost the same in both estimates (1 071 or 1 066) and it is believed that the present estimate represents a true order of magnitude of present vessel landings, and agrees reasonably well with what is known about fish landings. There are, in addition, 1 500 mt "wasif", immature anchovy and sardine, caught by beach seines, giving a total of 17 000 mt.

Demand and Marketing

These aspects are dealt with in the related Annex I. It will suffice to say here that on the basis of earlier test marketing trials by the project, evidence of interviews at inland centres, and the evident strength of demand at centres where adequate marketing channels exist, (e.g. Hodeida and Mocha), demand for fish is not and will not be a constraint on development.

1. Demand: Present fish consumption in the Yemen Arab Republic averages 2 - 4 kg per caput per annum, but this covers wide variations. The Yemen Arab Republic does not constitute a single integrated market for fish, due largely to lack of road communications within large parts of the highland and desert areas. For this reason, the Mission report does not pay much attention to the determinants of global fish consumption. There is ample evidence from earlier project papers (Fovere, Working Paper no. 2) and the present Mission's enquiries, to indicate that there is a strong latent demand for fish in the mountain areas, and the principal determinant of effective demand for fish will be an expansion of the sales area through improved communications. This latter factor is impossible to forecast as it depends as much upon political relationships and aid, as upon economic considerations.

No reliable time series are available of the trend in Disposable Incomes or Population, and certainly no independent estimates of income and price elasticities. Such evidence as exists indicates negative growth in disposable real incomes per head in some recent years.

In these circumstances the only approach which may safely be made is to ensure that any proposals are within both the resource constraint and the absorbtive capacity of the market. This can be done by selecting for examination those landing places which have a present or future possibility of adequate road communication, essentially the Hodeida-Sana'a and Mocha-Taizz-Ibb segments of the total market.

As argued later (p. 19) the potential for fisheries expansion in the Yemen Arab Republic is limited by the number of existing fishermen, and essentially rests upon the conversion of most of the houri fishermen to larger sambuks. The limits to this possibility are set out in Table 3 (page 12) and suggest a potential maximum increase in catch of 37%, reduced to an operational target of 35% to 20 800 tons per annum. The potential for increase is largely confined to ports with a low existing proportion of sambuks and this in practise to Mocha and Khawhah with a potential catch of 3 608 tons. Most of this fish would be consumed in the Taizz-Ibb area, with a population (1975 census) of 320 925 in the urban area, and 1 342 469 in the rural area. If all the fish were consumed in the urban area, consumption per head would only be 11.2 kg, a figure well below some levels of consumption in areas of the Yemen Arab Republic where fish is readily available. Distributed over the total area population, consumption would be 2.16 kg/head.

These considerations, rather than any estimate of need, suggest that an increase in landings would per se not pose serious marketing problems, though admittedly not resolving the Yemen's need for fish supplies, which, for various reasons discussed elsewhere, we judge will be supply-constrained and incapable of satisfaction from local artisanal resources.

2. Marketing Structure and Price Formation: For reasons which, admittedly, the Mission did not fully understand, the normal form of firsthand sale is the auction. This is relatively uncommon elsewhere in small-scale, isolated fishing centres, where the number of buyers and sellers is restricted. As described in the Annex, at almost all centres the sales are conducted on the fishermen's behalf by an auctioneer. It is difficult to generalize on their status. At Hodeida there is more than one auctioneer, each selling for a group of fishermen and the impression we have is that they are essentially independent entrepreneurs. At Mocha and the centre villages the auctioneer is an ex-fisherman of the same social and economic status and, as far as we could judge, a true representative of their interests. This perhaps explains the seasonal need of the Mocha and Khawhah fishermen to turn to Hodeida merchants for credit. At certain villages, however, e.g. Khoba, the auctioneer is clearly a person of substance and of superior social status with other economic interests, including dealing in fish and we have to assume that in these cases the fishermen have to accept a degree of economic subservience in return for credit assistance and, possibly, commercial experience and entrepreneurship. In the normal case, the auctioneer is not the village headman or the fishermen's "leader".

The buyers are of two main kinds, relatively small entrepreneurs who buy fish for salting and later sale in the Tihamah, and fresh fish wholesalers from Sana'a and Taizz. These traders sell fish to retail markets and stalls in the surrounding villages and also sell fish by auction in Sana'a, Taizz and some other centres. It was established that there is certain amount of collusion between the inland buyers in that it is common for them to take daily turns in making the trip to the coast, and buying fish for their joint needs. This may well be dictated simply by the economics of the transport costs and the quantities available and in principle at any rate, is resolved by the use of the auction at the inland market.

Fish is sold by retail in Sana'a and Taizz by individual traders in municipally owned retail fish markets, by traders from their own premises and by hawkers and stall holders in the village markets.

This system cannot be said to have the preconditions for efficient and competitive price formation. The numbers of buyers and sellers are relatively small, there is little lateral competition between the main landing centres and a one to one relaionship between particular sellers and buyers, e.g. Taizz and Mocha, Sana'a-Hodeida.

Nevertheless, it is a better system than exists in many developing countries and its features are largely dictated by geographical factors. The existence of a substantial and diffused secondary market for fish processing limits undue arbitrariness in the formation of fresh fish prices. On page 8 and 9 it is remarked that at the smaller villages with no facilities, first-hand prices of fish are so low and the difference in earnings between Sambuk and houri fishermen so negligible, as to suggest a buyer monopoly bargaining situation.

The Mission was not able to collect sufficiently detailed or extended data on prices, but the evidence we have suggests that the distributive margin is high. Indian mackerel, for instance, the most traded fresh fish, had during the period of our enquiry the following price structure per kilo:

Mocha	First-hand	0.45 YR	
Taizz	Wholesale	1.33 "	Mark up 195%
Taizz	Retail	1.7 "	Mark up 28%

After allowing for costs of transport and ice, the wholesale margin appears to be excessive, reinforcing the conclusion of the previous paragraph. The retail margin may be accepted as fairly normal.

The basic position of the Mission was that fisheries development in the Yemen would only come through improved marketing structure and facilities, and it may be fairly asked if, despite any investment in this field, the existing structure is not such that it would provide no financial inducement to expand landings through re-equipment of the fleet, all the benefits being reaped through lower costs and increased gross margins by the inland buyers. Certainly there is no automatic mechanism which ensures that the benefits reach the fishermen, but the following observations are relevant.

1. Except at the smaller villages with independent "commission salesmen" the degree of bilateral monopoly can easily be overstated. The inland fish buyers have provided transport ice, wages, etc. to attend the market, costs amounting perhaps to 800 - 1 000 YR per trip, and will not readily return empty handed. The fishermen do have alternative, though less remunerative, local processing markets, and fresh fish outlets in the Tihama. This is not to say that the system provides perfectly competitive price formation, but, excluding collusion between buyers and auctioneers, is not totally monopolistic and, in most cases cases, the auctioneers or salesmen are true representatives of the fishermen's interest, being appointed and removable by them. The provision of independent credit facilities would go a long way to removing much of what imperfections exist in the auctioneer/fishermen relationship.

2. We have suggested that market expansion, at current retail prices, will essentially be determined by expansion of the road net and by increased efforts to sell fish in the areas of the main cities, where presently unrequited latent demand would be rather price inelastic. Existing retail fish prices are comparable with chicken and less than other meats, and having regard to the difficulty of expanding livestock supplies in North Yemen, probable changes in relative prices should favour an expansion of the market for fish. Essentially, we contend that the inland market for fish can be expanded at precisely the same rate as investment in transport and marketing facilities.

3. On the other hand, expansion of landings is likely to be a slower business, as a prior condition will be an adequate price incentive to re-equip with larger vessels. There will also be socially conditioned time lags in introducing new methods of working and crewing vessels.

4. The interaction of these factors suggests that there is nothing inherently improbable in the suggestion that an expansion of the sales areas, through the provision of ice and transport, would, in turn, cause increased demand at the port which, due to lags in response, would be met in part by higher prices to fishermen, in part by increases in existing retail prices of fresh and salted fish, and perhaps in part, by a reduction in the existing level of gross distributive margin, justified on grounds of greater volume.

How these effects would be distributed it is impossible to say, as it depends upon the precise degree of monopolistic imperfection in the system, but having regard to the observations above, and a highly probable increase in the number of inland wholesalers, as there are no barriers to entry, it is legitimate to expect a reasonable benefit to the catchers, and a consequent increase in landings.

5. This is the only explanation we can adduce for the present situation at Hodeida where, since the construction of the Hodeida - Sana'a road, the fleet and landings have grown substantially. There is a number of auctioneers, and first-hand prices are much higher than elsewhere in the Yemen Arab Republic (2.6 YR/kg compared with 1.5 YR/kg elsewhere), with a consequent reduction in total distribution margin, on Indian mackerel, for example, of 55% as compared with the earlier Mocha-Taizz figure of 177%.

These changes are of course reflected in average fishermen's earnings of 26 YR/day at Hodeida compared with 6 YR/day elsewhere, and as observed on page 9 , account for different shares systems in use.

Earlier reports have noted that the fishermen paid a 10 percent Government tax on the value of their catch, this sum being collected by the auctioneer or local tax agent. This tax has now been discontinued.

Vessel Ownership

It proved impossible for the Mission to obtain any kind of quantitative picture of vessel ownership.

The pattern is, of course, varied. Many houris are owned by individual fishermen or by brothers within a family. Some sambuks are owned by their skippers or jointly with the crew. Some families own jointly more than one vessel, as for example, at Mocha where some families own jointly three houris of varying size to provide some flexibility of operation at the various seasons.

It is, however, certain that a substantial part of the fleet is financed by auctioneers and shore-based individuals, even where the nominal owner is the fishermen. It is also the case that probably more than half of the sambuks are shore-owned. At Khoba it was stated that probably 90 percent of the sambuks were shore-owned. At Mocha, the head fisherman said that most fishermen were in debt to Hodeida merchants for vessels, engines and gear and repaying at the rate of 25 to 30 percent of gross vessel earnings.

The broad impression is therefore, that possibly more than half of the houri fishermen are in debt, at least part of the year, to shore-based sources of finance, either fish merchants and auctioneers or wealthy individuals in their village, and that at least half the sambuks are shore-owned and worked by fishermen on a shore basis.

This picture is not unexpected and is met within most artisanal fisheries of the developing world.

As discussed later, fishermen's earnings are very low and the purchase of even a simple houri, gear and outboard engine, valued at 5 700 Yemeni Rials[1/] , represents some three years' earnings per man, a difficult sum to save at a low level of subsistence. Similarly, a modern large sambuk, worth some 38 000 YR represents an unattainable level of savings from income for the average fisherman and, as discussed in the next section, some source of external financing for vessel construction is clearly necessary. Apart from other factors, this clearly, in part, explains the willingness of many northern fishermen to work in Saudi Arabia, where they can save the cost of a new sambuk in perhaps two years.

The extent of this system adds another dimension to the development problem since measures to improve the fishery may not necessarily improve the condition of the fishermen.

Economic Status of the Artisanal Fishery

The estimated costs and earnings of the various kinds of vessels are difficult to compute with any generality. The ports and landing places vary greatly in their marketing arrangements and communications. Prices and species composition vary markedly from south to north, and the vessels vary in type, size and propulsion. In Appendix A estimated costs and earnings data are given for the three principal types of vessel, which conform to all known facts, and the estimate of daily catch rates taken from Table 2.

A significant feature of the situation is the marked difference in average price between Hodeida and the smaller, more isolated ports, which apart from any other factors result in substantial differences in net fishermen's earnings, and a larger proportion of large sambuks in the fleet at the former port.

The prevalence of various share systems is difficult to evaluate. The generally used method in the houris is for the crew (average 2.4 men) to share equally in the catch proceeds

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1/ 4.5 Yemeni Rials Y.Rls.=U.S.$ 1.00

after deduction of running costs and something for depreciation. The difference between this method and the more normal one of equal shares for the crew and one for the vessel is relatively small, and gives the houri fishermen an average earning of 1 917 YR per year, or 5.3 YR per day. It is interesting to note that the difference in average earnings per man between motor and sailing houris is small (5.3 YR/motor and 6.0 YR/sail) and in favour of the latter. The figures are, of course, only an approximation; the difference is not significant. The reason is that both motor and sailing houris are operated in the same way and with the same passive gear, on much the same ground. The improved performance realized by mechanization, under these constraints, is limited to savings in time and slightly greater range, and is barely sufficient to offset fuel costs and depreciation. For this reason, we see no great justification for a general programme of houri mechanization as opposed possibly to some assistance according to local circumstances. This relationship would, of course, be changed by higher prices due to marketing improvements.

Two different systems of sharing earnings have been reported for sambuks. In a family or skipper-owned vessel, earnings are shared after deducting expenses, equally among the crew, with a share for the vessel and gear. However, for the part of the fleet which is shore-owned, or subject to private loans, the fishermen crew either (a) take 50 percent of the gross earnings and pay running expenses, or (b) take 50 percent of the gross and the owner pays running expenses.

These two systems, of course, result in very considerable differences in crew earnings and owners' profits. In the former case, at Hodeida, a crewman would earn 14.8 YR per day as compared to 26 YR under the latter system. The owner, under the former system, would realize 44.6 percent of the gross earnings and a 154 percent return on original capital costs, whereas under the latter he would receive net 22.5 percent of the gross earnings and a 78 percent return on original cost per year.

In similar circumstances, both systems are clearly very favourable to the owner, and onerous to the fisherman. The choice between the two would be partly affected by the fisherman's bargaining position, the extent of his financial participation and local circumstances. It is, however, partly a function of prices. The figures above relate to Hodeida. It is worthy of note, that at the smaller ports to the south, Mocha for instance, an average value of 1.5 YR/kg results for sambuks under the second system in an owner's share less than the depreciation, and for family-owned sambuks on share systems a similar capital account deficit. This accounts both for the lack of sambuks at such ports and the existence of a dual system. The second sytem is, in fact, only feasible at Hodeida.

If the data of Appendices A to C and of Table 2 are aggregated, assuming that 50 percent of the sambuks are shore-owned, with a 50:50 percent mix of the two systems, a sectoral account can be constructed as follows:

Sector Account - Artisanal Fisheries Mid '75-Mid '76 (000 Y.Rls.)

Total Catch		- 15 573 t
Gross Earnings	37 051	
Variable Costs	- 10 172	
Net Cash Flow	26 879	
Depreciation	1 787	
Owners' Surplus	+ 6 694	
Crew Shares	+ 18 398	
	26 879	

One cannot, of course, place too much strain on these conjectural figures. But if the information about the extent of shore ownership and share systems is broadly true, it appears

that investment in fishing vessels, more particularly at Hodeida and the centre ports returns something like 50 percent per annum on original cost to the owner. The new capital value of the fleet is estimated to be 12.9 million Yemeni Rials.

The average fisherman's earnings would be 5 290 YR per year or 14.4 YR per day, which is believed to be the correct overall order of magnitude. The range varies from some 26 YR/day for fishermen at Hodeida on large sambuks with 50 percent crew shares, possibly higher for successful boats, of course, to 5 or 6 YR/day for the average houri fisherman at the smaller villages without marketing facilities. These figures are to be compared with an average daily wage of 20-25 YR for unskilled labour in the towns.

It is to be noted that at small ports with no facilities such as Taif, where prices are poor and average 1.5 YR/kg, and where the sambuk crew pays the variable costs from their half share of the gross, average daily earnings per man are 7.3 to 8.5 YR, depending on size of crew very little different from the houri fisherman. One might assume that at the smaller villages with poor market situations monopoly bargaining has reduced prices to a minimum economic level, i.e., that at which crew earnings are at the minimum necessary to call forth the supply; subsistence level.

With more efficient and more costly vessels, it is difficult a priori to discover reasons why prices should rise to more than break-even levels at current subsistence or houri fishermen's earnings, leaving the fishermen's situation unchanged. It is partly for this basic reason that marketing improvement and market supervision is regarded as a basic and prior necessity for any fisheries development programme in the Yemen.

2.3 Government Policy and Administration

It is the Government's intention to give a high development priority to the fisheries sector, both on grounds of increasing the domestic supply of animal protein and also of improving the condition of the fishermen. A survey of the shrimp potential is to be undertaken with FAO and Dutch bilateral assistance. The FAO/UNDP system has a fisheries project in the country (YEM/74/003), based in Hodeida, which has been operational for two years.

The fisheries administration is at present largely in process of formation. An FAO Fisheries Adviser is in the post, with the main task of developing a Fisheries Department in the Ministry of Agriculture. His counterpart will be the Designate Director General of Fisheries. There are three posts of extension officer at the coast, only one of which (Mocha) is filled at the present time. It is understood that recruiting difficulties have been encountered due to the relatively low level of Government service salaries.

In the view of the Mission the present and anticipated fisheries administration would not be capable of effectively managing a development programme, and some proposals are made on this matter in a later section. The principal towns of the country have local development boards linked in a national federation SINCODA, which administers a central budget and provides limited finance for local development projects from tax receipts. SINCODA receives 20 percent of local tax receipts. The budget basis is 60 percent of revenues shared equally by local associations, 30 percent devoted to projects in backward areas and 10 percent to SINCODA's reserve.

At Mocha the fishermen are represented on the General Assembly and Executive Committee of the Development Board, but they are not represented at all at Hodeida.

There is no general cooperative law at present in Yemen, but SINCODA's Constitution and its Law 35 are said to provide a legal basis for the formation of fishermen's cooperatives and associations. There is little interest on the part of fishermen in formal cooperative organization, and it is not recommended that much reliance be placed upon their formation in implementing a development plan. However, at appropriate locations, the local development board might be an appropriate instrument for investment and management of local services.

2.4 Analysis of the Development Situation

This review of the salient features of the current situation in the artisanal fisheries leads the Mission to the following main conclusions:

(1) Ultimate consumer demand and resource availability (estimated to be at least 27 000 tons of fish) will not hinder fisheries development.

(2) In the opinion of the Mission the ultimate binding constraint will be the numbers of fishermen employed and their efficiency. For reasons given in the next section, it is believed that it will prove very difficult (at least in the foreseeable future) to expand the manpower in the artisanal sector.

Indeed, given the conditions of coastal life and the high cost of infrastructure and services to sustain it, such an extension would possibly not be in the best interests of the economy or of the fishing communities. From the point of view of the economy, and to some extent of individuals, the rate of emigration from fishing villages is a natural and advantageous reaction, if the costs of social disorganization are ignored. It would be difficult to justify on purely economic grounds the costs of roads, water exploration, provision of mains electricity, and so on, to maintain isolated villages of perhaps 1 000 people and a net exportable output of fish valued at perhaps half a million Yemeni Riyals per year. In the longer view, the course of fisheries development for technical and marketing reasons as well as grounds of social welfare, should indicate some concentration of the effort and fishing population in fewer, larger centres. This is indeed happening at present as more vessels work into Hodeida and Mocha from neighbouring, smaller villages, and ought to be expected to accelerate if marketing and prices can be improved.

(3) Given the present pattern of geographical distribution and the composition of the fleet, expansion of output will depend primarily on a shift of men from small sailing and mechanized houris to the larger sambuks, preferably of an improved type. As explained earlier, it is not believed that, at present prices, a shift from sailing houris to motor houris is economically beneficial, except possibly locally.

The limits to this process are set out in Table 3, where, neglecting possible improvements in efficiency, an increase in total landings of some 37 percent from concentration of the labour force into sambuks is foreseen. Allowing for an increase in efficiency of new sambuks of 20 percent over existing vessels, the upper boundary of vessel landings would be 44 percent greater at 21 500 tons1/. Since not all fishermen, especially younger and older ones could contemplate even with the aid of a credit scheme, purchase of such vessels, and since also some smaller villages will not have marketing facilities to support such an expansion it is believed that an increase in landings of about 35 percent to 20 800 tons represents a realistic maximum.

1/ excluding beach seine catches

Table 3

Effect of Allocating Existing Manpower to Existing Type of Sambuk

	Existing Number of Vessels Sambuks	M Houri	S Houri	Number of Houri Fishermen	Potential Increase in Number of Sambuks	Potential Total Number of Sambuks	Existing Average Annual Catch t per Sambuk	Potential Catch t per year
Hodeida	82	29	82	116	24	106	47.8	5 067
Mocha	-	22	50	153	22	22	44.0	968
Khawhah	15	21	131	312	45	60	44.0	2 640
Centre Villages	50	22	260	573	82	132	35.0	4 620
Khoba	100	50	-	175	25	125	40.6	5 075
Luhaiya	-	-	80	160	23	23	40.6	934
Bab al Mandab	22	-	40	80	11	33	36.3	1 198
Total[a/]	269	144	643	1 569	232	501	41.2	20 502

a/ Exoluding north village presently all sambuks

The essential feature of this table is that opportunities for expansion are a function in part of the proportion of existing sambuks in the fleet, and thus re-equipment at Hodeida would, of itself, provide limited gains whereas Mocha and Khawhah shows great promise. The slightly anomalous result for Khoba is due to the fact that the sambuks there are an intermediate type, slightly smaller than normal with a six-man crew, and the houris rather larger than normal with an average crew of 3.5 men, thus restricting the opportunity of redeployment. This pattern of the fleet represents a very efficient adjustment to existing prices and marketing patterns.

(4) On present prices, large or improved sambuks would not be economic at the ports away from Hodeida. On standard costings, the 12 m sambuk, based at Mocha or Taizz, with an average fish price of 1.5 YR/kg would, if the crew were paying the recurring expenses, provide earnings of only 7.3 YR per man per day, hardly better than the houri. It must also be said that sambuks at Mocha will always be under some temptation to engage in smuggling from Eritrea. The rate of return to owners would be correspondingly lower (24 percent of 78 percent, owner paying expenses).

(5) We, therefore, consider that a necessary, prior condition of fisheries development is an improvement in marketing, which is at present constrained by poor road communications and poor marketing organization. Improvement of vessels and an expansion of landings is dependent upon this, and the main thrust of our present proposals is to improve marketing capacity.

(6) The present road network between producing and consuming areas is deficient and limited largely to the Hodeida-Sana'a and Mocha-Taizz axes.

Many of the villages lack any land communication except by camel or donkey. They also lack supplies of electricity and often water, which is brought in by camel. In these circumstances it would be unrealistic to make detailed proposals based on purely fishery considerations when what is so clearly required is an integrated rural development approach, which would, of course, include a fishery component, but which would embrace action in the fields of water supply, public health, communication, development of alternative occupations, e.g. handicrafts and so on. Such an approach is to be justified by wider social considerations such as the preservation of village structures, reducing the attractions of emigration, improving the conditions of life of an important sector of the population, and the saving of the social and economic costs of internal emigration to the larger towns.

As previously mentioned, an efficient fish distribution system will imply some concentration of landings. The only realistic approach at the present time is to seek to develop those centres with marketing potential deriving from their location and communications with consuming centres. Mocha, Khawhah, Hodeida, Khoba and Luhaiya have been selected on these grounds, with very modest proposals for improved processing facilities at other ports, whose future development is largely dependent upon an extension of the road network.

The present and proposed system of fisheries administration will be inadequate for the requirements of even the limited programme envisaged, which, apart from marketing infrastructure, must include a supervised credit operation and a substantial extension scheme.

Social Problems of the Artisanal Fishing Sector

The Mission was asked to pay some attention to the social situation of the fishing communities. This is clearly most desirable since the problems are as much social as economic in origin, and the fishermen's motivation and operations conditioned as much by social factors as considerations of costs and returns. However, it was of course not possible in the time available to conduct sociological surveys of any depth. Satisfactory inquiries into such matters as social organization, status, family patterns, etc., require some detailed preparation, and above all, the prior establishment of a satisfactorily trustful relationship between the researcher and his subjects, and an understanding by the latter of his purposes. This approach was not possible with the time and resources available. It was, moreover, a pity that the camping gear necessary to a stay of some days at each

village did not arrive in time. At Hodeida the reception given to the Mission by the fishermen precluded the collection of detailed data on sociological matters. What follows therefore is necessarily impressionistic, partial and superficial and is based on a review of available reports and data, supplemented by several interviews with sympathetic respondents in several villages.

A general description tends to be misleading in some details. The settlements vary considerably in size from small four or six family hamlets up to large villages like Khoba of 7 000 population, and the City of Hodeida with a population of over 80 000 whose fishing population probably accounts for some 900 men. The archetypical situation is one of a village on or close by a shallow sandy beach, consisting of a number of family compounds; wood and straw houses, a store and cooking area, surrounded by a high strawfence, one family living in each.

It is important to note that the area under discussion forms part of the Tihamah, the flat desert coastal strip of North Yemen, very hot and humid and lacking almost any form of road. Travel is along the beach or by camel track and, at best, only accessible by four-wheel drive vehicles. (Hodeida and Mocha have been noted as exceptions).

The settlements therefore are very isolated and inbred. Visitors are a rarity and well received with traditional Arab hospitality.

Normally, the village is administratively in the charge of a sheik who, in many cases, holds a hereditary position or may be elected and confirmed in his duties by the local governor. There will normally also be a head fisherman or fishermen's spokesman if the sheik is not himself a fisherman. Where there is a resident fish buyer or auctioneer, he is usually a man of considerable local influence. These three are the village's main contact with the regional administration. At most substantial villages there is a representative of the police, often, apparently, an auxiliary or special non-uniformed agent. The literature reports that village sheiks and committees have substantial powers for regulating disputes within the village, deriving from Islamic and tribal customs and official sanction. There is a tribal structure among the inhabitants of the Tihamah but, apart from the authority of the sheiks, it was not possible to discern what influence it has on the conduct of life. At Khoba it was stated that inter-tribal marriages are not favoured. It is certainly true that at Hodeida, where there have been substantial numbers of immigrant fishermen in recent years, there are two largely separate communities, the Hodeida-born and the immigrant from along the coast, living in different areas and in different types of houses, with some ill feeling at times between them. This may spring from some tribal differences, but is easily explained by the natural antipathy of established fishermen for interlopers.

The services of the village are rudimentary. No health services, normally no schools, except in the larger villages, no electricity and frequently no water which has to be fetched by camel train from some distance and deposited in a communal tank. Often, though not always, the village surroundings and the paths between the compounds are surprisingly clean considering the situation and this is largely done on a voluntary, self-help basis, as there appear to be no municipal or public services in the usual sense.

Around some villages in favourable situations there is some cultivation of dates and other crops, but these are undertaken by large landowners or by peasant families and it was said that fishermen almost never own land, though they may in season obtain some agricultural work such as date harvesting.

The villages are clearly dependent upon the fishery, though the extent varies from case to case. At Khoba approximately 60 percent of the families are primarily dependent on fishing for their livelihood, at Luhaiya 43 percent. At the other end of the scale, excluding Hodeida, if the numbers of fishermen are correct, only some 17 percent of families are primarily dependent on the fishery at Mocha and 17 percent at Khawbah. Of course a large number of additional families are dependent upon the fishery in the secondary phase, fish processing, salting, those in transport and supplies of fuel, etc. and very significantly those in the principal subsidiary activity, the manufacture of braided and plaited containers and mats from reeds and palm leaf fronds. This latter is a widespread cottage

industry, largely undertaken by the women, one in which earnings are very low, averaging perhaps 1 YR per day. Much of the salt fish is packed in these containers for transport.

Family Structure

Within this rather hard and isolated environment, the fishermen and their families pursue a tradition-ordered life which has probably altered very little for generations. North Yemen is among the most orthodox of Islamic scocieties and traditional values are still strong. Women of marriageable age wear the veil, though not in all Tihamah villages, and are normally secluded in their household compounds, though, of course, they visit each other. One has the impression that fishermen's families are little involved in the work of the husband, in mending nets, etc. and are mostly occupied in household tasks, tending a few chickens perhaps and in their spare time plaiting palm frond articles. However, some unmarried and older women, together with young girls, work at fish processing, gutting, splitting and salting fish, or cooking it in clay ovens set in the ground. This may be family work or piece-work for others. The status of women is governed largely by Islamic law. They are subject to their husbands' wishes in most things, such as residence, household tasks, etc. but do have important and protected rights. They can for instance administer and dispose of their own property including their share of the bride-price. This is a sum paid by the husband's father to the family of the bride on marriage and varies from a minimum of 2 500 YR up to as much as 5 000 YR depending on the family status of the bride. It might be thought that this would be a large sum for a fisherman to save from annual earnings of around perhaps 3 600 YR and at its highest approximates the cost of a larger motor houri. It might be expected to cause some postponement of the average age at marriage of fishermen, but this does not appear to be the case. The normal (not necessarily average) age at marriage is 14 for boys and 10 for girls. Marriages are arranged by families and it is normal for the bride and groom not to have met previously to the wedding, though of course in small villages it is often the case that they have been childhood acquaintances. As mentioned, inter-tribal marriages are unpopular but, more significantly (and this was stated on different occasions) fishermen's daughters invariably marry fishermen's sons and vice versa. The fishing population therefore forms a virtually closed caste system.

As a Moslem, the fisherman is legally entitled to have up to four wives, providing he can support them and that he treats them equally. However, it is unusual for a fisherman to have more than one wife, probably for financial reasons and most families are nuclear ones consisting of man, wife and children, living in a compound constructed by their own labour with the help of friends.

Average family size is difficult to estimate. It was said that fishermen average four or five children per family. However, the 1975 census figures show that at Mocha (the census area, not the town) a total population of 21 370 people was distributed in 4 794 households giving an average family size of 4.45. For Khawhah the same figure was 4.3. This gives the average number of children per family as 2.4 and this seems nearer the true figure for fishermen.

Table 4 relates to a sample taken in Sana'a in 1972 of females aged 10 to 49 years, giving the number of children born alive, from which an average number of live births can be calculated as 3.6.

Table 4

Number of live children born	Number of females
0	2 686
1	2 079
2	2 203
3	2 158
4	1 866
5	1 626
6	1 422
7	1 070
8	697
9	531
10+	690

Table 5

Age at first marriage

Age	Number
15	4 896
15-19	9 329
20-24	2 343
25-29	390
30-34	40
35-39	5
40-44	5
Not stated	305

Weighted average age at first marriage = 13.4 years

The high rates of infant mortality in Yemen and particularly in the Tihamah must be mentioned here[1]. Table 6 reproduces data on the high absolute level of infant mortality.

Table 6

Sibling mortality rates among children under 15 years

	Highlands			Midlands		Tihamah			
	Sana'a	Ibb	Haina	Dar el Olefi	Al Manika	Zokrab	Houdah	Ibin Abbas	Average
Sibling Mortality Rate %	42	46	46	43	32	41	57	53	45
% of these dead under 2 years of age	84	87	79	67	63	69	75	81	76

Sibling mortality rate shows the number of dead children in relation to the total number of children born per woman and is not directly comparable with ordinary mortality rates which show percentage deaths in one year.

The reasons for the high mortality are many, insect and parasitic diseases, poor hygiene and inadequate nutrition. Ibin Abbas is a typical fishing village of a current 800 population in the north of Tihamah and it will be seen that more than half of the children born die before age fifteen, 43 percent of them before two years of age.

It may be said therefore that the average family size is probably two adults and two children who will survive age 15, and a proportion of children who will not.

The implication of this is that the fishing population is at best static and, more probably, slightly declining apart from the question of emigration.

1/ From Nutrition Newsletter 1972 10(3) 1-9 "Some observations on Yemeni food habits" by Annika Bornstein.

Social mobility and status

In a fishing village almost entirely dependent upon fishing and related occupations, questions about the social esteem of various occupations tend to be somewhat biased in that the non-fishermen of the village are largely "establishment" figures of relative wealth, e.g., sheik, fish merchant, transport operator, etc. However, at places where there is a mixed occupational structure it appeared that fishermen, as a class, were at the bottom of the social ladder and held in low esteem, as compared with agricultural workers, salt-mine workers (Salif) and those in urban activities. One reason for this must be their relatively low earnings, but it probably also springs from their lack of capital goods and possessions, (particularly land or livestock) always an important status factor in peasant societies. It has been noted that fishermen generally have only one wife, another important status factor. It should also be mentioned here that additional wives for a fishermen are a net financial burden as compared to agricultural families where additional family labour can be productively employed in the family holding or share-cropping.

For a combination of these reasons fishermen as a caste are held in low esteem. This, together with the bride-price tradition, largely ensures that fishermen are a closed caste, and explains why fishermen's sons marry fishermen's daughters. The bride-price to enter a higher status family would be substantially greater than for a fisherman's daughter.

There is therefore a low level of social mobility for fishermen's children. Formal education is largely lacking, although where available this is an avenue for the most intelligent children. Their geographical horizon is limited by the difficulty of travel, and many of them will live their lives within the narrow confines of their own and neighbouring villages, except perhaps for occasional fishing trips to Hodeida. Within their environment the opportunities for alternative, better employment are strictly limited at present.

Occupational mobility is therefore also low. This is perhaps reinforced by the average relationship of one son per father outlined earlier. In such a case there is a strong pressure upon the single son to follow his father's footsteps and use the family capital equipment in his turn, apart from any sentiment about maintaining a family tradition. The consultants were told repeatedly that fishermen's sons always become fishermen, though one or two had higher ambitions for their children such as teacher training, but these were in the larger towns with schools. Fishermen, generally it was understood, are not eager to send their children to school; girls do not normally enter employment or receive any formal education. The principal avenue at present for increased social and occupational mobility and for increased earnings is emigration. Many older fishermen do not wish their sons to emigrate, but this is clearly only part of the story.

Emigration

With an overall population growth rate of 2.5% per annum, and a very low level of economic development, Yemen has traditionally supplied large numbers of unskilled and semi-skilled workers to neighbouring Arab States, principally Saudi Arabia. The 1975 census figures put the current population within the Yemen Arab Republic at 5 237 893, with Yemenis abroad at 1 234 000, or 20% of the total Yemeni population.

When it is considered that this total consists almost entirely (90%) of males, it may be said that some 40% of the total adult male labour force is working abroad at a given time.

The effects of this movement upon the fishing sector is hard to assess. Certainly there are significant differences between the north and south of the country. Mocha for instance lost only 20 heads of families in the past two years, and these were mainly peasant agriculturists. Fishermen from this area tend more perhaps to move to Hodeida. However, at Ibin Abbas, formerly a village of 1 500 people, the current total is 800, and between 400 and 500 fishermen have left, mostly for Saudi Arabia where some are engaged in fishing and others in other unskilled trades. From Haria (Salif) 300 fishermen have gone to Saudi Arabia, leaving only 100 fishermen and a total population of 1 800 people, clearly very heavily

weighted in favour of women and children. From El Dahia and El Zaidih 255 fishermen out of 500 have emigrated over the past two years and the population of Luhaiya is down to 1 500 families from a former total of 3 000. From this latter part, 70 large sambuks have gone to work from Jizan in Saudi Arabia, carrying some 490-500 crewmen, returning only occasionally for family visits and refitting. From Khoba, with a present population of 7 000, there are over 500 fishermen working in Saudi Arabia.

A rough estimate of the total of emigrant fishermen by the Mission mostly in Saudi Arabia is 2 350, out of a former total, or more precisely, an available total of 6 000 or 39%. The total is distributed roughly as follows:

North of Luhaiya	200
Luhaiya	1 000
Khoba	500
Ibin Abbas and neighbouring villages	500
Hodeida and centre villages	100
South, Mocha, Khawhah	50
	2 350

There are apparently at the moment no legal obstacles placed against the free movement of people or their remittances home, which makes a very substantial contribution to the Yemen Arab Republic Balance of Payments, amounting to more than 250 million dollars per year.

Apart from the restricted alternative employment opportunities in the Tihamah and the difficulty of amassing a capital sum for investment in a fishing vessel, the reasons for this emigration are fairly clear. In Saudi Arabia a fishermen can earn between 500 and 800 Saudi Arabian Rials a month[1/] either at fishing or at unskilled work. If 650 S.Rls. is taken as an example, then this equals 822 YR per month, or 28 YR per day as compared with an average daily earning of perhaps 6 YR day for houri fishermen in a small village, or up to 20 YR for a successful sambuk fishermen at Hodeida. For fishermen following their trade at Jizan in Saudi Arabia, fish prices are said to be up to 5 times those in Ibin Abbas and emigrants from this village have been known to earn as much as 3 000 YR per month in a sambuk. Fuel too is cheaper than in Yemen. From Haria fishermen regularly report earning 50 YR per day in Jizan as compared to 14 YR per day in the Yemen.

Many are the tales of returning villagers with sufficient savings to buy a sambuk after 20 months in Saudi Arabia.

There is a significant export trade in fish from Yemen to Saudi Arabia, estimated at 1 500 tons in 1975-1976.

The correct approach to the problem of emigration as it affects the fishing population is to regard the frontier as artificially imposed upon a single economic system, whose trade-flows are regulated by prices. Across this frontier, direct landings in Yemen, and earnings by Yemeni fishermen in Saudi Arabia, are to be regarded as another form of exports. This is particularly so because the fishermen and, for that matter, other categories of workers, leave their families behind in the villages and regularly remit back most of their earnings. On return they usually bring substantial savings after a typical period of 20 to 24 months.

It is interesting to consider that if the estimated 2 350 emigrant fishermen were repatriated to the Yemen the present fishing power could increase by 65% and result in landings close to the postulated sustainable yield from inshore waters of 27 000 tons.

1/ 1 Saudi Arabia Rial (S.Rls) = 1.28 Yemeni Rial (Y.Rls)

The pull of the Saudi market for fish is very strong and at present only impeded by poor communications. One suspects that even if the fishermen were to be repatriated, which is considered to be a very unlikely event, most additional fish landed in the north of the Yemen Arab Republic would be sold in Saudi Arabia by overland routes. It is to be noted that a new road south from Jizan to Hodeida is under construction. These attempts to resettle the fishing population, which may be desirable on other grounds, would probably only have a minimal effect on domestic fish supplies.

There are, however, some serious social costs of this movement. Many villages are composed largely of women, children and old men, with a corresponding lack of attention to the local economy and communal services. The subservient status of women in the household means that many important decisions concerning family property, children's education and community affairs cannot be taken in the absence of the male head of the family. Some villages have obviously been reduced close to, or below, a viable economic level by the emigration process and in all villages the tax base and the capability to provide communal services has been eroded.

In the view of the Mission the attractions of temporary emigration are so strong that they cannot be countered without a long-term development of employment and general improvement of earnings in the Tihamah, i.e., by general economic development. No fisheries strategy likely to have a significant impact on the outflow can be foreseen although improvements in marketing and the provision of credit for vessels and engines would be expected to have some retarding effect in the villages. It is observed incidentally, that a local tax on foreign remittances received, or a similar national tax allocated to depopulated areas, for communal services and rural development, would go some way to offsetting the worst local effects of emigration, which, on the scale that it is occurring, cannot be ignored.

Conclusion

One ends with a picture of a small, relatively isolated and closed caste, within a system of rural castes and tribal relations. It is bound by rigid caste and social ties, both in marriage and in occupational structure. Its members are largely illiterate and uneducated. Their earnings and their resources are small and insufficient for autonomous and spontaneous development. Numerically, it is barely replacing itself and, as mentioned earlier, the number of active fishermen is likely to be a binding constraint on artisanal fisheries development.

There is also the impression that the will and initiative for technical progress is largely lacking, and the internal leadership of fishermen's groups is not noticeably effective. All stimulus for change and the necessary resources, will have to be provided from outside, probably in the face of some initial resistance from established houri fishermen. These latter were noticeably cool in their responses as to the desirablity of introducing improved sambuks. Their requests were for nets, training, ice and cold storage, with a preference for the existing scale and technology applied for the fish catch.

These social considerations in themselves reinforce the economic conclusion that development must be market-led to divert opposition from fishermen and to make them able and willing to participate in a credit scheme. They also stress the vital importance of good and sympathetic extension work among the fishing communities and hence the need for good extension training of capable people.

MISSION PROPOSALS

According to the Terms of Reference of the Marketing and Processing Consultant the Mission was expected to "indicate the equipment and facilities needed for developing the market".

This is done in a very detailed manner in the Annex at a total investment cost of 32 968 400 YR. This is less a project proposal than a programme of maximum dimensions within

identified resource and manpower constraints and is contingent upon related developments in the road network, training programmes, credit availability, etc.

As such, it is not in total an immediate possibility, nor in strict economic terms is it viable, as shown in the accompanying Table 7. The basic reason for this lack of financial viability is that some ports, given fairly uniform costs of marketing investment, have a limited capability for a response in output. This is due to the existing relative proportions of sambuks and houris. For instance the benefits which may be expected to arise at some ports from marketing investment have already occurred at Hodeida and future benefits will be more dependent upon future changes in vessels and methods than upon marketing development per se.

The detailed programme provided a basis for the design of specific projects as communications improve and as financing sources can be identified. It was not the Mission's intention to propose a single bankable project for the country as a whole, since the conditions are not right for such an approach, either on geographical, financial or administrative grounds.

Some immediate investment possibilities can however be identified. Existing roads favour a development of the Mocha/Khawhah - Taizz sector of the market. Demand in the inland area - Taizz/Ibb - is potentially strong as discussed earlier. The market structure is relatively favourable in that there is a small number of inland wholesalers and the auctioneer, at Mocha at least, is not a quasi-independent trader but a fisherman's representative. There is a lot of interest in developing the fisheries sector both on the part of the Mocha Development Board and the Taizz Municipal Authority who run the existing inland market facilities. The accompanying table, in a rather schematic way, compares this sector project consisting of landing and marketing facilities at Mocha and Khawhah, a inland wholesale market at Taizz, transport, boxes and the construction of 67 sambuks with the total programme. It compares incremental costs and benefits, net of existing crews' earnings, assuming capital costs are all incurred in Year 1, and benefits accrue in Years 2 to 10 with approximate residual values on the market buildings. It shows that despite the overall non-viability of the programme from a financial point of view, it permits the identification of financially viable segments as financing becomes available.

A subsequent segment would be an inland market at Ibb, which, judged purely from an incremental investment aspect, would give a higher rate of return.

The table makes no allowance for savings on the present operating costs of houris, nor of possible improvement in wholesale prices and the actual IRR could be well in excess of 20%, neglecting technical assistance inputs.

Most probably, similar segments can be developed for Luhaiya and Khoba as the road is constructed south from Saudi Arabia.

Financing

In the case of a World Bank loan for such a project it is envisaged that the primary borrowers would be the Government of the Yemen Arab Republic, through the Ministry of Agriculture or the Ministry of Commerce, for supervised on-lending to the Taizz Municipal Authority and the Mocha Development Board who would develop and manage the markets. Credit for vessel construction and possibly privately owned transport and storage facilities, could be administered by the Fisheries Department, who would also coordinate the necessary technical assistance component.

The rate of return on such infrastructure development is relatively low, particularly in the absence of any assumption about higher wholesale prices.

In the Mission's view, the limited present possibilities for expansion of landings and markets, occasioned by the deficiencies in communications and hence the relatively small-scale of individual projects, coupled with administrative problems, make it impossible to

design a bankable project of interest to the World Bank at this time.

Such segments of the overall programme outlined which are presently feasible would be better candidates for specific bilateral assistance, and offers of such assistance have already been received by the Government from a variety of sources.

The main requirement is for technical assistance in their co-ordination and implementation.

Table 7

Comparison of Costs and Returns

	Total Programme	Taizz-Mocha-Khoba Segment
Capital cost - Markets including transport, boxes, etc.	19 526 693	5 917 143
Capital cost - New vessels (sambuks)	13 400 000	4 432 000
Total capital cost	32 926 693	10 349 143
Operating costs - Markets	11 302 500	3 200 760
- New vessels	8 746 000	2 929 910
Existing crew earnings 1 619 x 1 875 YR p.a. 465 x 1 875 YR p.a.	3 035 625	871 875
Incremental Landings (tons)	5 538	1 930
Value at 4.6 YR/kg	25 474 800	8 878 000
Capital Investment Years	32 926 693	10 349 143
Annual Benefits - Years 2-10	2 390 675	1 875 455
Residence Value Year 10	10 000 000	3 000 000
Internal Rate of Return	Negative	13

CREDIT FACILITIES

Present credit facilities available to fishermen are too limited and too onerous in their conditions to finance a development of the scale envisaged; therefore, a Credit Scheme initiated and financed by the Government is required.

Earlier documents and in particular "Recommendations regarding a Fisheries Credit Scheme of the Revolving Fund Type in the Yemen Arab Republic" by G.E. Eddie, Rome, April 1975, have been studied.

This latter paper gives a sound review of the principles of revolving fund schemes in a fisheries context, stressing the need to provide technical services, training and supervision as an integral part of such a scheme in developing countries. It pays a great deal of attention to the technical aspects of the fleet expansion, the shortcomings of the existing vessels, boat-building methods etc. and all these points have been agreed in principle by the Mission consultants.

Their criticisms are that the Scheme, as outlined, does not have an initial specific aim, and the validity of the cost estimates is difficult to check as no details of costs are given in the paper.

A particular difficulty is that the Credit Scheme proper appears to be little more than a vehicle for a large-scale programme of improved vessels and gear design, maintenance services and training. It is perhaps difficult to criticize this in principle as these ends are certainly desirable, and would improve the efficiency not only of the industry, but of the loan scheme itself. However, the costs of such a programme would probably be larger than the funds necessary for a true loan operation. The matter really turns on the extent of aid and financing available. At the time of writing the credit report, it was believed that UN Capital Development Fund (UNCDF) assistance would be available for the whole scheme, but the present position is that the UN Capital Development Fund has offered for two ports the sum of U.S.$ 50 000 each. This is not large enough for the scale of investment required. More particularly, the primary purpose of the assistance offered is to develop skills in investment and the management of capital funds, and it is intended to be controlled by a fishermen's group or cooperative. It is intended too to "test the feasibility of a revolving fund and/or a reserve fund to guarantee revolving credits"[1], and is not in itself large enough to finance more than a handful of vessels, perhaps 20 in total over five years. This is mentioned again in the discussion of financing possibilities. The need to provide better and cheaper servicing facilities, training and improvement of vessels is accepted, but these should be considered as adjuncts to the provision of credit to be financed where possible by aid from UNDP/FAO and bilateral sources.

The Mission proposed as a basic objective a revolving Fund Credit Scheme to provide over ten years finance for the construction of 160 improved sambuks and additional engines. This is the maximum requirement derived from previous considerations. The scheme should include administrative provision for loans on gear and outboard engines, but these should be a subsidiary aspect of the scheme.

It will be administratively impossible to distinguish between incremental sambuks and normal replacement. If higher standards in all new constructions are insisted upon, the scheme should cover both classes of vessel and re-engining of existing vessels. This implies a construction rate of 300 hulls and 470 engines over a period of 5 years, and is beyond our assessment of Yemen's boatbuilding capacity of about 30 sambuks per year. This therefore implies the importation of 150 hulls, as well as engines. If foreign exchange restrictions make it impossible, the scheme will have to be geared down to 150 new vessels and a net

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1/ Memorandum dated 17 May 1976 from Shawn Turnbull, UNCDF Investment Consultant to Mr. Tilak Malhotra, UNDP Resident Representative

increase over five years of only perhaps 10 or 20 vessels, after allowing for replacements.[1] One might consider special incentive schemes for expanding boatbuilding capacity, justified on employment, particularly rural and village employment and on foreign exchange grounds.

On the time scale envisaged, the total of 300 hulls would result in 160 additional vessels, 140 replacement vessels and 170 re-engining of existing vessels.

It is emphasised that loans should be available only for improved sambuks of large or intermediate size. This would involve stiffer hulls with better stern gear and power take-off, or winch, and iced storage. The power-assistance provided would possibly permit a reduction of crew by at least one man, to six in larger sambuks and five in smaller ones. There are no independent and reliable estimates, but it has to be assumed that a 12 m sambuk of improved type, with stiffer frames, larger deadwood, keelson, would cost about Yemini Riyals 25 000 (as compared with YR 15 000 for existing types) plus 40-50 hp engine, gearbox and stern gear at YR 35 000.

It is assumed that such vessels, in addition to saving one crew member, would obtain 10 percent more sea time and be 25 percent more efficient per day at sea. An estimated cost and return statement is appended (Appendix D). It should be noted that the price assumed is higher than present levels generally, though lower than Hodeida. Such vessels can only be economic after marketing improvements have raised local demand and prices. There is a clear need for flexibility in the scheme and a willingness to finance intermediate types of vessel.

The usual conditions as described by G.E. Eddie would apply to borrowers from the scheme. The scheme would not supply cash, but only vessels engines and gear and would be the prime contractor for vessel construction. This latter condition is usually avoided by loan schemes in developed countries, to limit the schemes liability and responsibility for delays and non-performance, faults, etc., but in the conditions of the Yemen and the need to enforce improved standards, it should be accepted.

Loans of 100 percent should be given to working fishermen for a period of five years or more and with a 6 month grace period, at a rate of interest of 10 percent, which should be regarded as provisional depending upon financing of the scheme. Though open to abuse, repayments might be geared to a fixed proportion of the weekly or monthly earnings of the vessels.

On these assumptions, the repayments of capital and interest would be equivalent to a fixed annual average amount (though provision should perhaps be made for reducing balance interest in appropriate cases) of YR 16 750 or YR 15 000 if the initial gear is not subject to loan. With a crew of six men, two shares out of eight would provide 16 567 from net earnings and this is certainly adequate. At the end of five years, the owner(s) would have the vessel, worth approximately YR 30 000 free of all charges. During the period, crewman shares would be YR 8 283 or YR 23 per man per day. It may be said that the proposals in outline are feasible from the fishermen's point of view. At the end of the five years, the vessel should be eligible for a re-engining loan, if required, when this is repaid at year 10, the vessel capital account should be in surplus of YR 39 000 and second vessel loans could be limited to, say YR 25 000 if the schemes continues after 10 years.

Such a scheme would result in additional investment, i.e., excluding replacement vessels and engines which will probably be built anyway of 160 vessels worth YR 9 600 000 and would

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1/ The natural replacement rate is estimated to be 10 percent of existing fleet, 28 vessels per year for five years (140 vessels)

increase fish landings from the present 15 500 m tons to 22 200 m tons, an increase of 43 percent. As stated before, this is a scheme of maximum dimensions, within the manpower and resources constraints and a less ambitious or longer phased scheme can certainly be devised.

Minimum administrative costs including rent of premises and travel etc. is estimated as YR 120 000 per annum. The type of scheme envisaged, however, would require in addition a boatbuilding/engineer surveyor who, initially, would probably have to be an Arabic-speaking expatriate, the salary costing perhaps YR 40 000. In addition, the scheme should be operated and supervised in the field by trained extension officers, one each based at the main centres chosen, costing about YR 45 000. For the purposes of this exposition and neglecting any inputs supplied by the Project YEM/74/003 or bilateral aid, there would be a minimum of YR 225 000 per annum.

Another major variable is the initial borrowing rate of interest, which is assumed to be an on-lending rate from the Government/World Bank loans of eight percent.

The initial capital sum required to finance such a revolving fund depends upon a number of factors in addition to the above assumptions. The principal factor is the extent to which the fund can go into deficit in the initial critical period. An efficient scheme, with minimal initial and closing balances, necessarily involves a period when expenses can, and may, be financed by supplementary borrowing at commercial rates. The efficient running of such a scheme essentially depends on good fund management, the selection of long- and short-term deposits and appropriate borrowing when necessary to minimize the initial funding. Present short-term borrowing and deposit rates of interest at commercial banks are:

	Deposits (%)	Loans (%)
1 month	4	13
2 months	5	14
1 year	9	15

The foreign commercial banks mainly restrict themselves to financing imports or letters of credit, except on occasions when they have participated in consortium loans, arranged by the Central Bank, for specific projects. It is possible that government guarenteed loans could be made at 12 percent and substantial 3 month deposits at eight percent. For the purpose of the calculation, the consultants used a short-term deposit rate of five percent and a borrowing rate of 12 percent.

When the source of initial funding is clearer, the trade-off between initial capital funding, short-term financing operations and the interest rate margin can be investigated in more detail.

Based on the foregoing assumptions, Table 8 aquires a forecast of the operation of such a scheme, with the object of illustrating its main features.

There would be a substantial foreign exchange component for imports of vessels and engines estimated at U.S.$ 2.6 million out of the total investment in sambuks of U.S.$ 4.13 million.

The sum allowed in the calculations, 9.4 percent of repayments in the first five years is equal to 12.2 percent of loans made. This may be too low, though much depends upon the effort put into recovering payments. In view of the impossibility of vessel insurance, no-fault losses of vessels should be written-off and the outstanding loan cancelled, so as not to leave the fisherman hopelessly in debt. Consideration can be given to inserting these losses within the scheme, i.e., spreading such risks over all the borrowers.

Table 8

Outline Credit Scheme Operations
'000 YR

Year		Loans Made	Admin. Costs	Collection Commission 2%	Bad Debts 15% of Due	Total Out-going	Repayment Cap.20% Int.10%	Net Balance	Cumulative Balance
1	10 Sambuks 30 Inter-mediate 34 Engines Gear	2 970	225	-	-	3 195	-	-3 195	- 3 195
2		4 120	225	18	133	4 496	891	-3 605	- 6 800
3		5 370	225	41	310	5 946	2 068	-3 878	-10 678
4		4 470	225	70	529	5 294	3 528	-1 766	-12 444
5		3 020	225	92	693	4 030	4 620	+ 590	-11 854
6		-	180	104	778	1 062	5 188	+4 126	- 7 728
7		-	180	84	-	264	4 196	+3 932	- 3 796
8		-	180	60	-	240	3 033	+2 793	- 1 003
9		-	180	34	-	214	1 708	+1 494	+ 491
10		-	180	13	-	193	664	+ 471	+ 962
10		19 950	2 025	516	2 443 = 9.4% Repayments 12.2% loans	24 934	25 896	+ 962	

Repayment of Principal 20%

Repayment of Interest 10% on reducing balance

The extension workers would supervise and monitor the scheme, but the collection of repayments to be made by salesmen and auctioneers on a two percent commission basis, subject to proper accounting and book-keeping procedures is envisaged.

Administration - Credit Scheme

Clearly, a principal difficulty of such a scheme in the Yemen will be finding appropriately qualified managerial talent. The manager of the scheme needs to be an experienced accountant with a good understanding of both credit operations and, preferably, of fisheries. The extension workers need to be men of probity and judgement, as well as being well trained in credit evaluation and in extension techniques. Public service salaries in the Yemen are relatively low for such people and unlikely to prove attractive.

There is a newly created Agricultural Credit Bank in the Yemen Arab Republic, which could manage such a scheme in principle, though this would involve the creation of a large specialized Fishery Department. In view of the importance of associated activities, particularly training, extension and servicing facilities, it is thought that the scheme should have its own administration within the Department of Fisheries.

The development powers and involvement in the industry of the Chief Executive of such a credit scheme will be far larger than that of a Director General of Fisheries in Sana'a and he will control a far larger staff. He will administer the scheme within policy guidelines and directives laid down from time to time by the Minister, but daily interference in the technical loan operation is not to be tolerated.

Once the main lines for fisheries strategy and policy have been laid down, it is unlikely that the Yemen Arab Republic needs a large Department of Fisheries in Sana'a at the level of a Director General. Apart from an office in the Ministry of Agriculture, it is suggested that the fisheries administration be located in Hodeida, and its chief be executively responsible, with appropriate assistance, for the management of the credit scheme and the extension service. The alternative would be to create a semi-autonomous Fisheries Development Corporation.

It is clear that the credit scheme is secondary to marketing improvement and this gives some time in which preparation may be made. It is suggested therefore:

a) that the UNDP/FAO provide the services of a full time experienced Credit Adviser for a period of three years to assist in the introduction and management of the scheme;

b) that National Staff, the Chief Executive and the Extension Workers be recruited at an early stage and sent on fellowship for training abroad.

The financing of such a scheme poses some problems. If a borrowing scale of 8 percent on the initial funding is taken, the initial fund would have to be 15.5 million YR (U.S.$ 3.44 million) if the scheme is to break even in the 10th year, after repaying the loan in the fourth, sixth, seventh, eighth and ninth year. This gives a rate of "roll-over" of the fund of only 1.29 which cannot be regarded as satisfactory.

The basic reason is the relatively high level of overheads - administrative costs, bad debts and collection commission - averages 25 percent of loans made, or 6 400 YR per loan. Though high, this can be considered acceptable having regard to the technical supervision and extension components of the scheme.

In present Yemeni circumstances, a collection commission of 2 percent would appear to be administratively necessary, as an alternative to a number of permanent officers making daily or weekly collections in the villages.

The bad debts provision amounting overall to 9.4 percent of repayments due, and 12.2 percent of loans made, is not regarded as excessively cautious.

On the other hand, with commercial landing rates at 12 to 14 percent, the maximum rate the fishermen borrower can be expected to pay should be about 10 percent.

It can therefore be concluded, that the scheme will require some proportion of "soft" financing, either by an IDA loan, or possibly bilateral assistance. Some bilateral assistance in kind, particularly engines and gear, can easily be incorporated in the financing but there will be a substantial (U.S.$ 2.6 million) foreign exchange component.

As shown in the next section, the overall rate of return on the total integrated project is quite good at +33 percent, excluding financing costs and technical inputs, but it would be administratively difficult to appropriate the surplus arising in the marketing chain, perhaps by means of a tax and use it for financing the credit scheme.

2.5 Support Services

1. Fishermen have frequently remarked upon the high cost and difficulty of engine servicing and maintainance. The scheme should have a related component to provide maintenance workshop and spares service at the main centres, possibly with a mobile workshop for the villages. It should also sell gear, fuel and other requisites. All these services should be provided at cost, with no charge on the scheme. In due course of time, as fishermen's cooperatives develop, such supply services might be devolved to them. Properly managed, such a scheme could be a powerful instrument for creating local cooperatives and a cooperative federation. Initially, as we have said, there is little interest among fishermen in cooperation.

The Project: YEM/74/003 Fisheries Development - Yemen Arab Republic

Due to earlier emphasis on stock assessment the present work programme of this project is not closely geared to the requirements of the above strategy. We suggest the following changes:

a. As mentioned, the project should provide a Credit Specialist to advise on the operation of the Credit Scheme.

b. Since a necessarily large proportion of the landings must be processed, at present by simple salting, air drying and smoking being difficult, the project should be strengthened in this field. A fish processing technologist is presently under recruitment.

c. The present project is deficient in its development of artisanal fishing techniques. It has little, if anything, for the extension officers to extend. There should therefore be a comprehensive programme of work in alternative gears and methods. Bottom and floating longlines, light fishing, light trawling, pair trawling, all come to mind as possibilities worth exploring. A necessary condition for this work is an improved sambuk to be operated by the project. Netherlands aid could be available for the construction of four improved sambuks, one for the project and three to be loaned to fishermen on certain conditions at each of the development centres.

d. The existing sambuk hull-form has been greatly admired and has been seen as a largely optimal evolution to local conditions, despite its structural shortcomings. It is however basically a sailing hull with the inherent disadvantages of relatively low initial stability and poor carrying capacity for its length, and would also probably prove unsuitable for trawling. The project should have the services of a Naval Architect/Boatbuilder, and a Marine Engineer for at least twelve months to prepare designs and build an improved vessel.

e. The project will soon have the Fish Trading and Demonstration Centre in operation, which will be able to provide necessary training in fish handling and processing, etc. An important feature of the projects work will be the training of the extension officers and their proper motivation. The project should have a consultant (6 m/m) for Extension Training in Fisheries, to run an intensive on the job course in extension methods, etc.

f. The sum of U.S.$ 534 100 will be made available by the FAO/Near East Cooperative Programme for an investigation of small harbours and landing places in the Yemen Arab Republic. It is suggested that the major portion of this be spent on investigations and design studies at the ports selected as development centres, namely Mocha, Hodeida and Khawhah as those capable of early development.

2.6 Financing and Administration Marketing Scheme

As stated earlier, the marketing component of the Mission's proposals is considered as essentially an on-lending operation by the Government to local municipalities. Sources of funding might be the World Bank, or bilateral sources, at current rates of interest with a relatively modest grace period of two years.

It is envisaged that the investment required for boxes and transport would be fairly readily forthcoming from private sources, reducing the capital fund required for the marketing element to U.S.$ 7.4 million to be repaid over 15 years.

The credit scheme is somewhat more complicated. As a pure loan operation it would require a capital fund of U.S.$ 3.55 million and would be relatively inefficient from a roll-over point of view.

Some inputs in kind would be available from bilateral assistance and the balance, (perhaps U.S.$ 3 million) should be financed by a combination of normal and soft loan facility with a four or five year grace period. If the mean overall rate of interest can be brought down to about 5% some U.S.$ 2.5 million would be required initially.

At the present time it seems unprofitable to speculate further until probable sources of financing and their contributions have been identified.

Should the UNDP/FAO Fisheries Development Project YEM/74/003 be terminated for lack of funds before the inception of our proposals, it is important that the loan financing should include an element for technical assistance, along the lines set out in the previous section.

An offer of assistance from the U.N. Capital Development Fund has been mentioned. The purposes for which this assistance has been offered would largely be covered by the Consultants' proposals and an alternate separate use for these funds cannot be proposed except insofar as they might be placed under the jurisdiction of the credit scheme. This would, of course, not conform with the primary intention of the offer, that of giving fishermen experience in the management of investment funds. Should the proposals be implemented, the UNCDF would be approached for supplementary finance, perhaps for gear, fuel and requisite sales, which could, after an initial period be transferred to fishermen's control.

It is possible that the marketing infrastructure, though financed and organized by the Government through the provision of credits and technical services, would be run by the municipal authorities concerned, who administer markets at present. Loan repayments and running costs would be recouped by charges on sales volume from merchants and/or auctioneers.

There is no strong case for the creation of a national authority to discharge this function, which could be administered by an existing Ministry.

The costs calculated in this report include a 10% charge for design and technical

services. The whole programme should be contracted to experienced foreign contractors, using standardized equipment and components. The contractors should be required to provide technical services and training of Yemeni nationals in the operation of the equipment and in good fish handling practices.

SUMMARY OF THE FISHERIES MISSION

The Mission visited most ports and landing places in the Yemen Arab Republic, with the exception of the military zone at Bab al Mandab, for which permission was not forthcoming.

The main conclusions concerning the existing situation are as follows:

1. Consumer demand for fish will not limit development. Most of the country is presently undersupplied with fish due to the poor road network marketing trials have shown a strong demand and fish is very much cheaper than competing foods.

2. Resource availability estimated at 26 000 tons per annum is not likely to be a binding constraint.

3. The extent of possible development is set by the number of fishermen, who form a closed and virtually static society, diminished by emigration.

4. We estimate present landings at 17 500 tons, considerably higher than previous estimates.

5. The immediate obstacle to development is marketing, caused partly by poor coastal communications and a lack of a firm marketing structure. The improvement of the marketing structure is a first priority for a development strategy.

6. Increased landings can only come from placing a greater proportion of existing fishermen in more productive larger vessels, sambuks and improved sambuks.

7. This would permit an increase in landings of 35-40% to 22 500 tons.

8. The small isolated villages without roads, water or electricity pose a development problem of a special kind which cannot be remedied except by integrated rural development programmes beyond the scope of our present Mission. It is therefore suggested concentrating the initial fishery development efforts at three or four favourable situated centres.

It is therefore proposed:

1. At Mocha, Khawhah, Hodeida and Luhaiya, the creation of appropriate marketing infrastructure with ice plants, chill rooms, auction hall, etc.

2. At Sana'a, Taizz and some mountain villages, inland markets, chill stores, etc. The cost of this marketing infrastructure, excluding land, is estimated to be U.S.$ 4.4 million. This is a long-term programme and should start with a Mocha/Khawhah - Taizz project costing U.S.$ 1.3 million.

3. A credit scheme to finance the construction and importation of 300 sambuks engines over five years, giving a net increase in the fleet of 140 sambuks. This is a scheme of maximum dimensions and could increase landings by 7 000 tons per annum.

   There are some financing problems due to inevitably high costs and some soft financing would appear to be necessary. (Without this, the initial capital funding required would be U.S.$ 3 500 000.) The scheme includes provision for supervision and extension.

4. Associated technical assistance proposals to be made and financed either by the World Bank, UNDP/FAO or bilateral sources who have expressed interest. These include a Credit Adviser, small-scale gear trials, improvement of existing types of vessel and their later substitution by better designs, training in extension methods and simple processing.

5. In the context of the Yemen Arab Republic, this is an ambitious proposal of maximum feasible dimensions and is likely to be hindered by lack of administrative capabilities and government resources. An early start should be made on creating a cadre of experience through training and fellowships.

Further detailed preparation is necessary, part or which can be done through the forthcoming survey of harbours and small landing places. The costings provide for detailed design study and technical training and a decision in principle on financing the scheme would enable the preparatory phase to begin almost immediately after the completion of the Harbour and Landing Place Study.

APPENDIX A

COSTS AND EARNINGS

Large (12 m) sambuk at Hodeida

			Y.Rls.
CAPITAL COST	Hull	15 000	
	25 hp Diesel Engine	20 000	
	Nets 3 x 2 x 500	3 000	Y.Rls. 38 000
ANNUAL CATCH	290 days fishing: Average 165 kg/day		47 850 kg
	Average price = Y.Rls. 2.75 kg		
		ANNUAL GROSS EARNINGS	131 587
VARIABLE COSTS			
Gear		1 000	
Repair and Maintenance		1 600	
Fuel: 1.39 gph x 8 x 290 x 4 years		12 806	
Lub oil		2 112	
Sales commission (10%)		13 159	30 677
		NET CASH FLOW	100 910
DEPRECIATION			
Hull (10 years)		1 500	
Engine (5 years)		4 000	5 500
		SURPLUS INCLUDING CREW	95 410

OWNERS ACCOUNT 1			CREW ACCOUNT 1 (Paying Expenses)		
50% Gross		65 793	50% Gross		65 793
Depreciation	5 500		Variable costs		
Repair and Maintenance	1 600	7 100	(excl. repairs)		29 077
		58 693			36 716
	= 154% on Cost		Per man (7)	5 245	
			Per man/day	14.8	

OWNERS ACCOUNT 2 (As at Khoba)			CREW ACCOUNT 2		
50% Gross		65 793	50% Gross		65 793
Expenses		30 677			
		35 116	Per man (7)	9 399	
Depreciation		5 500	Per man/day	26.1	
	Surplus	29 616			
	= 78% on Cost				

APPENDIX B

COSTS AND EARNINGS

Large motor houri at Mocha

				Y.Rls.
CAPITAL COST	Boat	1 500		
	Engine	3 700		
	Gear	500	Y.Rls. 5 700	
ANNUAL CATCH (after Walczak)	250 days fishing: Average 40 kg/day		10 000 kg	
	Average price = Y.Rls. 1.2 kg			
VARIABLE COSTS			ANNUAL GROSS EARNINGS	12 000
Gear		250		
Repair and Maintenance		500		
Fuel: 250 x 4 gpd x 4 years		4 000		
Lub oil		660		
Sales commission (10%)		1 200		6 610
			NET CASH FLOW	5 390
DEPRECIATION				
Hull (10 years)		150		
Engine (5 years)		740		890
			SURPLUS	4 500

EARNINGS PER MAN (2.4) = Y.Rls. 1 875 p.a. = 5.2 per day

Compare same vessel at Hodeida prices (Y.Rls. 2.6 kg)

EARNINGS GROSS		26 000
COSTS VARIABLE	8 010*	
DEPRECIATION	890	8 900
		17 100

* Allowing for change in Commission

EARNINGS PER MAN (2.4) = Y.Rls. 7 125 p.a. = 19.8 per day

APPENDIX C

COSTS AND EARNINGS

Sailing houri at Mocha

				Y.Rls.
CAPITAL COST	Hull	1 500		
	Gear	500	Y.Rls. 2 000	
ANNUAL CATCH (after Walczak)	220 days fishing: Average 20 kg/day 4 400 kg Average price = Y.Rls. 1.2 kg			
VARIABLE COSTS			ANNUAL GROSS EARNINGS	5 280
Gear	250			
Repair and Maintenance	100			
Sales commission (10%)	440			790
			NET CASH FLOW	4 490
DEPRECIATION (10%)	150			150
			SURPLUS	4 340

EARNINGS PER MAN (2) = Y.Rls. 2 170 p.a. = 6.03 per day

Compare same vessel at Hodeida prices (Y.Rls. 2.6 kg)

GROSS EARNINGS		11 440
VARIABLE COSTS	1 494*	
DEPRECIATION	150	1 644
		9 796

*Allowing for change in Commission

EARNINGS PER MAN (2) = Y.Rls. 4 898 p.a. = 13.6 per day

At present prices, because of the fuel cost, sailing boats are as efficient as motor ones; not so at higher prices. Phase in outboards later in programme.

APPENDIX D

COSTS AND EARNINGS

An improved 12 m sambuk

			Y.Rls.
ASSUMPTIONS	Efficiency plus 25% =	160 kg/day	
	Time at sea plus 10% =	310 days p.a.	
	Crew number	5	
ANNUAL CATCH	49.6 tons = 50 tons p.a.		
	Hull	25 000 Y.Rls.	
	Engine	35 000 Y.Rls.	
	Gear	7 000 Y.Rls.	67 000
		Average value of landings	2.6 Y.Rls./kg
COSTS VARIABLE		ANNUAL GROSSING	130 000
GEAR	2 000		
Maintainance	3 000		
Fuel 2.75 gal/h x 8 x 310 x 4 Y.Rls.	27 280		
Lub Oil	4 950		
Sales Commission 5%	6 500		43 730
		NET CASH FLOW	86 270
DEPRECIATION HULL (10 years)	2 500		
Engine (5 years)	7 000		9 500
		SURPLUS INCL. CREW	76 770

VESSEL

2 Shares = 24 668

Each crew 12 324 p.a. = 34 Y.Rls./day

APPENDIX E

CREDIT SCHEME - FINANCING

YEAR END BALANCES
('000 Y.Rls.)

	Net Outgoings and Receipts	Interest Paid on Interest Fund 15 m YR and 8%	Closing Balance	Bank Interest Paid or Received	Net year end Balance	
1	- 3 195	-	11 805	590	+ 12 395	
2	- 3 605	-	8 790	439	+ 9 229	
3	- 3 878	-	5 351	267	+ 5 618	
4	- 1 766	-	3 852	193	+ 4 045	
5	+ 590	1 200	3 435	122	+ 3 557	Repay 3 million YR
6	+ 4 126	960	3 723	186	+ 3 909	Repay 3 million YR
7	+ 3 932	720	4 121	206	+ 4 327	Repay 4 million YR
8	+ 2 793	400	2 720	136	+ 2 856	Repay 2 million YR
9	+ 1 494	240	2 110	105	+ 2 215	Repay 2 million YR
10	+ 471	160	606	30	+ 636	
						Repay 14 million YR
				FINAL LOSS	364	

Rates of Interest		
	Initial Fund	8%
	Short Term Deposits	5%
	Short Term Loans	12%

Final Loss is within 2.4% of loans made

With 16 million YR initial funding final balance is surplus 560

Fund breaks even at about 15.5 million YR

ANNEX I

1. MARKETING OF FISH IN THE YEMEN ARAB REPUBLIC

1.1 Background Information

The existing yearly catch of about 17 000 tons of fish is marketed partly in fresh condition and partly processed (dried, salted and baked). It is not possible to determine exactly which part of the total amount landed is marketed fresh and which part is processed due to lack of any statistical data about this subject in the Yemen Arab Republic. The estimation made in Table 8 is based on a short marketing study in the Yemen Arab Republic during summer 1976, on data collected from the Central Bank of Yemen and Statistical Year Book concerning export of dried fish and based on previous study of Walczak (1975) and Fouéré (1975).

There are 41 fishing villages on the Yemeni coast where fish is landed. Two of them, Hodeida and Khoba, account for more than 50 percent of the Yemen Arab Republic's landing. The most important fishing villages have an area for auction of fish. Generally this is an open area (Hodeida), a kind of hut made of wood, twigs and straw (Khawhah, Khoba), or a concrete market (Mocha).

Auction is the normal way for transferring the fish from fishermen to fish traders. The auction is made by auctioneers who are paid by fishermen based on the value of fish sold. Auctioneers in Khawhah and Khoba are paid 5 percent of the value of fish and in other parts of the Yemen Arab Republic 10 percent.

The role of auctioneers is not only to participate in the transfer of fish, but also to give credit to the fishermen, generally before the fishing season for buying or repairing fishing gear, vessels and engines. Sometimes they participate in the trading of fish and fish products. Auction is commonly used in some highland cities such as Taizz and Sana'a. Auctioneers in Taizz are paid 10 percent of the value of fish.

The auctioneers are recruited from fishing communities and generally the post is handed from father to son. In bigger centres (Hodeida) where more auctioneers are working, each of them has his own fishermen for whom he auctions the fish.

After auction, the fish will be placed on the retail fish market. There are different types of retail markets in the Yemen Arab Republic. Some of them are made from concrete and some are huts or markets organized in open areas. All markets except one market in Taizz are working under very poor hygienic conditions; without water, electricity or a sewage system.

The present situation of fish markets in the Yemen Arab Republic is shown in Table 9. The fishermen and the fish traders are not presently paying any tax. From 17 000 tons of fish landed per year in the Yemen Arab Republic, 12 500 tons are consumed locally and 4 500 tons are exported as dried or fresh fish. The consumption of fish *per caput* per year corresponds to about 2.4 kg; of course this quantity of fish is not regularly distributed amongst Yemeni citizens. In some villages on the seaside, the population is consuming more 20 kg *per caput* per year; in the Tihamah area about 8.5 kg. In some parts of the highlands they do not eat fish at all.

The Yemeni traders do not use scales and they do not weigh the fish. Trade is based on piece, not on weight.

1.2 Marketing

Marketing of Fresh Fish

General data:

- Fish marketed in fresh condition 6 000 tons
- Exported in fresh condition 1 500 tons

- The most important types of fish:

  Indian mackerel (about 45 percent of total landing), king fish, tuna and tuna-like fish, carangids, sharks, stingrays, barracuda, red snappers

- The main consumption centres:

  Hodeida, Tihamah villages, Taizz, Sana'a

- Transport facilities:

  Open lorries from 2-8 tons, camels, donkeys.

Although only 39 percent of total landings are marketed in fresh condition, this plays the most important role in the fish trade of the Yemen Arab Republic. Whereas it was practically unknown until recently, fresh and iced fish is today a normal food product in many cities of the highlands. This progress in marketing fresh fish was made in the last few years due to the newly constructed paved roads and to the use of ice which is available in some parts of the country (Table 16).

Fresh fish is acceptable throughout the Yemen Arab Republic, on the seaside in the Tihamah area and in the highlands. Research made by Fouéré (1975) and the results of the present study conclude that the highland population accepts only fresh fish. Processed fish can be marketed only in limited areas and only during the feast of Ramadan.

The fish traders use ice when transporting fish in the Tihamah area and the highlands. Fish is most normally iced in lorries after auction and immediately transported to inland markets. Fish is handled without fish boxes and without an adequate quantity of ice. The fish is covered with wet rags and occasionally by sawdust. Fish is sometimes collected in locally made wooden containers, mixed with ice and kept for one or two days before delivering to the market. Fresh fish is transported often from the landing places to neighbourhood villages by camels or donkeys in palm-leaf baskets. There are only a few insulated trucks in the Yemen Arab Republic; 2 to 3 ton trucks are used in the Tihamah area and 5 to 8 ton trucks for the highland track.

The price of fresh fish varies from place to place and from area to area. On the seaside the most profitable market is Hodeida where an average price for 1 kg of fish at the auction market was Yemeni Rls. 2.6 during July/August 1976. In contrast, the average price in some small villages north and south of Hodeida was Yemini Rls. 1-1.5 for 1 kg of fish.

The most important Yemeni fish, Indian mackerel (Rastrelliger kanagurta), is marketed in fresh condition on the seaside and in the Tihamah area, due to short shelf-life1/. Second in quantity and first in value, the king fish (Scomberomorus commersonii) reaches the highest price in all markets, varying between Yemeni Rls. 1 and 9.5 for 1 kg of fish on auction markets. It is necessary to stress that 1 kg of locally produced meat (goat or sheep) is valued at Yemeni Rls. 25-30. For detail prices of fish see tables 10, 11 and 12.

Part of the fish landed in Khoba and in Khawhah is exported to Saudi Arabia (Jizan). This export is not officially registered: An estimation is that about 1 500 tons of fish per year go to Saudi Arabia. This does not include the catch of Yemeni fishermen in the Yemen Arab Republic or Saudi waters which is directly landed in Jizan.

The Yemeni traders have not had long experience in the handling of fresh fish with ice and sometimes fish is spoiled before delivery from auction market. As block ice is the only existing supply in Yemen, traders crack blocks with knives. Of course, during this operation a large part of the ice is thrown away.

1/ The price for 1 kg of Indian mackerel varies on auction market between Yemeni Rls. 0.19 and 4.00, but the average price is Yemeni Rls. 1.29.

Fish boxes are unknown, but some traders showed interest in this type of packaging for fish.

Marketing of Salted and Cooked Fish

Salted and partly dried and baked fish are the most important processed fish in the YAR. These ways of preserving fish have a long tradition and a limited area for marketing. Tihamah area is practically the only area where preserved fish is marketed in large quantities. About 5 000 tons of fish is preserved and marketed in the Tihamah area as salted or baked fish, which represents 29 percent of the total landing of fish in the YAR.

The most important fish used for salting and baking is Indian mackerel (Rastrelliger kanagurta) but some other fish such as king fish (Scomberomorus commersonii), tuna and tuna-like fishes (Scombridae), barracuda (Sphyraena jello) and yellow jack (Carangidae) are processed too. It was not possible to determine how much fish is salted and how much is baked. Salting is at any rate a much more prominent way of preserving than baking.

As salting and baking have not been previously described in literature, some basic data and a short description of the technological process is necessary.

Salted fish

Indian mackerel (Rastrelliger kanagurta)

The fish is split into a butterfly fillet from the back part of the body. The gills and viscera are removed. After this operation the fish body retains 80-85 percent of the original weight. The next operation is salting the inside part of the fillet and closing of the fillets to reform the fish. Salt added corresponds to 25 percent of weight of fish. Fish is packed after salting in palm-leaf baskets, usually 1 000 fish in one basket. The shelf-life is about one week. One workman could fillet 120-150 fish per hour or salt 200 fish per hour. Workmen are paid Y. Rls. 2 for filleting 1 000 pieces of fish.

Price of salted Indian mackerel varies between Y. Rls. 2 and 4 for 1 kg of fish (see Table 13).

Other types of fish

The fish is split into a butterfly fillet or in two fillets, dry salted and stored in a processing yard for a few days, packed in palm-leaf baskets and delivered to the market. Quantity of salt corresponds to 25-30 percent of weight of fish. The shelf-life of the fish of bigger size processed in this way is between 2 and 3 weeks, depending on type and size of the fish. During the storing period, the fish loses a certain amount of water and sometimes is partly dried before delivering to the market.

The quality of salted fish and technology utilized during processing are in general poor and primitive. With a better knowledge of technology and with higher hygienic standards it would be possible to produce salted fish of much better quality.

Baked fish

Indian mackerel (Rastrelliger kanagurta)

The fish is split and a small amount of salt is added. After this operation the fish is ready for baking in specially constructed ovens.

The oven is made of clay with an opening on the top for charging with fish and with a small door at the bottom for adjusting the fire. Before putting the fish in the oven, the fire is set and the oven heated enough for baking a charge of fish. After filling with fish,

the top of the oven is closed and the fish is baked for about 30 minutes or more depending on the size of the fish. Baked fish is packed in palm-leaf baskets and transported to Tihamah villages where it is sold at the fish market.

Similar technology is used for other types of fishes. If fish is too long, it is cut in pieces. The shelf-life of baked fish is only a few days. The taste of baked fish is very good and fish is consumed with or without seasoning and sometimes with bread, as a sandwich. The price of baked fish is shown in Table 14.

Marketing of Dried Fish

Dried fish represents about 32 percent of fish landed in YAR or about 5 500 tons calculated as fresh fish, including wasif. A big part of dried fish is exported, mostly shark's fins, salted and dried shark's fillets and wasif (dried small pelagic species - sardines and anchovies).

Fish is dried at the seaside although climatic conditions are not suitable for drying fish. Relative humidity varied during summer 1976 between 62 and 94 percent.

There is a long tradition of drying sharks in the Kamaran Island, but not only there. Fish is dried in Khoba and in some other fishing villages where sharks and wasif are caught. After catching and filleting, the fish is salted (no salt is used for small-size fish) and placed in the sun on the sand. Auxiliary equipment for drying, such as trays, racks, grates or grills, is not in use.

The quality of dried fish is sometimes very low, mostly polluted by flies. Seven hundred and thirty seven tons of dried fish was exported in 1974, valued at YR 819 000 (Statistical Year Book 1976). The main market for dried shark's fillet is Kenya and for dried shark's fins, Singapore. The price for 1 kg of dried shark was YR 0.8; for 1 kg of dried, untrimmed black fins YR 8 and for 1 kg of dried, untrimmed white fins (guitarfish) YR 16 (Walker, 1975).

Dried slugs are processed in small quantity in the YAR and about 20 tons are exported to Singapore.

The domestic market accepts only dried wasif which is used in Tihamah as well as in the highlands for preparing different sauces. About 1 500 tons of fresh sardines or anchovies are dried into wasif during a year.

The first modern equipment for drying fish has been imported by the UNDP/FAO Project YEM/74/003 and it will be installed in a demonstration centre in Hodeida.

Marketing of Canned Fish

Canned fish is not produced in the YAR. Six hundred and forty tons of preserved (mostly canned) fish was imported during 1974. The value of the import was YR 2 632 000. Import was four times bigger than in the previous year; import in 1973 was only 130 tons.

Canned fish was imported from ten different countries, mostly Europe and Japan. Canned sardine and sardine-like fishes were the product most in demand in retail stores.

Consumption of canned fish was 0.10 kg per caput per year in 1974. Table 15 shows the average retail price of canned fish in Hodeida during summer 1976.

Export of Fish

Fish is exported from the YAR in dried condition through Hodeida port or as fresh fish from north ports to Saudi Arabia. Dried sharks, dried shark fins, wasif and boiled dried slugs are the most important export products. Dried shark is exported to Kenya and dried shark fins and slugs to Singapore.

According to the Statistical Year Book, edited by the Central Planning Organization, export of dried fish reached an amount of 737 tons in 1974, valued at YR 819 000, comparing to 444 tons valued at YR 536 000 in 1973.

The price for white shark fins was YR 16 per kg, for black fins YR 8 per kg, and for dried shark fillets only YR 0.8 per kg (Walker, 1975).

Export of fresh fish to Saudi Arabia is not officially registered and it was not possible to determine the amount of export, but possibly a part of the landing in Khoba, a bigger part of fish from Luhaiya and practically all landing from Maydi is going to Jizan, the nearest city in Saudi Arabia. Estimation is about 1 500 tons of fresh fish per year. Not included in this is the landing of about 3 350 tons of fish caught by Yemeni fishermen in Yemeni or Saudi Arabia territorial waters and landed in Jizan. The value of this export is not registered and the price reached for this fish in Jizan market was not available.

Consumer's Preferences

There is a long tradition of consumption of fresh as well as processed fish on the shore and in the Tihamah area of the YAR. For many people fish was and is the main source of proteins. Consumption preferences are different in this area from those in the highlands of the country.

Although the population of Tihamah and the seaside represents only 20 percent of the present population in the YAR (about 1 million), they consume more than 76 percent of the fish sold in the YAR; consumption *per caput* per year comes to 9.5 kg. Consumption of the other 80 percent of Yemeni populations is about 3 000 tons of fish or about 0.7 kg *per caput* per year. Fish is eaten by the shore a few times per day, prepared in different ways. The most common ways of cooking fish are: fried in oil, fish curry or baked fish. Salted fish is commonly kept for a certain period of time in water to be desalted and after that it is cooked in a curry or tomato sauce.

After a short survey in some restaurants in Sana'a, Hodeida and Taizz, it can be concluded that the preferred dish is fried king fish and that, after investigation in the fish markets in Taizz, Sana'a, Ibb and Dhamar, the highland populations accept only fresh fish. Salted fish is completely absent from their eating habits.

There is a small production of frozen fish in Hodeida of about 35 tons per year of king fish and emperor breams. This is marketed in Sana'a mostly to foreign communities.

Canned fish is consumed in relatively small quantities but it appears that importation of this article is tending to increase rapidly.

Production of Ice

Only four factories for producing ice exist today in the YAR. Three of them are located in Hodeida and one in Taizz. Total production is 126 tons of block ice in 24 hours.

Ice began to be used for handling of fish a few years ago and cities such as Sana'a and Taizz have today a regular supply of fresh fish because of icing methods. It must be stressed that the existing production and especially the location of the ice-making plants do not cover all the needs of the fishing industry. Hodeida factories give 50 percent of their daily production to the fishermen, and sometimes ice is delivered to Bab al Mandab, more than 300 km south of Hodeida or to Khoba and Luhaiya, 200 km to the north.

Ice is made from fresh water. The most important factory (Hodeida "km 16") is located near a well specially drilled for factory purposes.

An additional 20-24 tons ice-making plant in Hodeida port is in the phase of assemblage and it will be put into operation by the end of 1976. The price of ice varies between YR 128 and 160 per ton. For detailed data about the production of ice see Table 16.

1.3 Project Proposal for Fish Market Development in the Yemen Arab Republic

The proposition for fish market development in the Yemen Arab Republic in the next 5-10 years described in this study is based on the following facts:

1. The fish landing will be increased by about 40 percent or about 6 000 tons of fish per year. Total landing will reach an amount of 22 200 tons per year.

2. The market for the increase of 6 000 tons of fish will be the highland port of the YAR where big consuming centres such as Sana'a, Taizz, Al Turbah, etc., are located.

3. The fish will be transported to the market in fresh condition with ice.

4. A chain of ice-making plants, stores for ice, chill rooms and processing plants will be erected at landing centres as well as in the highland area. These new technical facilities will be used for amelioration of the existing quantity of marketed fish and for proposed new landing.

5. Present production of dried fish will retain the same level for the near future. About 3 000 tons of fish will be dried yearly and exported, mostly dried shark fins and dried shark fillets. Dried fish for local market (wasif) will be reduced in favour of fresh fish.

6. Production of salted and baked fish will be reduced about 50 percent in favour of fresh fish for the same market - the Tihamah area.

7. Export of fresh fish to Saudi Arabia will have the same level in the next few years with a reducing tendency in favour of domestic market.

8. Fish market development in the highland is based on extremely fast expansion of paved roads in the YAR. About 2 100 km of paved roads will be in exploitation in the next five years.

9. The fish will be distributed to the market by modern refrigerated lorries, in plastic fish boxes with ice.

10. Proposed development in fish marketing will cover about 2 million inhabitants on highland. After realization of mentioned development and taking in consideration the hypothesis that augmentation of Yemeni population will be about 20 percent in the next ten years, consumption of fish will be 2.85 kg *per caput* per year, comprising the existing 2.4 kg, plus augmentation of 0.45 kg *per caput* per year.

11. Statement under (10) shows that there still exists a big possibility for marketing of fish in the YAR. With consumption of 2.85 kg *per caput* per year the YAR will have one of the smallest consumptions of fish in the world.

12. The problem of marketing shrimps was not studied in this document because the quantity of shrimps in the YAR water and way of exploitation were not determined.

Fresh Fish (Iced Fish)

General data:

- Existing landing of fish		17 000 tons
- Expected landing in next 5-10 years		22 200 tons
- Fish proposed to be marketed in fresh condition in the YAR		14 700 tons
- Export of fresh fish		1 500 tons
- Total fish marketed in fresh condition	73% or	16 200 tons
- Capacity of the new installed ice-making plant per day		66 tons
- Capacity of ice stores		80 tons
- Capacity of chill rooms		160 tons
- Surface of chill rooms		588 m^2
- Number of refrigerated lorries		10
- Capacity of refrigerated lorries (5 tons of fish) total		50 tons
- Number of insulated lorries: 3 - capacity of insulated lorries - total		10 (x 3 tons)
- Paved roads in the YAR		
Existing		901 km
Under construction		635 km
Under study		638 km
Total paved roads in the next 5 years		2 174 km

The fish markets in the YAR will be supplied from five main landing centres: Luhaiya, Khoba, Hodeida, Khawhah and Mocha. These five landing centres will have auction markets through which the landed fish will be transferred to wholesale and retail markets.

The systems of distribution of fish should be applied: distribution of fish through wholesale markets in Taizz, Sana'a, Dhamar and Al Turbah and from wholesale to retail markets or fish shops; and distribution from auction market directly to retail markets in the Tihamah area and in small consuming centres in the highlands of the country.

For the distribution of 22 200 tons of fish, five landing centres will have adequate technical facilities which consist of auction halls, ice-making plants, stores for ice and chill rooms. The biggest landing centre, Hodeida, with about 45 percent of total landing in the YAR will have adequate auction market and other facilities with a moderate capacity of new ice-making plant and chill room, because a new cold store is erected in the port of Hodeida with a capacity of about 1 000 tons of goods at $0^{\circ}C$ and at $-18^{\circ}C$, and because Hodeida has today a production of about 100 tons of ice in 24 h. The new technical facilities are specified in the following table for all five landing centres.

Proposition for the new facilities for handling fish in landing centres in the Yemen Arab Republic

Name of centre	Quantity of fish landed per year in tons		Existing facilities	Proposed new facilities	
	Existing	Proposed			
Luhaiya (see Figure 3)	1/ 1 000	1 400	Fish market (hut) not suitable	- Auction hall - Ice-making plant - Store for ice - Chill room	10t/day 10t/24 h 10t 10t
Khoba (see Figure 3)	4 780	6 700	Fish market (hut) not suitable	- Auction hall - Ice-making plant 2/ - Store for ice 2/ - Chill room - Processing plant - Auciliary facilities	10t/day 10t/24 h 10t 10t 10t/8 h
Hodeida (see Figures 1 and 2)	3/ 7 187	10 000	2 x Retail fish market (concrete) not suitable 6 x ice-making plant capacity 100 t/24 h	- Auction hall - Retail fish market - Ice-making plant - Store for ice - Chill room - Processing plant - Auxiliary facilities (restaurant, sanitary area, store)	25t/day 3t/day 10t/24 h 10t 2 x 15t 5t/8 h
Khawhah (see Figure 3)	4/ 1 238	1 700	Fish market (hut) Processing area not suitable	- Auction hall - Ice-making plant - Store for ice - Chill room - Auxiliary facilities	10t day 10t/24 h 10t 10t
Mocha (see Figure 3)	5/ 1 159	1 600	Fish market (concrete) not suitable	- Auction hall - Ice-making plant - Store for ice - Chill room - Auxiliary facilities	10t/day 10t/24 h 10t 10t
Total landing	15 364	6/21 400 tons			

(continued)...

Remarks:

1/ Excluding fish landed in Jizan

2/ Only if fresh water is available in Khoba

3/ Including landing of central villages

4/ Including Khataba landing

5/ Including Bab al Mandab landing

6/ Difference between total landing and above is 800 tons. This fish will be landed in small fishing villages far away from above five centres.

Khoba, the second landing centre with proposed landing of 6 700 tons of fish per year is so badly located (shallow water in the front of village, lack of fresh water, undefined road connection), that our proposition for new technical facilities could be accepted only if same could be solved (i.e. water for ice-making plant.) A big part of the fish in Khoba should be processed in salted and dried products.

Mocha, a centre in the south with a moderate landing of fish, is considered a centre for all small fishing ports in the south as Dhubab and Bab al Mandab.

Distribution of fresh fish in the Yemen Arab Republic should be divided in three regions, with the following scheme of distribution of fish in tons per year.

Seaside area		2 700 tons
Tihamah		4 000 tons
Highlands		8 000 tons
	TOTAL	14 700 tons

The seaside markets will be supplied with fish through auction markets to retail markets in bigger centres (Hodeida) or directly from fishermen to retail markets in small villages.

The fish markets in Tihamah will be supplied through auction markets to retail markets as it is shown in Table 10 - Distribution of fish in the Tihamah area. A part of landed fish will go to the Tihamah markets from small fishing villages, without going through auction markets.

As the organization of fish supply in the Tihamah area is functional and effective, it is suggested that only an amelioration of the handling, and the erection of small retail markets in main villages (such as existing markets in Zabid and Al Marawiah) are required. Investment for these retail markets is relatively small and local funds could be used for this purpose. Transport of fish will be effected by using 5 tons insulated trucks (3 tons of fish) over existing or new planned paved and gravelled roads which will be constructed in the next five years.

The markets in the highland will be supplied with fish exclusively through five main auction markets from the seaside. The highland markets will receive during a year about 8 000 tons of fish. For the distribution of this quantity of fish the following technical facilities are proposed:

Proposition for new facilities for marketing fish in the highland area of the Yemen Arab Republic

Location of market	Quantity of fish to be handled per year in tons	Existing facilities	Proposed new facilities
Taizz (see Figures 7 and 9)	2 500	1 x ice-making plant capacity 20 t/24 h 3 x Retail fish market 1 market not suitable 1 market needs improvement	1 x wholesale market 20t/day 1 x ice-making plant 5t/24h 1 x store for ice 10 t 2 x chill room at 15t-30t 3 x small fish shop
Atorbh (see Figure 5)	1 200	-	1 x wholesale/retail market 8t/day 1 x ice-making plant 3t/24h 1 x store for ice 5 t 1 x chill room 10 t 3 x small shop for processed fish
Ibb (see Figure 7)	650	-	1 x retail market 3t/day 1 x chill room 3 t 2 x small shop for processed fish
Yarim (see Figure 7)	550	-	1 x retail market 3t/day 1 x chill room 3 t 2 x small shop for processed fish
Dhamar (see Figure 5)	1 200	-	1 x wholesale/retail market 8t/day 1 x ice-making plant 3t/24h 1 x store for ice 5 t 1 x chill room 10 t 3 x small shop for processed fish
Rada'a (see Figure 6)	300	-	1 x retail market 2t/day 1 x chill room 2 t 3 x small shop for processed fish
Al Bayda (see Figure 6)	300	-	1 x retail market 2t/day 1 x chill room 2 t 3 x small shop for processed fish

Location of market	Quantity of fish to be handled per year in tons	Existing facilities	Proposed new facilities
Sana'a (see Figures 4, 7 and 9)	2 000	Retail fish market not suitable	1 x wholesale market 20t/day 3 x retail market at 3 t = 9t/day 1 x ice-making plant 5 t/24h 1 x store for ice 10 t 2 x chill room at 15 t = 30 t 3 x small fresh fish shop 6 x small processed fish shop
Marib (see Figure 9)	100	-	2 x small fresh fish shop
Amran (see Figure 6)	300	-	1 x retail market 2 t/day 1 x chill room 2 t 3 x small shop for processed fish
Khamer (see Figure 6)	200	-	1 x retail market 2 t/day 1 x chill room 2 t 3 x small shop for processed fish
Hajjah (see Figure 7)	500	-	1 x retail market 3 t/day 1 x chill room 3 t 2 x small shop for processed fish
Al Mahwit (see Figure 7)	400	-	1 x retail market 3 t/day 1 x chill room 3 t 2 x small shop for processed fish
Sada'a (see Figure 9)	120	-	2 x small fresh fish shop
Total handling/year	10 320		

Sana'a, Taizz, Atorbh and Dhamar are the most important consumption centres in the highlands and they have wholesale markets as well as retail markets. Other consumption centres (10 villages) have only retail markets or small fish shops. Some of the retail markets in the highlands will be supplied through the above four wholesale markets or directly from seaside auction markets.

The fish destinated for the highlands will be distributed over the new road system, mostly paved as it is shown in Table 18 - Distribution of fish in the highland of the Yemen Arab Republic.

Three main roads connecting seaside and inland are predominant in the Yemen Arab Republic: South Road - connecting Mocha and Taizz, from Taizz to Atorbh, Taizz to Rahidah (border of

People's Democratic Republic of Yemen), Taizz-Ibb-Yarim-Dhamar, from Dhamar to Sana'a or to Rada'a and Al Bayda. Central Road starting in Hodeida to Sana'a, from Sana'a to South, Dhamar and Al Bayda, East to Marib or North to Amran - Khamer - Huth - Sada'a. North Road consisting of highway Jazin (Saudi Arabia) - Harad - Hodeida and Harad - Huth - Sada'a.

These three main roads correspond to the landing auction centres: South to Mocha and Khawhah, Central to Hodeida and North to Khoba and Luhaiya.

Some of the cited roads are in exploitation or under construction. North Roads Hodeida-Harad-Jazin and Harad-Huth are still under study. Nowadays there exist 901 km of paved roads in the Yemen Arab Republic, 635 km are under construction and 638 km of paved roads are under study. Paved road systems in the Yemen Arab Republic will have 2 174 km in the next five years.

With the proposed system of distribution of fish in the highlands, about 2.5 million of inhabitants will be covered. This population will have a consumption of 3.5 kg of fish per caput.

Processed Fish

Three types of processed fish will be produced yearly in the Yemen Arab Republic during the next 5-10 years period:

- Dried (or salted and dried) fish	4 000 tons/year
- Salted fish - Baked (cooked) fish	2 000 tons/year
Total	6 000 tons/year

Dried shark fins and dried-salted shark fillets will continue to be the most important export fish product. Export of this product will be the same quantity as today. The market for this product should be traditional markets such as Singapore, or better, Far East as well as Kenya, but it will be necessary to investigate other African markets such as Zaire and some other West African countries which are importing dried fish. It is possible to increase production of dried slugs, but before increasing production, a study for determining quantity and the best way of processing should be done.

Wasif, a product made from immature small pelagic species, should be reduced in future. Estimation is that about 1 500 tons of fresh fish are dried to wasif. We propose a reduction of 500 tons because of the following reasons: The tendency is to offer on the market fresh fish of bigger commercial and nutritive value and, with a fishing law limiting the size of mesh, it will be possible to avoid catching immature fish of small size.

Production of salted and baked (cooked) fish will be reduced at the end of the discussed period to an amount of 2 000 tons. Reduction of salting and baking of about 50 percent derives from giving the biggest amount of fish in fresh condition which will be reflected in better nutritional and commercial value of final product. As a part of the fish will still be salted especially during the Indian mackerel season, two processing plants for filleting and salting are suggested in Khoba, 10 t/day and Hodeida 5 t/day capacity. Baked fish as an interesting culinary product should be produced in future. Improvement of ovens and technology is suggested. This must be a matter of a special study.

Export of Fresh Fish

Export of fresh fish to Saudi Arabia will have the same level as today - 1 500 tons of fish per year. The main auction markets for supply of fish for export will be Khoba and Luhaiya. This export must be legalized and realized through official commercial channels between Saudi Arabia and Yemen.

Although there is a good market for Yemeni fish in Saudi Arabia, this export must tend to decrease because of the big demand for protein food in the Yemen Arab Republic.

The export will be realized through the new highway Hodeida-Jizan. As connections between the highway and Khoba and Luhaiya are not yet determined it is necessary to suggest to the Ministry of Public Works and the Highway Authorities that they should start a study on these important fishing centres which will land in the near future about 8 100 tons of fish per year.

The problem of fish caught in Yemeni water by Yemeni fishermen and landed in Jizan, Saudi Arabia should be carefully studied between the two countries. Our suggestion is that all fish caught in Yemeni territorial water must be landed in one of the Yemeni ports and marketed through regular commercial connections.

1.4 Capital Investment for New Technical Facilities for Marketing Fish in the Yemen Arab Republic

The capital investment (estimation) for new technical facilities for marketing fish in the Yemen Arab Republic described in this chapter is divided into three groups:

- investment for the new facilities for handling fish in landing centres
- investment for the new facilities for marketing fish in highland areas
- investment in common facilities (transport facilities, fish boxes, design and engineering)

The cost of buildings to be erected in landing centres or in highland areas is calculated at YR 1 000 for 1 m^2 of simple construction. The cost of equipment is calculated on the basis of offers from some producers of equipment in the U.S.A. and Europe. The cost for designing and engineering is calculated at ten percent of total investment or about five percent for designing and five percent for engineering including the financial operations during erection. The investment in electric power stations and water supply was not studied although only main centres such as Sana'a, Hodeida, Taizz and some others have these technical facilities. From January 1, 1977, all private companies producing electricity will be nationalized and a state-owned electricity board will supply consumption centres with the necessary power.

Of course construction of marketing centres must be synchronized with building up infrastructure including electricity. In special cases markets could be supplied from their own power station. Investment for this subject should be taken in consideration. The situation is similar with regard to water, with exception of some villages, such as Khoba, where a special study should be done to find if there is water available. It was not possible to study the above problem in this report. The cost of equipment, transport facilities, fish boxes and other equipment to be imported is calculated without any local tax.

Investment for the New Facilities for Handling Fish in Landing Centres

Luhaiya (See schema no. 2)	Auction hall, 10 t/day	Y.Rls.	496 000
	Ice-making plant, 10 t/24 h		270 000
	Store for ice, 10 t		142 000
	Chill room, 10 t		180 000
	Scale x 3		2 700
	Furniture for office		18 000
	Miscellaneous		100 000
		Y.Rls.	1 208 700

		Y.Rls.
Khoba	Auction hall, 10 t	496 000
	*Ice-making plant 10 t/24 h	270 000
	*Store for ice, 10 t	112 000
	Chill room, 10 t	180 000
	Processing plant, 880 m^2	880 000
	Scale	4 000
	Furniture for office	18 000
	Auxiliary facilities, 150 m^2	150 000
	Miscellaneous	160 000
	Total	2 270 000
Hodeida	Auction hall, 880 m^2	880 000
	Retail fish market, 550 m^2	600 000
	Ice-making plant, 10 t/24 h	270 000
	Store for ice, 10 t	112 000
	Chill room, 98 m^2 (194 m^3), 30 t	500 000
	Processing plant, 440 m^2	440 000
	Auxiliary facilities, 235 m^2	235 000
	Scale x 5	6 800
	Furniture	36 000
	Miscellaneous	300 000
	Total	3 379 800
Khawhah	Auction hall, 496 m^2	496 000
	Ice-making plant, 10 t/24 h	270 000
	Store for ice, 10 t	112 000
	Chill room, 35 m^2 (105 m^3), 10 t	180 000
	Scale x 3	4 000
	Furniture for office	18 000
	Auxiliary facilities, 150 m^2	150 000
	Miscellaneous	160 000
	Total	1 390 000
Mocha	Auction hall, 496 m^2	496 000
	Ice-making plant, 10 t/24 h	270 000
	Store for ice, 10 t	112 000
	Chill room, 35 m^2 (105 m^3), 10 t	180 000
	Auxiliary facilities, 150 m^2	150 000
	Furniture for office	18 000
	Scale x 3	4 000
	Miscellaneous	120 000
	Total	1 350 000

* Only if fresh water is available

Recapitulation	Y.Rls.
Luhaiya	1 180 000
Khoba	2 270 000
Hodeida	3 379 800
Khawhah	1 390 000
Mocha	1 350 000
GRAND TOTAL	9 569 800 or
	U.S.$ 2 126 600

Investment for the New Facilities for Marketing Fish in Highland Areas

		Y.Rls.
Taizz	Wholesale market, 594 m^2	594 000
	Ice-making plant, 5 t/24 h	220 000
	Store for ice, 10 t	112 000
	Chill room, 98 m^2 (294 m^3), 30 t	500 000
	Fish retail shop x 3	675 000
	Scale x 5	6 800
	Furniture for office	18 000
	Miscellaneous	200 000
	Total	2 325 800
Atorbh	Wholesale and retail market about 800 m^2	800 000
	Ice-making plant, 3 t/24 h	150 000
	Store for ice, 5 t	70 000
	Chill room, 35 m^2 (105 m^3), 10 t	180 000
	Scale x 3	4 000
	Furniture for office	10 000
	Shop for processed fish x 3	135 000
	Miscellaneous	130 000
	Total	1 479 000
Ibb	Retail fish market, about 550 m^2	550 000
	Chill room, 3 t	90 000
	Scale	3 000
	Furniture for office	10 000
	Shop for processed fish x 2	90 000
	Miscellaneous	75 000
	Total	818 000
Yarib	As Ibb	818 000
Dhamar	As Atorbh	1 479 000

		Y.Rls.
Rada'a	Retail fish market, about 380 m^2	380 000
	Chill room, 2 t	75 000
	Scale	3 000
	Furniture for office	10 000
	Shops for processed fish x 3	135 000
	Miscellaneous	60 000
	Total	663 000
Al Bayda	As Rada'a	663 000
Sana'a	Wholesale market, 594 m^2	594 000
	Retail market, 550 m^2 x 3	1 650 000
	Ice-making plant, 5 t/24 h	220 000
	Store for ice, 10 t	112 000
	Chill room, 98 m^2 (294 m^3), 30 t	500 000
	Chill room, 3 t	90 000
	Scale	15 800
	Furniture for office	48 000
	Shop for processed fish x 6	270 000
	Fish retail shop x 3	675 000
	Miscellaneous	350 000
	Total	4 524 800
Marib	Fish retail shop x 2	450 000
Amran	As Rada'a	663 000
Khamer	As Rada'a	663 000
Hajjah	As Ibb	818 000
Al Mahwit	As Ibb	818 000
Sada'a	As Marib	450 000

Recapitulation

Taizz	2 325 800	
Atorbh	1 479 000	
Ibb	818 000	
Yarib	818 000	
Dhamar	1 479 000	
Rada'a	663 000	
Al Bayda	663 000	
Sana'a	4 524 800	
Marib	450 000	
Amran	663 000	
Khamer	663 000	
Hajjah	818 000	
Al Mahwit	818 000	
Sada'a	450 000	
GRAND TOTAL	16 632 600	or
	U.S.$ 3 655 516	

Investment in Common Facilities

Transport Facilities

The transport between auction markets at the seaside and wholesale and retail markets inland will be done by two types of lorries: refrigerated lorry, 8 tons capacity (5 tons fish) for transporting fish to the highland and insulated lorry, 5 tons capacity (3 tons fish) for transporting the fish to Tihamah.

Refrigerated lorries will be used for transport of fish to the highland with minimum distance 100 kg and maximum 483 km, or from minimum 3 hours of driving to maximum 14 hours one way.

Insulated lorries will be used for transport of fish to the Tihamah area with maximum distance between markets of 150 km, or 3 hours of driving.

The investment:

			Y.Rls.
10 refrigerated lorries at Y.Rls.	157 500	=	1 575 000
10 insulated lorries at Y.Rls.	67 500	=	675 000
			2 250 000
	+ 10 percent for spare parts		225 000
		Total	2 475 000 or
		U.S.$	550 000

Fish boxes

For handling 21 500 tons of fish and transporting from fishermen to auction and retail market it will be necessary to have about 30 000 plastic fish boxes, each with a capacity of 30 litre or about 20 kg of fish.

The cost of fish boxes:

		Y.Rls.
30 000 at Y.Rls. 45	=	1 350 000 or
	U.S.$	300 000

Designing and engineering

Designing, engineering and guiding erection from a technical and financial point of view will be necessary for all objects for auction, storing and processing fish, as well as all fish markets inland, technological processes and necessary equipment.

The Total Cost:	Y.Rls.	2 941 000 or
	U.S.$	653 500

Recapitulation of investment in Common Facilities

Transport facilities	Y.Rls.	2 475 000	or	U.S.$	550 000
Fish boxes	Y.Rls.	1 350 000	or	U.S.$	300 000
Designing and engineering	Y.Rls.	2 941 000	or	U.S.$	653 000
Total	Y.Rls.	6 766 000	or	U.S.$	1 503 500

Total Investment for Marketing of Fish in the Yemen Arab Republic

	Y.Rls.	9 569 800	or	U.S.$	2 126 600
	Y.Rls.	16 632 600	or	U.S.$	3 655 516
	Y.Rls.	6 766 000	or	U.S.$	1 503 500
TOTAL	Y.Rls.	32 968 400	or	U.S.$	7 285 616

Table 8

Estimation of Distribution of Fish Yearly Landed in Yemen Arab Republic

(in metric tons)

	Present	Proposed in Future
FRESH FISH		
Seaside area	2 000	2 700
Tihamah area	2 000	4 000
Highland	2 000	8 000
Export to S. Arabia	1 500	1 500
PROCESSED FISH		
Dried (incl. wasif)	4 500	4 000
Salted and baked	5 000	2 000
TOTAL	17 000	22 200

Table 9

Present Situation of Existing Fish Markets in Yemen Arab Republic

Location	Auction Market	Wholesale Market	Retail Market
Luhaiya	Hut made from wood, twigs and straw, without water. In a lagoon.	-	On the same place as auction market.
Khoba	Hut made from wood, twigs and straw, without water. On the seaside.	-	On the same place as auction market.
Hodeida	Open and extremely dirty, dangerous for public health. On the seaside in the city.	-	Two markets made of concrete. One is not used because located far away from other markets. Only one place with water.
Khawhah	Hut made from wood, twigs and straw, without water. About a few kilometer from the sea-side.		On the same place as auction market.
Mocha	Concrete with three concrete tables for retail selling fish. Not suitable but the best in the Yemen Arab Republic.	-	As auction market.
Taizz	-	In central retail market	Three retail markets made from concrete - central retail market is used for auction of fish, not suitable - second fish retail market is badly designed and it will be necessary to modernize as soon as possible - third market well designed, not yet in operation.
Sana'a	-	Retail market is used for auction	Retail market, concrete. Bad technology, very poor hygienic condition.

Location	Auction Market	Wholesale Market	Retail Market
Al Manawa	-	-	Small market, well designed, needs running water.
Zabid	-	-	Small market, well designed, needs running water.
Bajil	-	-	Partly open area, partly hut. Dirty, not suitable without water and sewage system.
Bayt al Faqih	-	-	Partly open, partly hut. Without water and sewage system.
Hays	-	-	Partly open, partly hut. Dirty, without water and sewage system.

Table 10

Price of Fresh Fish in Hodeida Auction Market During Summer 1976

(In Y.Rls. per 1 kg of Fish)

Name of fish / Date	Indian Mackerel	King Fish	Carangids	Tuna	Sharks	Sting Rays	Barra-cuda	Red Snappers
23. 6.1976	1.07	6.67	6.67	-	-	-	-	-
4. 7.1976	-	-	1.00	-	-	-	-	-
6. 7.1976	0.88	4.74	-	-	-	0.25	-	-
10. 7.1976	1.00	-	0.72	-	-	-	-	-
13. 7.1976	4.00	-	-	-	-	-	-	-
18. 7.1976	1.40	7.50	3.20	3.30	-	0.20	3.00	-
20. 7.1976	1.80	9.50	2.16	-	1.00	0.26	3.00	-
21. 7.1976	1.50	-		1.50	-	-	-	-
25. 7.1976	1.00	-		-	0.66	0.04	0.66	-
27. 7.1976	0.78	-	1.30	3.30	-	-	-	0.93
29. 7.1976	0.90	2.50	1.04	-	0.33	-	0.33	-
30. 7.1976	0.19	-	-	-	-	-	-	-
31. 7.1976	-	-	-	0.25	-	-	-	-
1. 8.1976	1.00	3.50	-	-	-	-	-	-
Average Price	1.29	5.73	2.35	2.08	0.66	0.18	1.74	0.93

Table 11

Price of Fresh Fish in Some Wholesale Fish Markets on Seaside and Inland of Yemen Arab Republic During Summer 1976

(In Y.Rls. per 1 kg of Fish)

Name of fish / Name of village	Indian Mackerel	King Fish	Carangids	Tuna	Sharks	Sting Ray	Barracuda
Mocha	0.45	-	2.08	1.66	0.40	-	0.80
Khawhah	1.00	1.00	-	0.25	0.45	-	-
Taizz			1.55		0.80		
Khoba	1.00	4.00	-	2.00	-	-	-
Luhaiya	-	3.30	2.50	-	-	-	-
Taizz	1.33	6.50	-	1.41	-	-	-
Average Price	0.94	3.70	2.04	1.33	0.55	-	0.80

Table 12

Price of Fresh Fish in Retail Fish Markets in Some Villages in Tihamah and in Highland During Summer 1976

(In Y.Rls. per 1 kg of Fish)

Name of village \ Name of fish	Indian Mackerel	King Fish	Carangids	Tuna	Sharks	Sting Ray	Barracuda
Bajil	2.0	-	-	-	-	-	5.0
Al Marawiah	1.0	-	4.0	-	-	-	3.0
Zabid	-	5.0	-	-	-	-	-
Hays	-	5.5	-	-	-	-	-
Al Manssouriah	2.0	-	-	-	1.0	1.0	-
Bayt al Faqih	2.0	5.0	-	-	2.0	1.0	-
Sana'a	-	12.0	8.0	5.0	-	-	-
Taizz	1.7	5.0	2.2	3.0	-	-	-
Ibb	-	-	5.0	-	4.7	-	-
Dhamar	-	7.2	-	-	-	-	-
Average Price	1.7	6.6	4.8	4.0	2.5	1.0	4.0

Table 13

Price of Salted Fish in Retail Markets in Yemen Arab Republic During Summer 1976

(In Y.Rls. per 1 kg of Fish)

Name of village \ Name of fish	Indian Mackerel	King Fish	Carangids	Tuna	Sharks	Red Snappers
Hodeida	1.76	-	2.00	-	-	
Khawhah	-	1.71	-	2.40	0.75	
Al Manssouriah	2.50	-	-	-	-	
Bajil	2.00	-	-	-	-	
Al Marawiah	1.00	-	-	-	-	
Zabid	-	2.00	-	-	-	1.00
Hays	2.00	2.00	-	-	-	-
Taizz	-	4.50	-	-	-	-
Average Price	1.85	2.55	2.00	2.40	0.75	1.00

Table 14

Price of Baked (cooked) Fish and Wasif in Retail Markets in Yemen Arab Republic During Summer 1976

(In Y.Rls. per 1 kg of Fish)

Name of fish / Name of village	Indian Mackerel	King Fish	Carangids	Red Snappers	Wasif
Luhaiya	-	5.00	-	-	
Orge	3.00	-	-	-	
Zabid	2.00	-	2.00	1.50	-
Hays	2.00	-	-	-	-
Sana'a	-	-	-	-	10.0
Ibb	-	-	-	-	4.0
Average Price	2.33	5.00	2.00	1.50	7.00

Table 15

Average Price of Canned Fish in Hodeida Retail Stores

No.	Name of Product	Type of Cans	Weight of content	Price in Y.Rls.	Imported From
1	Sardines in olive oil - CRESCA	square	115 g	7	France
2	Sardines in oil and chillies - SABRI	square	125 g	2	Morocco
3	Sardines in olive oil - TITUS	square	125 g	1,5	Morocco
4	Sardines in hot olive oil - IZABEL	square	125 g	2,25	Spain
5	Sardines in spices soya oil -JOSIANE	square	125 g	2	Morocco
6	Sardines in olive oil	round	250 g	2,5	U.S.S.R.
7	Sardines in tomato sauce -MARSHALL's	square	198 g	3	U.K.
8	Sardines in tomato sauce -MARSHALL's	square	398 g	4	U.K.
9	Smoked sprats in oil	round	175 g	3,16	U.S.S.R.
10	Brisling sardine in olive oil	square	106 g	3,5	Denmark
11	Gild sardines in tomato sauce	square	106 g	2,5	Denmark
12	Gild sardines in tomato sauce-COMPASS	square	127 g	2,5	Denmark
13	Brisling sardines in curry sauce- COMPASS	square	106 g	3,25	Denmark
14	Sild sardines in sild oil	square	106 g	2,50	Denmark
15	Kippers in oil	square	200 g	8	Denmark
16	Mackerel in tomato sauce and chili- DELTAN	round	200 g	1,5	Romania
17	Mackerel in tomato sauce and chili - KING CUP	round	210 g	1,75	Japan
18	Mackerel fillets SEABELLE, NAGASE CUT, GEISHA	round	200 g	2,50	Japan
19	Light meat tuna in vegetable oil - GEISHA, SPRUCE BRAND	round	200 g	5	Japan
20	Light meat tuna GEISHA BRAND	round	100 g	2,25	Japan
21	Pike in tomato sauce	round	350 g	3,5	U.S.S.R.
22	Saury in oil SOCRA BRAND	round	200 g	2,5	U.S.S.R.
23	Saury in oil SOCRA BRAND	round	250 g	2,75	U.S.S.R.
24	Cod liver in oil SOCRA BRAND	round	230 g	3,25	U.S.S.R.
25	Cod roe - AMANDA BRAND	square	200 g	6	Denmark
26	Red Salmon - medium JOHN WEST BRAND	round	99 g	6	U.K.
27	Salmon - SAFCOL BRAND	round	227 g	2,5	Australia
28	Mussels in tomato sauce	square	115 g	3,5	Denmark
29	Smoked mussel	square	42 g	3,5	Denmark
30	Royal greenland shrimp	round in jar	120 g	10	Denmark
31	Anchovy fillets CRESCA BRAND	square	46 g	4	France
32	Anchovy fillets	square	50 g	3,5	Spain

Table 16

Ice Making Plants in Yemen Arab Republic

Name of Company	Location	Capacity t/24 h	Type of ice	Erected at	Price for 1 t of ice in Y.Rls.	Remarks
Ahmed Ali Magan and Sons	Hodeida	1 x 10 1 x 18 Total 28	Block 22/25 kg	1974 1975	160	Two other units of 5-10 tons daily capacity are ordered in Germany
Abdul Ali Mohammed and Sons	Hodeida 16 km	1 x 18 1 x 10 1 x 30 Total 58	Block 125 kg	1972 1973 1975	128 (Expected to soon be 144)	Company is planning to install one more plant of 30 t/24 h in 1977
Soviet Cold Store	Hodeida	1 x 20	Block 20 kg	1976	-	Not yet in operation, production will start at the end of 1976
Ice factory	Taizz	1 x 20	Block 150 kg	1972	133	One old plant of 5 t/24 h capacity in reconstruction
Total capacity per day at the end of 1976		126 tons				

Table 17

Distribution of Fish in the Tihamah Area

Auction market	Retail market	Road connection
Luhaiya and Khoba	Harad, Beni Marwan, Abs Hays, Al Zohrah, Al Zaidiyah, Hajjah, Wadi Mour, etc.	Paved road Hodeida-Harad-Jizan 190 km under study. Connection to Luhaiya and Khoba not yet determined.
Hodeida	Hodeida, Al Marawiah, Bajil, Khamis Beni Saad, Al Mansouriah, Bayt al Faqih, Zabid	Paved roads exist Hodeida - Sana'a 226 km Hodeida - "km 64" 190 km
Khawhah	Zabid, Vadi Zabid, Hays, Al Rown	Khawhah will be connected to road Hodeida - "km 64" by gravelled road which is under study
Mocha	Mawse'e, Al Mafraz	Mocha - 64 km, paved, under study

Table 18

Distribution of Fish in Highland of Yemen Arab Republic from Auction to Wholesale and Retail Market

Auction market on seaside	Wholesale and retail markets in highland	Road connection
Luhaiya and Khoba	Sada'a, Khamer, Hajjah, Amran, Al Mahwit	Luhaiya and Khoba to highway Hodeida-Harad-Jizan not yet determined Hodeida-Hara-Jizan paved 190 km in Yemen Arab Republic under study Harad-Huth paved 120 km under study Hajjah-highway (Hodeida-Jizan) not yet determined Khoba-highway (Hodeida-Jizan) Bajil-Al Mahwit partly paved, partly gravelled, one part not yet determined
	Al Mahwit, Manakhah, Sana'a, Marib, Dhamar, Al Bayda, Amran, Khamer, Huth, Sada'a	Hodeida - Al Mahwit paved 108 km (20 km gravelled, under study to be paved) Hodeida - Manakhah paved 108 km Hodeida - Sana'a paved 226 km Hodeida - Sana'a - Marib paved 399 km (173 km under construction) Hodeida - Sana'a - Dhamar - Rada'a - Al Bayda paved 483 km (158 km under construction Dhamar-Al Bayda
Mocha (including Bab al Mandab) Khawhah	Taizz, Atorbh, Ibb, Yarim, Dhamar, Rada'a, Al Bayda	Khawhah - Hays gravelled. 30 km under study Mocha - "63 km" paved, 45 km under study Mocha - Taizz paved 108 km (63 km under construction, 45 km under study)
		Mocha - Taizz - Ibb - Yarim - Dhamar paved 263 km (63 km under construction, 45 km under study Mocha - Dhamar - Al Bayda paved 421 km (221 km under construction, 45 km under study)

Table 19

Proposed New Ice-making Plant and Store for Ice

Location	Capacity of ice-making plant 5 t/24 h	Capacity of ice store in t	Remarks
Luhaiya	10	10	-
Khoba	10	10	Only if fresh water is available
Hodeida	10	10	Exist other 6 plants with about 100 tons capacity in 24 h
Khoba	10	10	
Mocha	10	10	
Taizz	5	10	Exists one ice-making plant with 20 tons capacity in 24 h
Atorbh	3	5	
Dhamar	3	5	
Sana'a	5	10	
Total capacity	66 t/24 h	80 t	

Table 20

Proposed New Chill Store for Fish at $-2^{o}C$

Location	Capacity in tons	Dimensions L x W x H in m	Surface in m^2
Al	10	7 x 5 x 3	35
Khoba	10	7 x 5 x 3	35
Hodeida	30	(7 x 7 x 3) x 2	98
Khoba	10	7 x 5 x 3	35
Mocha	10	7 x 5 x 3	35
Taizz	30	(7 x 7 x 3) x 2	98
Atorbh	10	7 x 5 x 3	35
Ibb	3	4 x 3 x 3	12
Yarim	3	4 x 3 x 3	12
Dhamar	10	7 x 5 x 3	35
Rada'a	2	3 x 3 x 3	9
Al Bayda	2	3 x 3 x 3	9
Sana'a	30	(7 x 7 x 3) x 2	98
Amran	2	3 x 3 x 3	9
Khamer	2	3 x 3 x 3	9
Hajjah	3	4 x 3 x 3	12
Al Mahwit	3	4 x 3 x 3	12
Total Capacity	170 tons		588 m^2

Table 21

Luhaiya Fish Market

Approximate Capital Cost	Y.Rls.
Buildings and Equipment	1 180 000
Transport Facilities	81 000
Fish Boxes	88 000
Designing and Engineering	134 900
Total	1 483 900

Marketing of Fish	
Total Landing	11 600 tons
Average price of fish bought:	Y.Rls. 2.6 per kg
Total value of fish bought:	1 400 000 x 2.6 = Y.Rls. 3 640 000
Average price of fish sold:	Y.Rls. 3.6 per kg
Total value of fish sold:	1 400 000 x 3.6 = Y.Rls. 5 040 000

Yearly Operation Budget	Y.Rls.	
	Credit	Debit
Total value of sold fish	5 040 000	
Total value of fish bought		3 640 000
Operation cost, transport and management		644 000
Interest on bank loan (12% first year)		178 000
Depreciation of capital cost (ten years)		148 000
	5 040 000	4 610 000
Profit		430 000

Table 22

Khoba Fish Market

Approximate Capital Cost		Y.Rls.
Building and equipment		1 390 000
Transport facilities		387 500
Fish boxes		422 600
Designing and engineering		220 000
	Total	2 420 100

Marketing of Fish

Total landing	6 700 tons
Auction market - fresh fish	2 300 tons
For processing	3 000 tons
Fish marketed in traditional condition	1 400 tons

Average price per kg: Y.Rls. 2.6

Total price of bought fish: 2 300 000 x 2.6 = Y.Rls. 5 980 000

Average price of fish sold: Y.Rls. 3.6/kg

Total value of sold fish: 2 300 000 x 3.6 = Y.Rls. 8 280 000

Yearly Operation Budget	Y.Rls.	
	Credit	Debit
Total value of sold fish	8 280 000	
Total value of fish bought		5 980 000
Operation cost, transport and management (only for fresh fish)		1 048 000
Interest on bank loan (12%) first year		290 000
Depreciation of capital cost (ten years)		242 000
	8 280 000	7 560 000
Profit		720 000

Table 23

Hodeida Fish Market

Approximate Capital Cost	Y.Rls.
Building and equipment (without processing plant)	2 939 000
Transport facilities	577 250
Fish boxes	621 000
Designing and engineering	413 800
Total	4 551 050

Marketing of Fish

Total landing in Hodeida area	10 000 tons/year
Auction market - fresh fish	6 000 tons/year
(Fish from neighbourhood parts and fish to be processed are not calculated)	
Average price of fish bought	Y.Rls. 2.6
Average price of sold fish	Y.Rls. 3.6
Total value of fish bought:	6 000 000 x 2.6 = Y.Rls. 15 600 000
Total value of fish sold:	6 000 000 x 3.6 = Y.Rls. 21 600 000

Yearly Operation Budget	Y.Rls. Credit	Debit
Total value of sold fish	21 600 000	
Total value of bought fish		15 600 000
Operation cost, transport, management		3 462 000
Interest on bank loan (12%) first year		546 222
Depreciation of capital cost (ten years)		455 185
	21 600 000	20 063 407
Profit		1 536 593

Table 24

Khawhah Fish Market

Approximate Capital Cost	Y.Rls.
Buildings and equipment	1 390 000
Transport facilities	167 062
Fish boxes	182 250
Design and engineering	173 931
Total	1 913 243

Marketing of Fish	
Total landing	1 700 tons/year
For fresh fish market	1 700 tons/year
Average price of bought fish	Y.Rls. 2.6/kg
Total value of fish bought:	1 700 000 x 2.6 = Y.Rls. 4 420 000
Average price of sold fish	Y.Rls. 3.6/kg
Total value of sold fish:	1 700 000 x 3.6 = Y.Rls. 6 120 000

Yearly Operation Budget	Y.Rls. Credit	Y.Rls. Debit
Total value of sold fish	6 120 000	
Total value of bought fish		4 420 000
Operational cost, transport, management		782 000
Interest on bank loan (12%) first year		229 589
Depreciation of capital cost (ten years)		191 324
	6 120 000	5 622 913
Profit		497 087

Table 25

Mocha Fish Market

Approximate Capital Cost		Y.Rls.
Buildings and equipment		1 350 000
Transport facilities		93 000
Fish boxes		101 000
Design and engineering		154 000
	Total	1 698 000

Marketing of Fish

Total landing 1 600 tons/year

For fresh fish market 1 600 tons/year

Average price of bought fish: Y.Rls. 2.6/kg

Total value of bought fish: 1 600 000 x 2.6 = Y.Rls. 4 160 000

Average price of sold fish: Y.Rls. 3.6/kg

Total value of sold fish: 1 600 000 x 3.6 = Y.Rls. 5 760 000

Yearly Operation Budget	Y.Rls. Credit	Debit
Total value of sold fish	5 760 000	
Total value of bought fish		4 160 000
Operational cost, transport, management		736 000
Interest on bank loan (12%) first year		203 760
Depreciation of capital cost (ten years)		169 800
	5 760 000	5 269 560
Profit		490 440

Table 26

Sana'a - Wholesale Fish Market

Approximate Capital Cost		Y.Rls.
Buildings and equipment		1 812 800
Transport facilities		358 900
Design and engineering		217 200
	Total	2 388 900

Marketing of Fish		
Total handling	2 000 tons/year	
Average price of bought fish:	Y.Rls. 3.6/kg	
Total value of bought fish:	2 000 000 x 3.6 = Y.Rls.	7 200 000
Average price of sold fish:	Y.Rls. 4.6/kg	
Total value of sold fish:	2 000 000 x 4.6 = Y.Rls.	9 200 000

Yearly Operation Budget	Y.Rls.	
	Credit	Debit
Total value of fish sold	9 200 000	
Total value of bought fish		7 200 000
Operational cost, transport, management		1 349 240
Interest on bank loan (12%) first year		286 700
Depreciation of capital cost (ten years)		238 890
	9 200 000	9 074 830
Profit		125 170

Table 27

Taizz - Wholesale Fish Market

Approximate Capital Cost		Y.Rls.
Buildings and equipment		1 650 800
Transport facilities		445 500
Design and engineering		209 600
	Total	2 305 900

Marketing of Fish	
Total handling	2 500 tons/year
Average price of bought fish	Y.Rls. 3.6/kg
Total value of fish bought:	2 500 000 x 3.6 = Y.Rls. 9 000 000
Average price of sold fish	Y.Rls. 4/6 kg
Total value of sold fish:	2 500 000 x 4.6 = Y.Rls.11 500 000

Yearly Operation Budget	Y.Rls. Credit	Y.Rls. Debit
Total value of sold fish	11 500 000	
Total value of bought fish		9 000 000
Operation cost, transport, management		1 682 670
Interest on bank loan (12%) first year		276 700
Depreciation of capital cost (ten years)		230 600
	11 500 000	11 190 060
Profit		309 940

Table 28

Atorbh - Wholesale and Retail Fish Market

Approximate Capital Cost	Y.Rls.
Buildings and equipment	1 479 000
Transport facilities	216 500
Design and engineering	169 500
Total	1 865 000

Marketing of Fish

Total handling 1 200 tons/year

Average value of fish: Y.Rls. 3.6/kg

Total value of bought fish: 1 200 000 x 3.6 = Y.Rls. 4 320 000

Average value of sold fish: Y.Rls. 5.05/kg

Total value of sold fish: 6 000 000 x 4.6 = 2 760 000

6 000 000 x 5.5 = 3 300 000

Y.Rls. = 6 060 000

Yearly Operation Budget	Y.Rls.	
	Credit	Debit
Total value of sold fish	6 060 000	
Total value of bought fish		4 320 000
Operational cost, transport, management		1 123 000
Interest on bank loan (12%) first year		223 800
Depreciation of capital cost (ten years)		186 500
	6 060 000	5 853 300
Profit		206 700

Table 29

Ibb - Retail Fish Market

Approximate Capital Cost	Y.Rls.
Buildings and equipment	818 000
Transport facilities - calculated in auction and wholesale markets	-
Design and engineering	81 800
Total	899 800

Marketing of Fish

Total handling 650 tons/year

Average value of bought fish: Y.Rls. 4.1/kg

Total value of bought fish: 650 000 x 4.1 = Y.Rls. 2 665 500

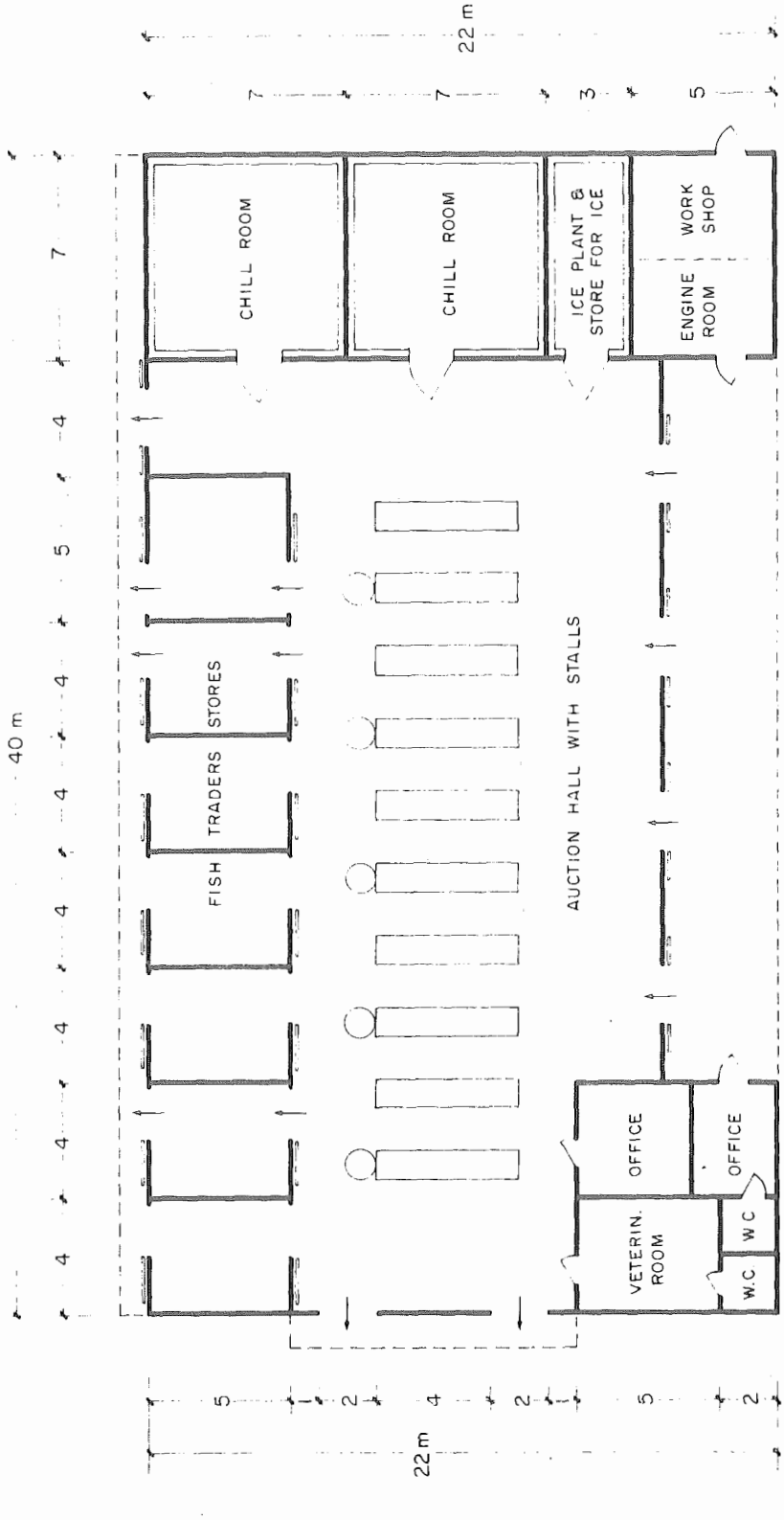
Average value of sold fish Y.Rls. 5.5/kg

Total value of sold fish: 650 000 x 5.5 = Y.Rls. 3 675 000

Yearly Operation Budget	Y.Rls.	
	Credit	Debit
Total value of sold fish	3 575 000	
Total value of bought fish		2 665 500
Operation cost, transport, management		475 500
Interest on bank loan (12%) first year		107 976
Depreciation of capital (ten years)		89 980
	3 575 000	3 338 956
Profit		236 044

FIGURE 1

GENERAL ARRANGEMENT FOR
HODEIDAH FISH AUCTION MARKET WITH CHILL ROOMS AND ICE PLANT

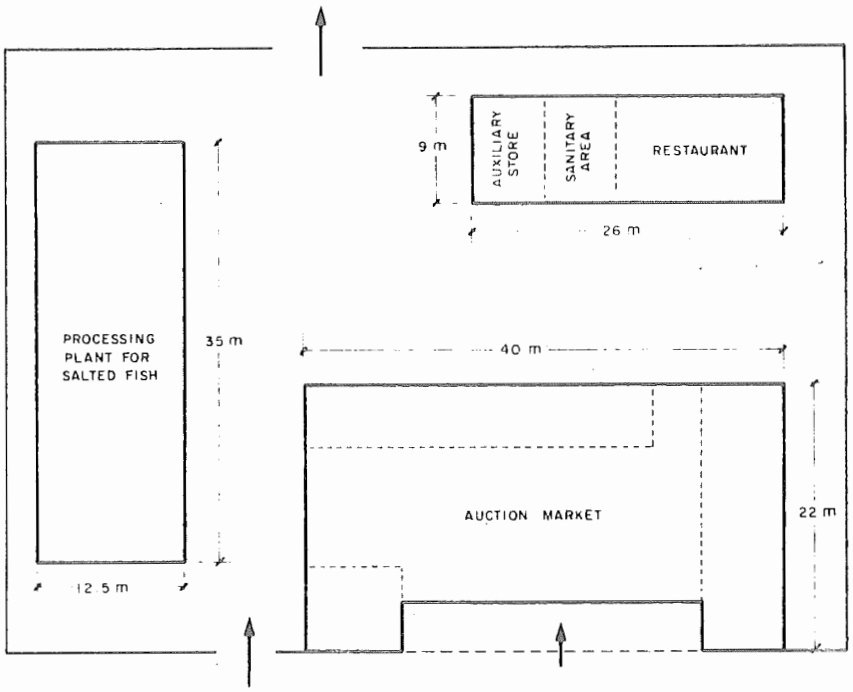


DESIGN V. Perović
DRAWN BY: M. Carlesi
ROME September 1976

SCALE 1: 200

FIGURE 2

LAYOUT OF HODEIDAH MARKETING AND PROCESSING CENTRE



SCALE 1: 500

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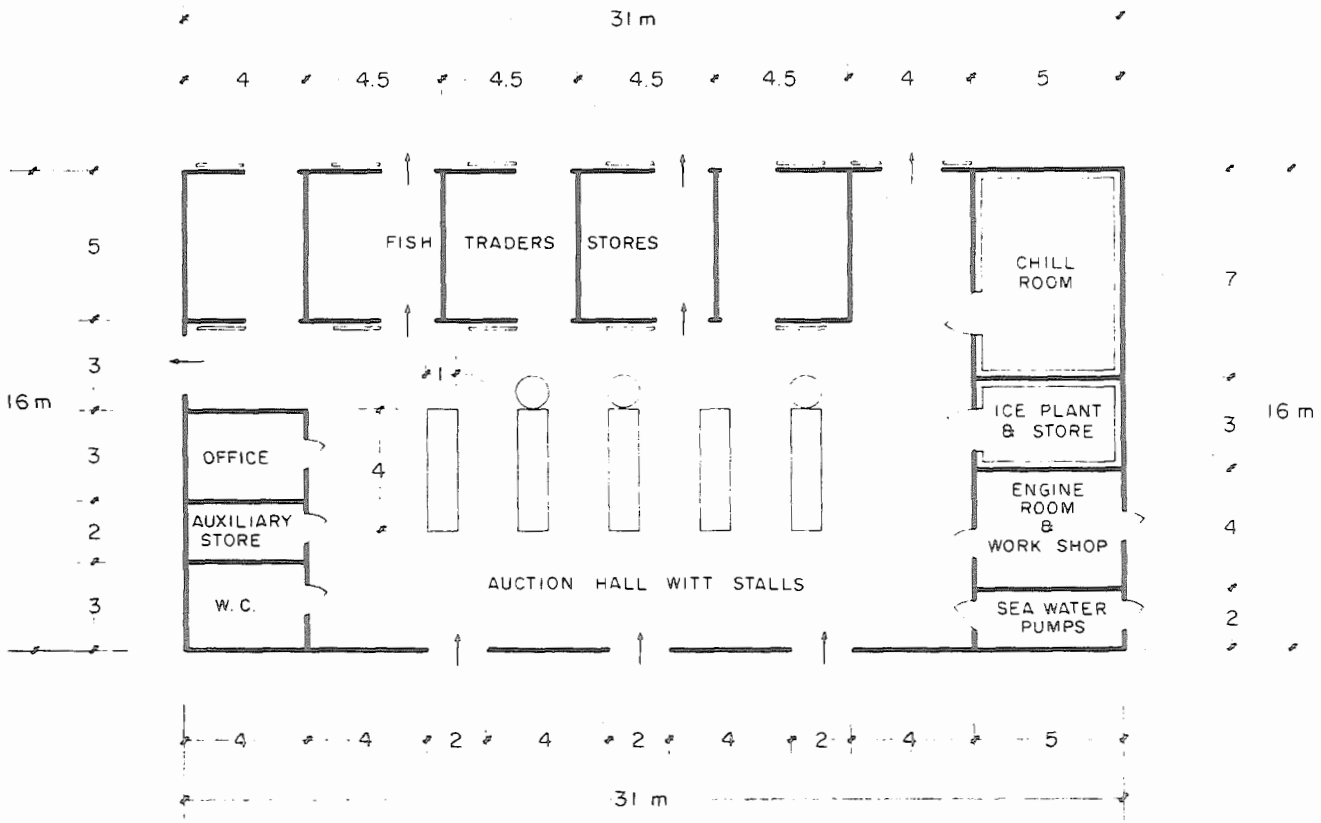
ROME September 1976

FIGURE 3

GENERAL ARRANGEMENT FOR AL LUHEH, AL KHOBA, AL KHOKHA AND AL MAKHA FISH AUCTION MARKET, CHILL ROOM AND ICE PLANT



SCALE 1: 200

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FIGURE 4

GENERAL ARRANGEMENT FOR SANA'A AND TAIZ WHOLESALE FISH MARKET, CHILL ROOMS AND ICE PLANT

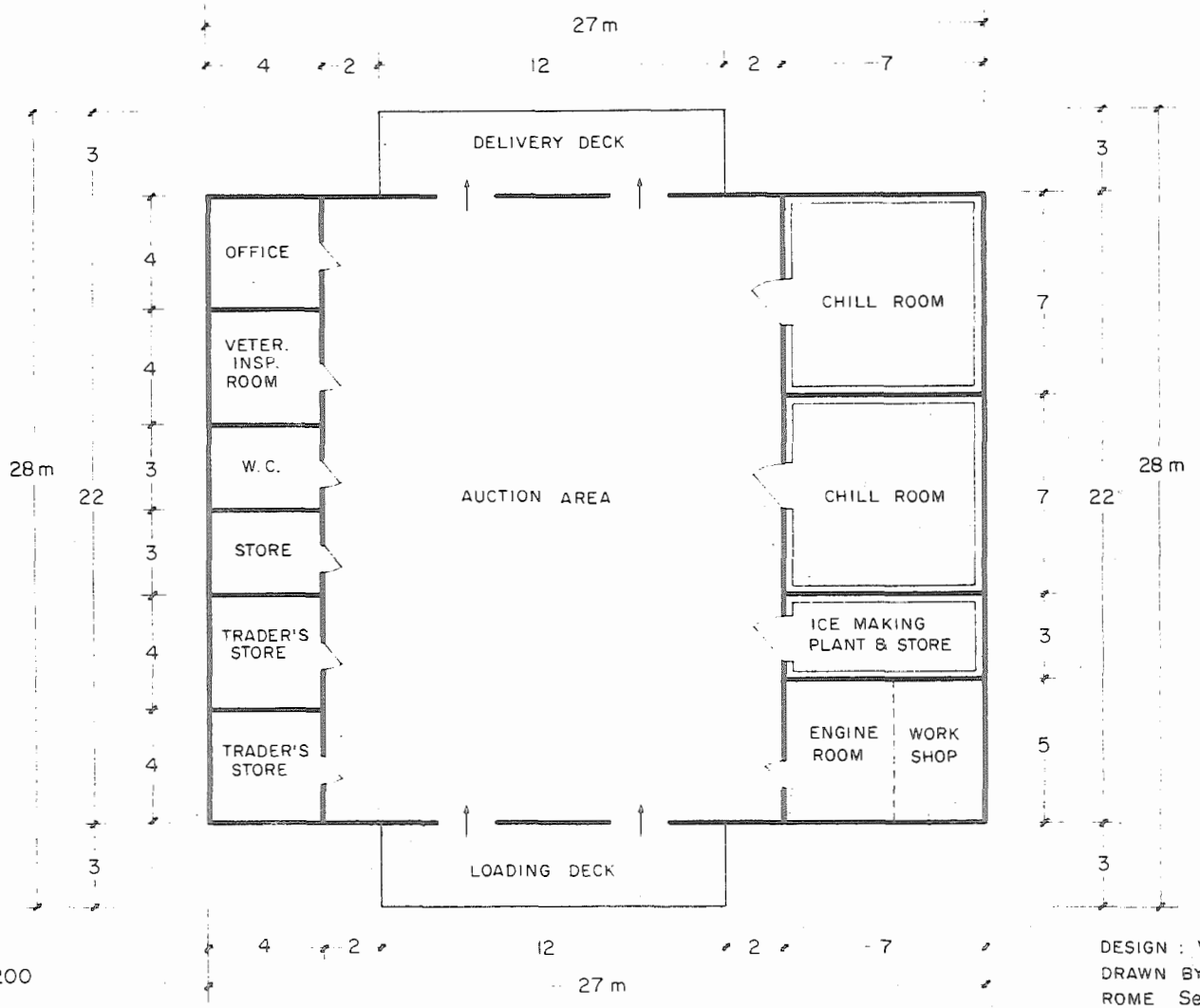

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FIGURE 5

GENERAL ARRANGEMENT FOR ATORBH AND DHAMAR WHOLESALE AND RETAIL FISH MARKET, CHILL ROOM AND ICE PLANT

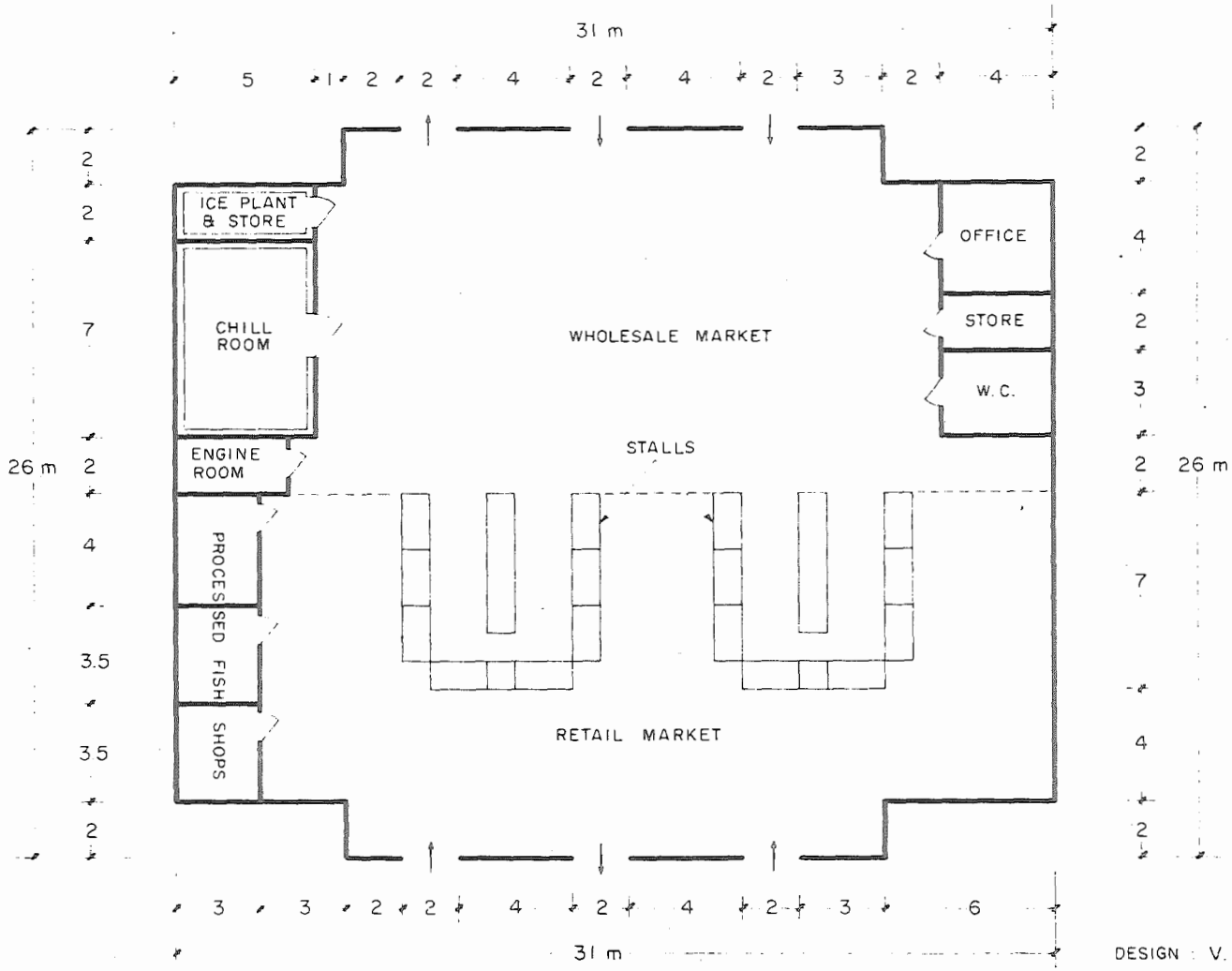

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FIGURE 6

GENERAL ARRANGEMENT FOR
RADA'A, KHAMER, MERRIB, AL BEIDHA AND AMRAN, RETAIL FISH MARKET, CHILL ROOM, ICE PLANT

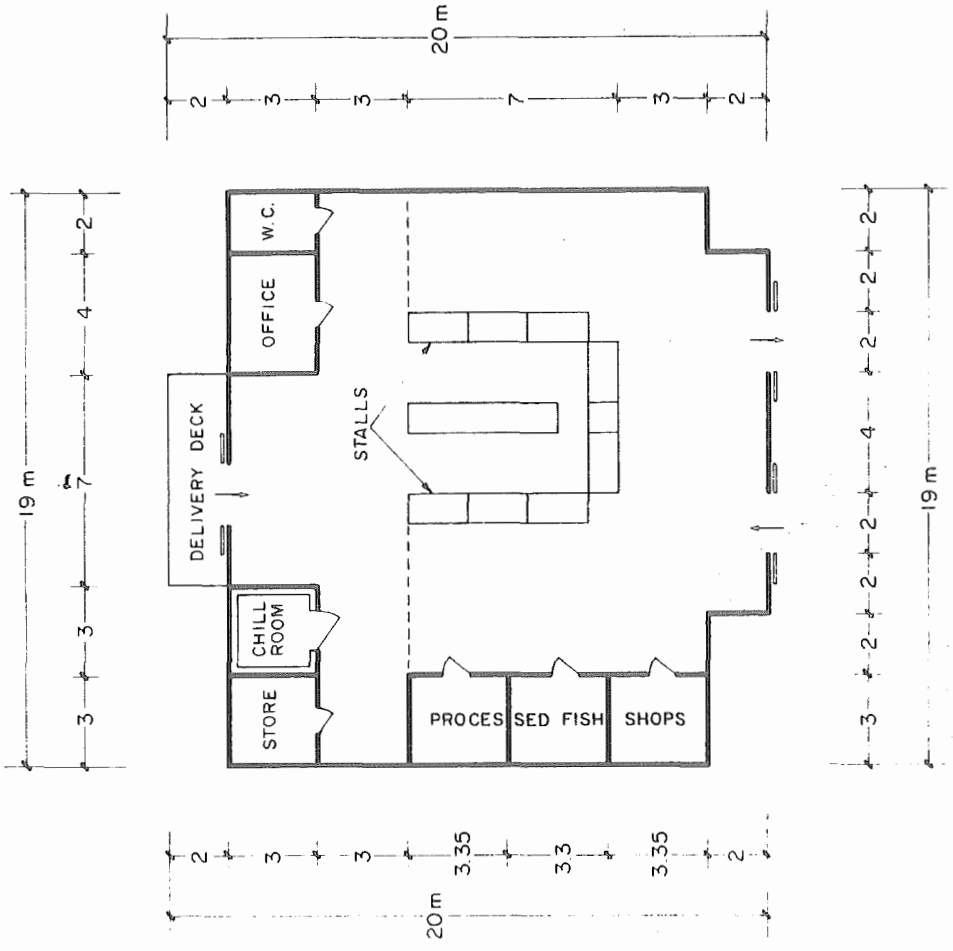

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FIGURE 7

GENERAL ARRANGEMENT FOR
SANA'A, IBB, YARIM, HAJJAH, AND AL MAHWIT, RETAIL FISH MARKET, CHILL ROOM, ICE PLANT

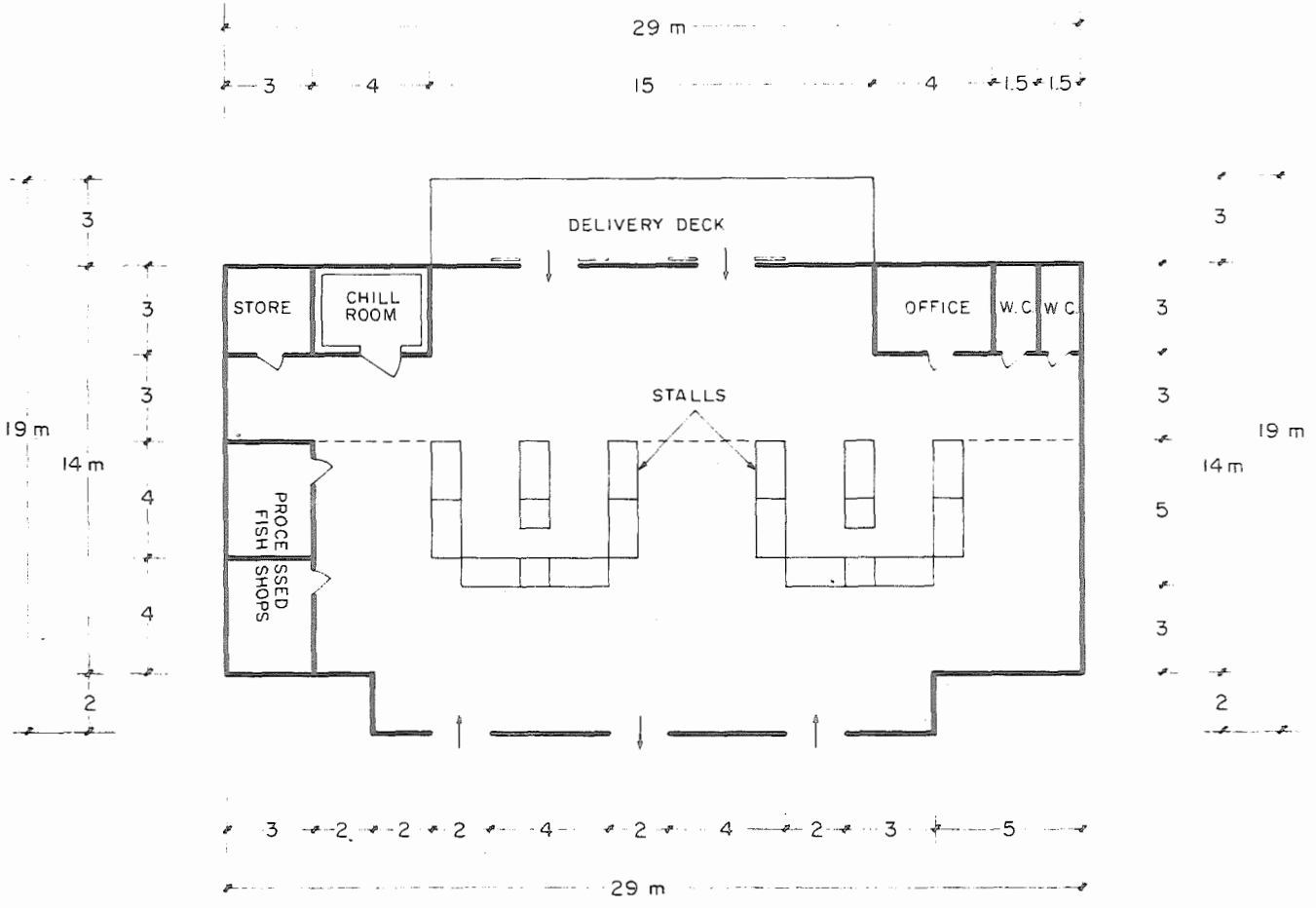

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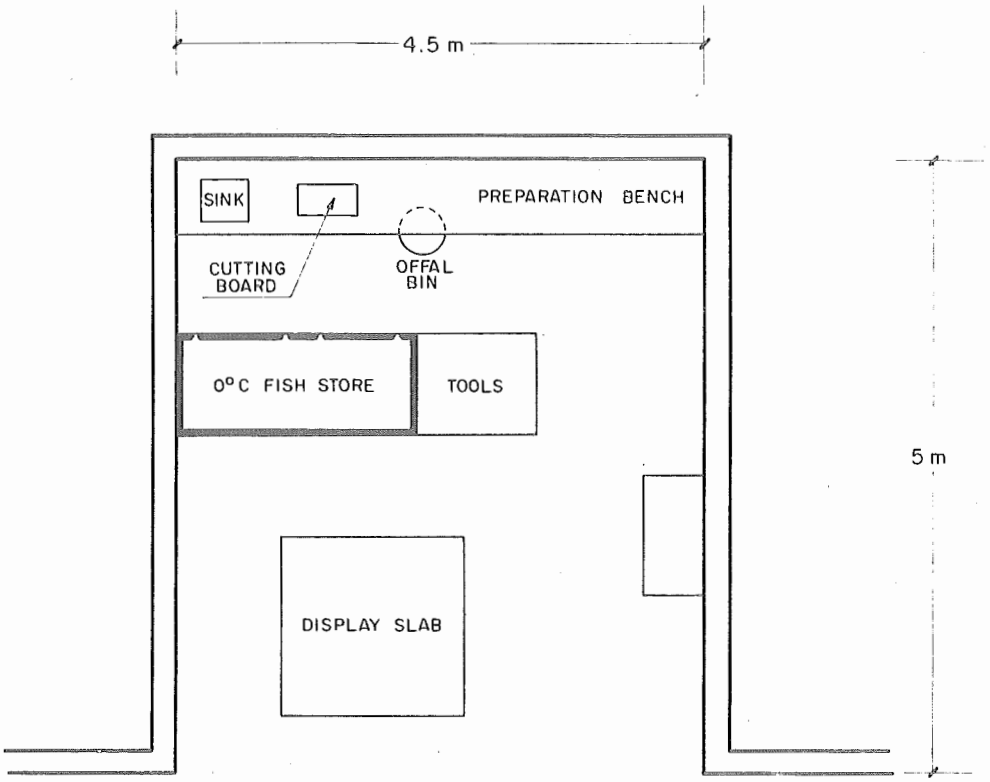
FIGURE 8

LAYOUT OF A SMALL SIZE FRESH FISH RETAIL SHOP FOR TAIZ, SANA'A, MARIB AND SADA'A



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